Civil Air Navigation Service Organisation
Air Traffic Flow Management
Data Exchange Network for the Americas

CADENA

Air Traffic Flow Management

and

Collaborative Decision Making

Procedures Manual

November 30, 2020

Version 5.3

Document Change Control Sheet

Date	Version	Author	Revision Description
07 13 2017	V1.0	CADENA	Original version
01 31 2018	V2.0	CADENA	Updated Section 2.2.3, Flow Management Unit (FMU) Manager/Chief responsibilities. Updated Section 2.3.3, Traffic Management Officer (TMO)/Supervisor responsibilities. Updated Section 2.4.3, Traffic Management Coordinator responsibilities. Added Section 6.1, "CADENA Operational Information System Web Page." Added APPENDIX A, "Sample ANSP Slides."
10 31 2018	V3.0	CADENA	Changed the word "member" to the word "participant" throughout the document to reflect that CADENA is open to all participants and is not limited to CANSO members. Changed the title of Chapter 3 to, "CADENA Weekly Planning Web Conference." Input a new Chapter 4, "CADENA Hurricane / Tropical Storm Planning Web Conferences" with the associated Host and participating FMU responsibilities. Input a new Chapter 5, "CADENA Ad Hoc Web Conference" with the associated Host and participating FMU responsibilities. "Host Backup" is now Chapter 6. "Stakeholder Roles and Responsibilities" is now Chapter 7. "CADENA ATFM/CDM Planning Web Conference Format" is now Chapter 8. "ANSP ATFM Daily Plan" is now Chapter 9. "CADENA Traffic Management Measures" is now Chapter 10. "CADENA Traffic Management Tools" is now Chapter 11. APPENDIX A: "SAMPLE ANSP SLIDES" was reduced from 4 slides to 3 slides.
04 15 2019	V4.0	CADENA	Updated the ANSP briefing order for the Weekly CADENA Planning Web Conference. Added a new Chapter 12, "Collaborative Decision Making and CADENA." Added a new Chapter 13, "CADENA and Contingency Planning." Added a new Appendix B, "Contingency Events and Checklists."
10 31 2019	V5.0	CADENA	Updated Section 2.4, "Traffic Management Coordinator" to reflect new recommended experience. Added Section 2.5, "Weather / Meteorological Coordinator." Updated Section 3.2, "Weekly Planning Web Conferences" to reflect the new 2-slide format and to reflect that the order of briefing will be reviewed annually. Updated Section 3.3, "CADENA Hurricane/Tropical Storm Planning Web Conferences" to reflect the new slide format. Updated Section 4.2, Regional TMM," to include cross-border Letters of Agreement.

			Updated Section 5.1, CADENA Operational Information System Web Page to include the main capabilities of the web page. Added Chapter 6, “CADENA and Contingency Planning.” Added Chapter 7, “CADENA Key Performance Indicators.” Added APPENDIX C, “CADENA ATFM/CDM Planning Web Conference Format.” Added APPENDIX D, “Contingency Events and Checklists.” Added APPENDIX E, “Addendum to the Letter of Agreement.”
06 30 2020	V5.1	CADENA	Added Section 6.3 to cover the coordination and application of the Planned Airway System Alternatives (PASA) contingency routes. Added Section 6.4 to cover the use of the CADENA Contingency Form. Added Chapter 8, “Space Launch and Recovery.” Added checklist item 14, “Off-Nominal (Unusual) Event” to APPENDIX D.
10 31 2020	V5.2	CADENA	Added Section 5.1.6 to cover Delay Information. Added Section 5.1.7 to cover ADP Link Files information. Added Section 5.1.8 to cover new User Settings to enable the receipt of email push notifications. Added information in Section 8.2 to define ANSP responsibilities for adding an Urgent Advisory prior to activation of an Aircraft Hazard Area.
11 30 2020	V5.3	CADENA	Added Chapter 9 to establish the CADENA procedures for End-to-End route optimization.

Acknowledgements

The "*Civil Air Navigation Service Organisation Air Traffic Flow Management Data Exchange Network for the Americas (CADENA), Air Traffic Flow Management (ATFM) and Collaborative Decision Making (CDM) Procedures Manual"* was produced by the CADENA Regional Implementation Group (RIG). This organisation provides this document as a guide to establishing a standardised and harmonised ATFM/CDM structure.

CANSO would like to thank the following contributors to this manual who have provided material to the benefit of all CANSO Members and States looking to implement or improve their Air Traffic Flow Management (ATFM) based on collaborative decision-making (CDM) principles.

EANA (Argentina)

DECEA/CGNA (Brasil)

DC-ANSP (Curaçao)

IDAC (Dominican Republic)

TTCAA (Trinidad and Tobago)

FAA (USA)

JCAA (Jamaica)

ECNA (Cuba)

SENEAM (México)

COCESNA (Central America)

CANSO would especially like to thank the below Members who worked tirelessly and contributed countless hours to ensure that this document came to fruition.

Roosevelt Peña, IDAC; Nicholas Borovich, EANA; Marcela Ponds, EANA; Deano Ledford, JCAA; Curtis Fraser, TTCAA; Roberto Prado, SENEAM; Midori Tanino, FAA; Joe Hof, CGH; Kapri Kupper, Metron; Lobo Junior, DECEA; Curt Francesca, DC-ANSP; Fernando Soto, COCESNA; Ricardo Martinez, ECNA.

Contents

Introduction 8

1 Collaborative Decision Making 9

1.1 Background 9

1.2 CDM and CADENA 9

1.3 Benefits 9

2 CADENA ATFM Roles and Responsibilities 10

2.1 Recommended CADENA ATFM Unit Structure 10

2.2 Flow Management Unit (FMU) Manager/Chief 11

2.2.1 Job Nature and Mission 11

2.2.2 Organisational Location and Direct Report 11

2.2.3 Responsibilities 11

2.2.4 Experience 12

2.3 Traffic Management Officer (TMO)/Supervisor 12

2.3.1 Job Nature and Mission 12

2.3.2 Location and Direct Report 12

2.3.3 Responsibilities 13

2.3.4 Experience 13

2.4 Traffic Management Coordinator 13

2.4.1 Job Nature and Mission 13

2.4.2 Location and Direct Report 13

2.4.3 Responsibilities 13

2.4.4 Experience 14

2.5 Weather / Meteorological Coordinator 15

2.5.1 Job Nature and Mission 15

2.5.2 Location and Direct Report 15

2.5.3 Responsibilities 15

2.5.4 Experience 15

3 CADENA Web Conferences and Communication 16

3.1 Overview 16

3.2 Weekly Planning Web Conferences 16

3.2.1 Attendance 16
3.2.2 Hosting 16
3.2.3 Responsibilities 17
3.2.3.1 Host: Pre-conference responsibilities 17
3.2.3.2 Host: Web conference responsibilities 18
3.2.3.3 Host: Post-conference responsibilities 18
3.2.3.4 Participating FMU: Pre-conference responsibilities 19
3.2.3.5 Participating FMU: Web conference responsibilities 20
3.2.3.6 Participating FMU: Post-conference responsibilities 20
3.2.3.7 Stakeholder Roles and Responsibilities 20
3.3 CADENA Hurricane / Tropical Storm Web Conferences 20
3.3.1 Responsibilities 21
3.3.1.1 Host: Pre-conference responsibilities 21
3.3.1.2 Host: Web conferences responsibilities 22
3.3.1.3 Host: Post-conference responsibilities 22
3.3.1.4 Participating FMU: Pre-conference responsibilities 22
3.3.1.5 Participating FMU: Web conference responsibilities 23
3.3.1.6 Participating FMU: Post-conference responsibilities 23
3.4 CADENA Ad Hoc Web Conferences 23
3.4.1 Responsibilities 23
3.4.1.1 Host: Pre-conference responsibilities 23
3.4.1.2 Host: Web conference responsibilities 23
3.4.1.3 Host: Post-conference responsibilities 24
3.4.1.4 Participating FMUs: Pre-conference responsibilities 24
3.4.1.5 Participating FMUs: Web conference responsibilities 24
3.4.1.6 Participating FMUs: Post-conference responsibilities 24
4 CADENA Traffic Management Measures 24
4.1 Overview 24
4.2 Types of Traffic Management Measures 25
4.3 Demand versus Capacity 25
4.4 Plan, Coordinate, Communicate, Implement, and Document 26

4.5 Monitor 27
4.6 Modify 27
4.7 Cancel and Exit 27
5 CADENA Traffic Management Tools 27
5.1 CADENA Operational Information System Web Page 27
5.1.1 CADENA OIS HOMEPAGE 28
5.1.2 Regional TMM 29
5.1.3 Active Reroutes 30
5.1.4 Advisories 30
5.1.5 ATFM Daily Plan (ADP) 30
5.1.6 Delay Information 31
5.1.7 ADP Link Files 31
5.1.8 Settings Information 31
5.2 CADENA Traffic Management Measure Log 32
6 CADENA and Contingency Planning 32
6.1 Background 32
6.2 Disruptions to Air Traffic Operations 32
6.3 Planned Airway System Alternatives (PASA) Contingency Routes 33
6.4 CADENA Contingency Form 35
7 CADENA Key Performance Indicators 37
7.1 Background 37
7.2 KPIs for CADENA ANSPs 37
8 Space Launch and Recovery 40
8.1 Background 40
8.2 Procedures 40
9 End-to-End Route Optimization 41
9.1 Background 41
9.2 Procedures 41
APPENDIX A: SAMPLE WEEKLY PLANNING WEB CONFERENCE SLIDES 42
APPENDIX B: SAMPLE HURRICANE / TROPICAL STORM WEB CONFERENCE SLIDES 43
APPENDIX C: CADENA ATFM/CDM PLANNING WEB CONFERENCE FORMAT 44

APPENDIX D: CONTINGENCY EVENTS AND CHECKLISTS 46

APPENDIX E: ADDENDUM TO THE LETTER OF AGREEMENT 51

ACRONYMS 55

Introduction

The Civil Air Navigation Service Organisation (CANSO) Air Traffic Flow Management Data Exchange Network for the Americas (CADENA) was established on June 23, 2016.

The CADENA initiative offers a regional, cross-border air traffic management (ATM) communications protocol and a seamless operational atmosphere that incorporates best operational procedures and practices. It contributes to the safety, environmental sustainability, efficiency, and cost-effectiveness of an ATM system.

Implementing regional, networked air traffic flow management (ATFM) requires the establishment of collaborative decision making (CDM) practices among CADENA participating Air Navigation Service Providers (ANSPs) and regional and international stakeholders. These practices are inclusive and transparent, and provide the opportunity for exchanging operational information to facilitate a shared situational awareness and promote sound strategic and tactical planning in a CDM environment of multilateral decision-making.

There are many essential components for successful implementation of ATFM capabilities and CDM processes in the region, and sharing information among stakeholders is primary. ATFM and CDM do not necessarily mandate agreed tools and technology, but they do require common situational awareness through timely communication, collaboration, and coordination with air navigation service providers (ANSPs), airspace users, and system stakeholders on operational information. The CADENA initiative is structured on a plan, execute, review, train, and improve (PERTI) process. This approach will enable the region's ANSPs and stakeholders to progress strategic planning and improve performance of daily traffic flow management.

CADENA offers each participant the opportunity to participate and play a central role in improving the safety, efficiency, cost effectiveness and environmental sustainability of ATFM and CDM in the Latin American and Caribbean Regions. CADENA participants lead by example, determine best practices, and ultimately decide how they want to shape the future of regional air traffic management, all in concert with ICAO Doc 9971, *Manual on Collaborative Air Traffic Flow Management*.

The *CADENA Air Traffic Flow Management and Collaborative Decision Making Procedures Manual* is an important step in implementing standardised and harmonised ATFM/CDM procedures in the Latin American and Caribbean Regions. CADENA participants have agreed to follow the procedures set forth in this document, which is intended to enhance CDM and ATFM implementation in the Latin American and Caribbean Regions. It is meant to complement, but not necessarily replace, other agreements or procedures that CADENA organisations are following to implement ATFM.

1 Collaborative Decision Making

1.1 Background

Collaborative Decision Making (CDM) is a well-established component of improving the operational efficiency of air transportation. Through the sharing of data, information and tools, ANSPs, aircraft operators and airport operators work together to identify solutions to issues that reflect the inputs and preferences of all parties. CDM is much more than a program – it is an operating philosophy on how to conduct day-to-day air traffic management for ANSPs and stakeholders alike.

1.2 CDM and CADENA

In the operational context of CADENA, CDM is comprised of representatives from ANSPs, airlines, airports, military, and organisations (e.g., ICAO, IATA, ACI) who work together to develop and implement procedural and technological solutions to solve the complex ATFM challenges faced by the regional airspace system in the Caribbean and Latin America. CDM in the CAR/SAM Regions is a harmonised approach that allows ANSPs and stakeholders to meet regularly, learn from each other, share operational information and operating preferences, build a common understanding, establish procedures, develop tools, and thus achieve greater aviation system efficiency.

To share operational information, CADENA uses web conference technology and has developed the CADENA Operational Information System (CADENA OIS) web page. On a daily basis, participating CADENA ANSPs utilise the CADENA OIS to input their ATFM Daily Plan and make the stakeholders aware of their current operational situation. Every week, CADENA hosts the CADENA Planning Web Conference which allows stakeholders from the CAR/SAM Regions to meet via webex, discuss the operational outlook for each weekend, discuss potential traffic management measures, and develop a collaborative Regional Operations Plan. And when the need arises, CADENA schedules and hosts CDM web conferences on an ad hoc basis to address significant operational constraints in the CAR/SAM airspace system. These ad hoc web conferences are convened at stakeholder requests to address topics such as the impact of tropical storms, volcanic ash, work stoppages, staffing shortages, etc.

1.3 Benefits

Through the sharing of information on the CADENA OIS and the various web conferences that CADENA hosts, stakeholders have been able to benefit from tangible and measurable operational cost savings. Examples include:

- Reduced airborne holding at boundary points between neighboring flight information regions (FIR) due to the availability of flight plan data, better planning, and increased situational awareness.
- More accurate Traffic Management Measures (TMMs) due to improved view of demand and capacity predictions.
- Reduced departure delays during a long-term outage of a major ACC in the region due to options developed during CADENA CDM web conferences.
- Fuel savings due to the communication of new, shorter routes available in the region between key city pairs.

- Rapid communication of the impact of volcanic ash events.
- Managed impact of major hurricane events by being able to:
  - Participate in daily CADENA Hurricane Web Conferences
  - Plan for the event and for post-event recovery
  - Have direct contact with impacted ACCs
  - Safely manage a neighboring ACC's traffic when they lost their frequencies
  - Implement timely and appropriate TMMs
  - Communicate with stakeholders and keep them informed
  - Reroute aircraft in collaboration with airspace users
  - Maintain situational awareness
  - Keep top management briefed and informed

2 CADENA ATFM Roles and Responsibilities

Each participating CADENA ANSP should design its ATFM organisational structure according to its needs, but at a minimum it should allow for the administration of air traffic flow management, the proper and timely exchange of information with air traffic facilities and aviation stakeholders, and have a clear line of decision authority.

2.1 Recommended CADENA ATFM Unit Structure

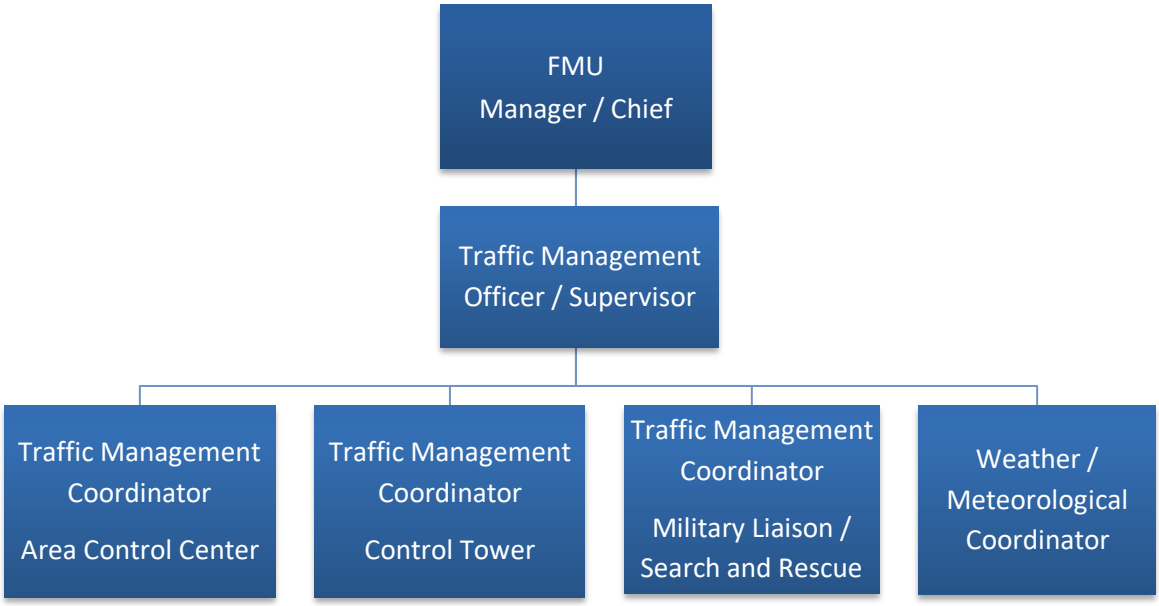


Figure 1. Recommended CADENA ATFM Unit Structure

Due to the fundamental duties and necessary and beneficial internal and external communication requirements, it is highly recommended that FMU personnel have held, or hold, an air traffic controller (ATCO) license with one of the following ratings: aerodrome, radar or non-radar approach, or radar or

non-radar area. Additionally, all FMU personnel, regardless of position or duties, should be knowledgeable of technical language for radio communications, fixed communications networks and aeronautical information management systems; have English language, ICAO proficiency Level 5, as minimum; have basic knowledge of computer browsers and software packages (word processing, spreadsheet applications, etc.) and internet usage proficiency; and demonstrate and maintain a collaborative approach to working with internal and external stakeholders.

2.2 Flow Management Unit (FMU) Manager/Chief

2.2.1 Job Nature and Mission

The FMU Manager/Chief is responsible for the planning, execution, and management of functions related to the operational activities in the FMU. The Manager/Chief ensures that efficient and effective traffic management is applied within the geographic area of responsibility. The Manager/Chief maintains an understanding of the technical aspects of the FMU and effectively manages human resources.

2.2.2 Organisational Location and Direct Report

- FMU Location: area control center (ACC).
- FMU Manager/Chief reports directly to: Air Traffic Services (ATS) Manager.
- Supervises directly: Traffic Management Officer (TMO)/Supervisor.

NOTE: *The office of the ATS Manager may also carry out the functions of FMU Manager/Chief. ANSPs may designate the responsibilities pertinent to their operation and name the positions to meet their operational structure.*

2.2.3 Responsibilities

The FMU Manager/Chief collaborates and communicates with operational stakeholders and ensures that the FMU staff maintains an effective and collaborative liaison with internal and external organisations.

Internal organisations can include, but are not limited to:

- ACC staff.
- Underlying terminal management areas (TMAs).
- Airport traffic control towers (ATCTs).
- Communications, navigation, surveillance (CNS)/technical operations staff.
- Search and Rescue (SAR) Office.
- Airport Reservation Office (ARO).
- Aeronautical Information Management (AIM) Office.

External organisations can include, but are not limited to:

- Adjacent ACCs and FMUs.
- Stakeholders: airlines, general aviation, military, airport authorities.
- Government agencies.
- Meteorological organisations.

The FMU Manager/Chief ensures the FMU staff:

- Monitors and assesses air traffic demand and capacity.
- Monitors air traffic flows.
- Maintains awareness of conditions that impact demand and capacity.
- Delivers information to adjacent ANSPs and stakeholders regarding the status of the infrastructure of air navigation services. For example, NAVAIDS, airports, facilities, etc.
- Updates and ensures the currency and accuracy of the information on the CADENA OIS web page.
- Prepares, delivers and briefs on reports and ATFM Daily Plan (ADP) to adjacent ANSPs and stakeholders concerning the capacity and demand of air traffic control (ATC) sectors, airport acceptance rates (AAR), and airport departure rates (ADR).
- Appropriately plans, coordinates, documents, implements, monitors, revises, and cancels traffic management measures (TMMs).
- Maintains an awareness of activities in special use airspace.
- Coordinates and relays information related to NOTAMs.

2.2.4 Experience

It is recommended that the FMU Manager/Chief have a minimum of two years of experience as an Air Traffic Management Officer (TMO)/Supervisor.

2.3 Traffic Management Officer (TMO)/Supervisor

2.3.1 Job Nature and Mission

The TMO serves as supervisor on-duty for traffic management coordinators (TMCs) in an FMU. He / she ensures that the TMCs implement efficient, effective, and timely traffic management measures within the geographic area of responsibility. He / she demonstrates a collaborative approach with neighboring FIRs and stakeholders.

NOTE: *In a small facility, this position can be performed by the FMU Manager/Chief.*

2.3.2 Location and Direct Report

- FMU Location: Normally located within the ACC or air traffic control facility/unit
- FMU TMO/Supervisor reports directly to: FMU Manager/Chief
- Supervises directly: Traffic Management Coordinators

2.3.3 Responsibilities

- Provides supervision to a staff of TMCs.
- Ensures that traffic management measures are initiated and coordinated in accordance with established procedures to maintain a safe and expeditious flow of traffic to balance available capacity with demand.
- Provides training, coaching and guidance to subordinates and facilitates team building throughout area(s) of responsibilities.
- Assigns and reviews work.
- Plans work and sets priorities and schedules.
- Approves leave.
- Prepares schedules for completion of work.
- Evaluates work performance of subordinates, ensuring equity of performance standards and ratings.

2.3.4 Experience

It is recommended that the TMO/Supervisor have a minimum of two years of experience as a TMC.

2.4 Traffic Management Coordinator

2.4.1 Job Nature and Mission

The TMC performs a technical level of responsibilities of considerable difficulty. He / she is responsible for conducting the ATFM activities within the respective FIR or ANSP.

2.4.2 Location and Direct Report

- FMU Location: ACC/ATC facility/ATCT
- FMU TMC reports directly to: FMU TMO/Supervisor

2.4.3 Responsibilities

- Assesses the facility's capacity and projects an acceptable level of traffic.
- Constantly monitors the flow of air traffic, the state of the infrastructure of air navigation services, the conditions of underlying airports, the current and forecasted weather conditions, and the projected air traffic demand to ensure acceptable levels of traffic are maintained.
- Enters the ADP for their ANSP into the CADENA OIS and makes amendments as need and appropriate. The ADP shall be entered and submitted to the CADENA OIS no later than 1600 UTC (1500 UTC during U.S. daylight savings time) each day. As developments occur that cause changes to the plan, modify the ADP as appropriate.
- This information shall include:
    - Anticipated demand.

- TMMs planned.
- Weather.
- Constraints.
- Special events.
- Equipment outages.
- Volcanic ash.
- Other.

NOTE: *The ADP will remain available on the CADENA OIS until 0600 UTC the following day when it will be archived for one year for quality assurance review purposes.*

- Monitors weather conditions and collaborates with stakeholders to avoid flight routes into undesirable weather conditions.
- Ensures that information in the CADENA OIS TMM Log and the ADP are accurate, complete and current. This will provide the stakeholders with timely and efficient access to applicable ATFM information.
- Uses equipment and tools suitable for balancing air traffic demand and capacity in ATC sectors and at applicable underlying airports.
- Plans, coordinates, implements, and modifies traffic management measures to balance demand and capacity in ATC sectors and at applicable airports.
- Implements the least restrictive TMM possible to achieve desired results.
- Cancels TMMs in timely manner to avoid unnecessary delays and restrictions.
- Ensures that the TMMs are applied in accordance with the established procedures to maintain a safe, orderly and expeditious flow of air traffic, in order to minimise the impact of high demand periods.
- When air traffic delays are anticipated or known to exist, he / she plans, coordinates, and takes appropriate actions to communicate and minimise delays, as able.
- Coordinates directly with adjacent ACC FMUs and other organisations, including international organisations, and stakeholders as required.
- When assigned, serves as a military liaison and coordinates with the military regarding exercises and activities within the designated ANSP airspace.
- Serves as a search and rescue coordinator, as assigned.

2.4.4 Experience

It is recommended that TMCs have a minimum of two years of experience as an ATCO for aerodrome, radar or non-radar approach, or radar or non-radar area.

2.5 Weather / Meteorological Coordinator

2.5.1 Job Nature and Mission

The Weather / Meteorological Coordinator is responsible for providing weather information to the TMCs in regard to ATFM activities within the respective FIR or ANSP.

2.5.2 Location and Direct Report

- FMU Location: ACC/ATC facility
- FMU TMC reports directly to: FMU TMO/Supervisor

2.5.3 Responsibilities

- Constantly monitors the current and forecast weather conditions for the enroute portion of the FIR, underlying TMAs, and underlying airports.
- Maintains awareness of the forecast conditions in the CAR/SAM Regions with regard to:
  - Hurricanes
  - Tropical storms
  - Volcanic ash
- Monitors weather conditions and collaborates with TMCs and stakeholders, as needed, to avoid flight routes into undesirable weather conditions.
- Ensures that the weather information in the CADENA OIS ADP are accurate, complete and current.
- Uses equipment and tools suitable for and forecasting weather conditions.
- Collaborates with the TMC in the planning and coordination of traffic management measures to balance demand and capacity in ATC sectors and at applicable airports.
- Collaborates in the cancellation of TMMs in timely manner to avoid unnecessary delays and restrictions.
- When air traffic delays are anticipated or known to exist, he / she collaborates in the planning and coordination of plans to minimise delays.
- Coordinates directly with adjacent ACC FMU weather / meteorological units and other organisations, including international organisations, and stakeholders as required.

2.5.4 Experience

It is recommended that a Weather / Meteorological have a minimum of two years of experience as a meteorologist in the aviation community

3 CADENA Web Conferences and Communication

3.1 Overview

In December 2016, CADENA launched the weekly ATFM Planning Web Conference that allows the exchange of operational information and keeps participating ANSPs and stakeholders informed on the expected constraints, demand, traffic management initiatives and special activity. These web conferences have broadened the scope of ATFM conversation, participation, and collaboration. It has moved operational planning from a single ANSP perspective to a regional perspective. The improved inter-ANSP and stakeholder communication has enhanced regional aviation system predictability, operational safety, and efficiency.

The web conference allows all concerned stakeholders the opportunity to participate and provide input to the strategic plan and provides operators a forum to inform of any deviation in the number of operations for planning purposes.

The output of the CADENA Planning Web Conference is the Regional Operations Plan (ROP). The ROP is a collaboratively developed plan derived by the CADENA operational team and associated stakeholders. It outlines anticipated demand, weather, volcanic ash, constraints, traffic management measures, equipment outages, and special events. It establishes the ATFM pre-tactical structure and responsibilities for managing the day's air traffic operations in the Latin American and Caribbean Region.

Participating CADENA ANSPs rotate the responsibility for hosting the CADENA Planning Web Conference among CADENA participants. The Host follows a standardised format to ensure consistency and quality See APPENDIX C: CADENA ATFM/CDM PLANNING WEB CONFERENCE FORMAT. The goal is to keep the planning conference to no more than thirty minutes in duration. However, it is understood that special situations, such as hurricanes or other significant events may necessarily prolong the conference.

The CADENA Planning Web Conference is held each Thursday at 1500 UTC (1400 UTC during U.S. daylight savings time).

3.2 Weekly Planning Web Conferences

3.2.1 Attendance

Attendance is required for FMU representatives from all participating CADENA ANSPs. Any TMA or ATCT that may have a significant constraint will be requested to attend by the overlying ANSP.

Attendance is optional for airlines and other aircraft operators, airport authorities, military organisations, and other aviation stakeholders.

3.2.2 Hosting

To ensure continuity of the CADENA Planning Web Conferences in the case of the scheduled Primary Host's inability to participate, a Backup Host is scheduled each week. The schedule of Primary and Backup Host can be accessed on the CADENA OIS after login through the ANSP home page.

Both the Primary Host and the Backup Host shall retrieve the slides from the CADENA OIS and assemble the Host slide deck. The Backup Host shall follow all preparation steps required of the Primary Host.

Then, if for some reason the Primary Host is not able to join the web conference, the Backup Host will be prepared to serve as Host.

3.2.3 Responsibilities

3.2.3.1 Host: Pre-conference responsibilities

- Prepares the Host master slide deck template with correct date and time, current weather product snapshot, and other relevant information. The Host master slide deck template can be found on the CADENA OIS after login through the ANSP home page.
- Reviews and applies the lessons learned from the previous web conferences. Lessons learned can be accessed from CADENA OIS after login through ANSP home page.
- Reviews the weather forecast products and prepares a brief overview of regional weather and other constraints. This should include convective or tropical storm activity and volcanic ash cloud. While there are a number of weather products available for planning, participating CADENA ANSPs have agreed to focus on using the products found at the following web sites:
    - Aviation Weather Center: https://www.aviationweather.gov/progchart/high?region=b1
    - NASA GOES-East: https://www.star.nesdis.noaa.gov/goes/
    - Intellicast: https://www.wunderground.com/maps/satellite/infrared
- Reviews the CADENA OIS, Regional Traffic Management Measures section, for current reroutes and other TMMs.
- Retrieves the planning slides from participating CADENA FMUs. Participating FMUs will upload their slides (either PowerPoint or .pdf) through the CADENA OIS. Slides are then retrievable after login to ANSP home page. See APPENDIX A: SAMPLE WEEKLY PLANNING WEB CONFERENCE SLIDES. The slides should include the following information:
    - Staffing.
    - Significant weather.
    - Anticipated demand.
    - Equipment outages.
    - Significant NOTAMS.
    - Constraints.
    - Special events.
    - Planned TMMs.
- If necessary, contacts other participating CADENA FMUs and/or stakeholders for updated data or to clarify issues.
- Logs in to the web conference at least fifteen minutes prior to the start of the conference in order to ensure connectivity and to conduct a sound check.

3.2.3.2 Host: Web conference responsibilities

NOTE: *The template for hosting and participating in CADENA ATFM/CDM Planning Web Conferences is shown in APPENDIX C: CADENA ATFM/CDM PLANNING WEB CONFERENCE FORMAT.*

- Provides a short synopsis of the regional weather conditions and significant events.
- Calls on each FMU, in turn, to provide their briefing. The order of discussion is agreed to by the RIG at the beginning of each year.

  NOTE: *Any discussion of TMMs during the web conference is for information and planning purposes only. FMUs must* coordinate *the actual TMM details in accordance with applicable internal procedures.*
- Actively listens to help ensure accuracy of the information presented and accepted.
- Facilitates the CADENA participants in developing traffic management strategies and formulating the Regional Operations Plan.
- Accepts information from others during the web conference and ensures each participant has the opportunity to address the conference.
- Ensures stakeholder questions and concerns are heard and addressed.
- Provides a short summary at the end of the web conference and thanks the participants for their contributions.

  NOTE: *Underlying ANSPs/TMAs/Airports will normally be represented by the overlying ANSP during the CADENA Planning Web Conferences. For example, Costa Rica will be represented by COCESNA. However, if representatives from an underlying ANSP/TMA/Airport are on the webex, the Host can call on them to provide pertinent operational details.*
- Announces the date and time of the next planning web conference.

3.2.3.3 Host: Post-conference responsibilities

- Prioritises work activities based on plan changes and outcomes.
- Prepares the Host Master slide deck, including a slide that provides a short summary of key discussion topics, and uploads it through the CADENA OIS within one hour from the completion of the web conference.

  NOTE: *The weekly Host Master slide deck will be displayed on the CADENA OIS to be accessible to the public.*
- Reviews the Regional Operations Plan link on the OIS to verify the other CADENA participant's contributions to the ROP are complete and submitted. All participating CADENA FMUs should complete and submit their contribution to the ROP within one hour from the completion of the web conference.

- As a backup when needed, prepares the ROP to send to the CADENA stakeholders via email. The body of the ROP should include pertinent operational information provided by the FMUs, including:
    - Equipment outages.
    - Significant constraints.
    - Planned TMMs.
    - Special events/activities.

    NOTE: *A link to the CADENA ROP email distribution list is located on the CADENA OIS after login through ANSP home page.*

3.2.3.4 Participating FMU: Pre-conference responsibilities

Reviews the following areas of concern and inputs the information into the ANSP slide deck template, including pertinent input of operational information provided by underlying ANSPs, TMAs, and airports. The ANSP slide deck template is accessible after sign-on through the CADENA OIS ANSP home page.

- Staffing.
- Significant terminal and en route weather conditions.
- Anticipated demand.
- Equipment outages.
- Significant NOTAMS.
- Terminal and en route constraints.
    - Route closures.
    - Re-routes.
    - Information concerning reduced AARs or ADRs for the airports of concern within their ANSP.
    - Information concerning reduced sector capacity for any sectors of concern within their ANSP.
- Planned TMMs.
    - Current.
    - Anticipated.
    - Triggering event.

    NOTE: *A triggering event is a specific event that causes a traffic management measure to be implemented. It is for planning purposes and used to reduce coordination when a TMM is needed. They can be identified in the ROP as "if …then" statements.*

Submits the slides to the weekly Host by uploading the slide deck through the CADENA OIS ANSP home page. The slide deck shall be submitted at least two hours prior to the scheduled start time of the web conference. The slide deck should include the information shown in APPENDIX A: SAMPLE WEEKLY PLANNING WEB CONFERENCE SLIDES.

3.2.3.5 Participating FMU: Web conference responsibilities

- Participates in the web conference and briefs participants on the information contained in the slides, including operational information provided by underlying ANSPs, TMAs and airports.
- Answers questions posed by participants. If the answer requires a lengthy conversation, agrees to a follow up conversation at the end web conference.

  NOTE: *If an underlying ANSP, TMA, or airport has joined the web conference, they may be called on to brief pertinent information.*

3.2.3.6 Participating FMU: Post-conference responsibilities

- Briefs facility management on the outcome of the web conference.
- Takes appropriate follow-up action based on the outcome of the web conference and the agreed ROP. Completes the ADP, which is accessible after login through the ASNP home page. This information will repeat the information provided on the Web Conference slides. The Regional Operations Plan is viewable to the public and stakeholders on the home page of the CADENA OIS.

3.2.3.7 Stakeholder Roles and Responsibilities

When participating in the CADENA Web Conferences stakeholders are expected to practice active listening, contribute pertinent information, and ask questions for clarification of issues. Discussion may include:

- Schedule changes (increases or decreases) that could have an impact on traffic demand.
- Planned reroutes to avoid constraints such as equipment outages, hurricanes, and volcanic ash plumes.
- Airport surface constraints that could impact capacity.
- Airport gate/stand constraints that could impact capacity.
- Equipment outages.
- Flight check activities.
- Special activities.

3.3 CADENA Hurricane / Tropical Storm Web Conferences

Hurricane web conferences provide a means to share important information that will aid ANSPs and stakeholders in planning and making appropriate decisions.

Starting 2 to 3 days before landfall at a participating ANSP, CADENA will conduct a daily 1400 UTC (or at the time coordinated) CADENA Hurricane Web Conference. The Host will be selected based on the location and the projected path of the hurricane. Only those ANSPs affected by the hurricane and its bands, and those where traffic may be rerouted, will be required to participate in the hurricane web conference.

Notification of the pending hurricane web conference will be announced through the CADENA OIS. The hurricane web conference is open to participating CADENA ANSPs and stakeholders. Participating CADENA ANSPs shall follow these procedures:

- Impacted ANSPs will upload through the CADENA OIS the set of Hurricane/Tropical Storm slides (PowerPoint or .pdf) to the Host by 1200 UTC (during U.S. daylight savings time) each day the hurricane web conference is conducted. See APPENDIX B: SAMPLE HURRICANE / TROPICAL STORM WEB CONFERENCE SLIDES. As a backup, these can be emailed to the Host.
- Topics to be addressed in the slides and during the web conference may include:
    - Projected path.
    - Projected duration per affected airport / FIR.
    - Projected capacity for airport recovery.
    - If airport services are affected, then the priority for recovery.
    - Projected airport closures and openings.
    - Reports of significant equipment outages.
    - Projected route closures and openings.
    - Planned TMMs.
    - Other issues.

The Host for the hurricane web conferences may change to accommodate the expected movement of the storm. The Host for the following day will be announced at the close of each web conference.

3.3.1 Responsibilities

3.3.1.1 Host: Pre-conference responsibilities

- For hurricane and tropical storm web conferences, prepares the Host master slide deck template with correct date and time, current weather product snapshot, and other relevant information.
- Reviews the weather forecast products and prepares a brief overview of regional weather and other constraints.
- Retrieves the hurricane or tropical storm slides from the CADENA OIS for the participating CADENA FMUs.
- Logs in to the web conference at least fifteen minutes prior to the start of the conference in order to ensure connectivity and to conduct a sound check.

3.3.1.2 Host: Web conferences responsibilities

- Provides a short synopsis of the regional weather conditions and significant events.
- Calls on each FMU, in turn, to provide their briefing. The order of discussion is will depend upon which participating ANSPs are impacted by the track of the hurricane or tropical storm.

  NOTE: *Not all participating ANSPs will be required to attend these web conferences – only those impacted by the track of the storm.*
- Listens carefully and take notes of relevant discussions.
- Ensures stakeholder questions and concerns are heard and addressed.
- Provides a short summary at the end of the web conference and thanks the participants for their contributions.
- Announces the date and time of the next Hurricane / Tropical Storm web conference.

3.3.1.3 Host: Post-conference responsibilities

Prepares the Hurricane / Tropical Storm Master slide deck, and uploads it through the CADENA OIS within one hour from the completion of the web conference.

NOTE: *The Hurricane / Tropical Storm Master slide deck will be displayed on the CADENA OIS under "Master Slide Deck" for access by the public.*

3.3.1.4 Participating FMU: Pre-conference responsibilities

Reviews the following areas of concern and inputs the information into the ANSP slide deck template, including pertinent input of operational information provided by underlying ANSPs, TMAs, and airports. The ANSP hurricane slide deck template is shown in Appendix B.

Submits the Hurricane / Tropical Storm slides to the Host by uploading the slide deck through the CADENA OIS ANSP home page. The slide deck shall be submitted at least two hours prior to the scheduled start time of the web conference. The slide deck should include the following information.

- Projected path.
- Projected duration per affected airport / FIR.
- Projected capacity for airport recovery.
- If airport services are affected, then the priority for recovery.
- Projected airport closures and openings.
- Reports of significant equipment outages.
- Projected route closures and openings.
- Planned TMMs.
- Other issues.
  NOTE: *Include maps of impacted airways and any other graphics that may help explain the operational situation.*

3.3.1.5 Participating FMU: Web conference responsibilities

- Participates in the web conference and briefs participants on the information contained in the slides, including operational information provided by underlying ANSPs, TMAs and airports.
- Answers questions posed by participants.

  NOTE: *If an underlying ANSP, TMA, or airport has joined the web conference, they may be called on to brief pertinent information.*

3.3.1.6 Participating FMU: Post-conference responsibilities

- Briefs facility management on the outcome of the web conference.
- Takes appropriate follow-up action based on the outcome of the web conference.
- Updates the CADENA OIS ATFM Daily Plan, as needed. This update will reflect the information provided on the Web Conference slides.

3.4 CADENA Ad Hoc Web Conferences

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

Topics may include: Developing and managing reroutes within an ANSP due to equipment outages; managing the impact of volcanic ash; managing the impact of an earthquake.

3.4.1 Responsibilities

3.4.1.1 Host: Pre-conference responsibilities

- Reviews the conference topic and issues.
- Gathers as much background material on the topic as possible, including maps and graphics, when applicable.
- Ensures the appropriate FMUs and stakeholders have been invited to attend the web conference.
- Logs in to the web conference at least fifteen minutes prior to the start of the conference in order to ensure connectivity and to conduct a sound check.

3.4.1.2 Host: Web conference responsibilities

- Facilitates the ad hoc conference discussion.
- Ensures each stakeholder has the opportunity to participate and that their questions and concerns are heard and addressed.
- Listens carefully and take notes of relevant discussions.
- Provides a short summary at the end of the web conference and notes any action items.
- Announces the date and time of the next ad hoc web conference, if applicable.

3.4.1.3 Host: Post-conference responsibilities

- Follows up with applicable CADENA RIG leadership to:
    - Discuss any issues that need further attention.
    - Ensure any action items from the webex are recorded and tracked.
    - Schedule the next Ad Hoc webex, if applicable.

3.4.1.4 Participating FMUs: Pre-conference responsibilities

- Reviews the conference topic and issues and gathers as much background material on the topic as possible, including maps and graphics, when applicable.
- Ensures the appropriate internal participants from their FMU or ANSP have been invited to attend the web conference.
- Logs in to the web conference at least fifteen minutes prior to the start of the conference to ensure connectivity and to conduct a sound check.

3.4.1.5 Participating FMUs: Web conference responsibilities

- Briefs the ad hoc conference on their part of the applicable topic.
- Ensures stakeholder questions and concerns are answered and addressed.
- Listens carefully and take notes of relevant discussions.
- Takes notes during the ad hoc conference and notes any action items.

3.4.1.6 Participating FMUs: Post-conference responsibilities

- Briefs facility management on the outcome of the ad hoc conference.
- Follows up with the Host to:
    - Ensure any action items from the webex are recorded and tracked.
    - Prepare for the next ad hoc webex, if applicable.

4 CADENA Traffic Management Measures

4.1 Overview

ATFM capability requires a methodology to balance demand with available capacity to increase operational effectiveness and efficiency. The function of balancing demand to capacity by participating CADENA ANSPs is carried out in the strategic, pre-tactical, and tactical stages in which the appropriate members of the ATFM community participate to maximize system efficiency through the sharing of relevant information. Through this information sharing, strategies and plans are informed and developed and situation appropriate traffic management measures are agreed and implemented.

Given the nature of the CAR/SAM airspace and FIRs, when adverse conditions impact the airspace and airports in CAR/SAM region, the ANSPs generally will need to include neighboring ANSPs in their TMMs to effectively and equitably manage demand.

Regional Letters of Agreement for TMMs

The CAR/SAM region is comprised of many small States that are responsible for managing the traffic flows within their areas of responsibility. This characteristic poses a challenge to implement a seamless ATFM system because a lot of coordination needs to take place between many States to manage any particular situation. Most States in the CAR/SAM region currently have limited ATFM/CDM procedures in place. There are operational letters of agreement between States but no formal document that addresses the subject of managing traffic flow between ANSPs as a whole. TMMs such as Ground Delay Programs (GDPs), assigning Calculated Take Off Times (CTOTs) or Calculated Time Over (CTO) to flights departing from airports outside the controlling ANSP authority, are currently not possible. APPENDIX E: ADDENDUM TO THE LETTER OF AGREEMENT is designed to address some of these shortcomings.

4.2 Types of Traffic Management Measures

In keeping with guidance specified in ICAO DOC 9971, and until automation enables the regional electronic transmittal and communication of TMMs such as ground delay programs (GDPs) and airspace flow programs (AFP), CADENA participants agree to use the following TMMs to balance demand and capacity in the Latin American and Caribbean Region:

- Miles-in-trail.
- Minutes-in-trail.
- Minimum departure interval.
- Fix balancing.
- Reroutes.
- Level capping.
- Airborne holding.
- Manual Ground stops.
- Manual Ground delay programs.

NOTE: *To maintain the integrity of the Regional airspace system, FMU personnel at each participating CADENA ANSP agree to employ the least restrictive TMM applicable in a given operational situation in order to minimize delays.*

4.3 Demand versus Capacity

Achieving safe and efficient air traffic flow management requires a clear understanding of sector and airport capacities, as well as estimated traffic demand. This understanding is best achieved through the exchange of data and information among adjacent ANSPs and stakeholders.

In assessing demand versus capacity, CADENA FMU personnel should:

- Coordinate with underlying TMAs and airport officials to determine current and expected AARs and ADRs. Collaborate to ensure closures of runways, taxiways, and other airport facilities minimise operational impact.
- Communicate with system stakeholders to evaluate expected flows, including schedule changes, cancellations and route adjustments.
- Coordinate with neighboring ANSPs to understand their constraints, which may influence flows, and result in traffic management measures, and delays within your airspace and airports.

4.4 Plan, Coordinate, Communicate, Implement, and Document

Prior to implementing a TMM, each FMU shall:

- Identify the need for a TMM through assessment of demand versus capacity.
- Implement the least restrictive TMM necessary through examining alternative options.
- Coordinate and discuss the proposed TMM with impacted FMUs and ATC facilities. This coordination should include TMM type along with any qualifiers such as altitude, route etc., start and end times, and reason.
- When time permits, use a collaborative approach and consensus decision-making among involved stakeholders.
- Participating CADENA FMUs will make every effort to provide at least two-hour's advanced notice to other FMUs when implementing a TMM.

FMU personnel shall record the implementation of all TMMs in the CADENA OIS TMM Log. A full description of all TMM actions/initiatives shall be included in the log entry, including:

- Facility receiving and complying with the TMM.
- Start and end times.
- TMM type.
- Restriction value and unit.
    - Nautical miles (NM).
    - Minutes (MIN).
- Associated NOTAM, as applicable.
- Element type (airway, airport, fix, route, flight information region) and identifier.
- Altitude, as applicable.
- Reason.
- Remarks.

NOTE: *TMM information entered into the electronic CADENA Regional TMM Log through the CADENA OIS is for informational purposes only and does not qualify as appropriate coordination.*

4.5 Monitor

After a TMM has been implemented, the sending and receiving FMUs are responsible to monitor the measure to ensure compliance and to ensure the measure is producing the desired results.

4.6 Modify

During the monitor period, it may be necessary to modify a TMM. If a modification is necessary, the FMU responsible for a TMM must discuss and coordinate the revision with the receiving facilities prior to implementing the change. Notify the stakeholders as appropriate.

Participating CADENA FMUs will make every effort to provide at least one-hour advanced notice to receiving FMUs when modifying the duration, scope, or quantity of TMM required. This is especially important if an increase or extension is required.

Modifications to TMMs must be entered into the CADENA OIS TMM Log.

4.7 Cancel and Exit

Cancel TMMs promptly when no longer needed. During the monitoring period, it will become clear when the TMM will achieve, or has achieved its objective and is no longer required. When cancelling and exiting a TMM, the FMU responsible for the measure must communicate and coordinate with receiving FMUs and stakeholders and notify them of the cancellation. Cancellations must be entered into the CADENA OIS TMM Log.

5 CADENA Traffic Management Tools

5.1 CADENA Operational Information System Web Page

To promote common situational awareness and enhance safety and efficiency, CADENA developed and launched an Operational Information System (OIS) web page. The OIS is accessible to participating CADENA ANSPs, stakeholders and the public. Access and edit rights vary depending on user assigned category. The CADENA OIS allows participating CADENA ANSPs to archive operational information regarding planning and TMMs for later analysis, trending, and lessons learned.

Participating CADENA FMUs have the ability to upload the following onto the CADENA OIS for display to the public:

- ATFM Daily Plan.
- Regional TMM.
- Active Reroutes.
- Advisory messages.
- Delay information.
- ADP Link Files.
- Master Slide Deck.

- Reroute Repository.
- Airport Capacity.
- Sector Capacity.
- Participant List.
- Contingency Form.
- FMU-to-FMU Letters of Agreement.

Participating CADENA FMUs that have been assigned appropriate user rights have the ability to:

- View the Host Calendar.
- Chat with stakeholders.
- Upload PowerPoint slides for the weekly and other CADENA planning web conferences.
- Add airport delay information.
- Upload ADP Link Files.
- Upload the Host Master slide deck.
- Add routes to the Route Repository.
- View the CADENA Contact List.
- View the CADENA Lessons Learned.
- View Archive information.
- Upload a Contingency Form.
- Upload an FMU-to-FMU Letter of Agreement.
- Add a Planned Airways System Alternative (PASA) route request.
- Adjust Settings to receive email push notifications.

The CADENA OIS System Administrator has the ability to upload the following onto the CADENA OIS for display to the public:

- The latest version of the list of CADENA participants.
- The latest version of the airport capacity and sector capacity information for the participating CADENA ANSPs.

5.1.1 CADENA OIS HOMEPAGE

Figure 2 below depicts the view of the CADENA OIS homepage that is available to the stakeholders and the public.

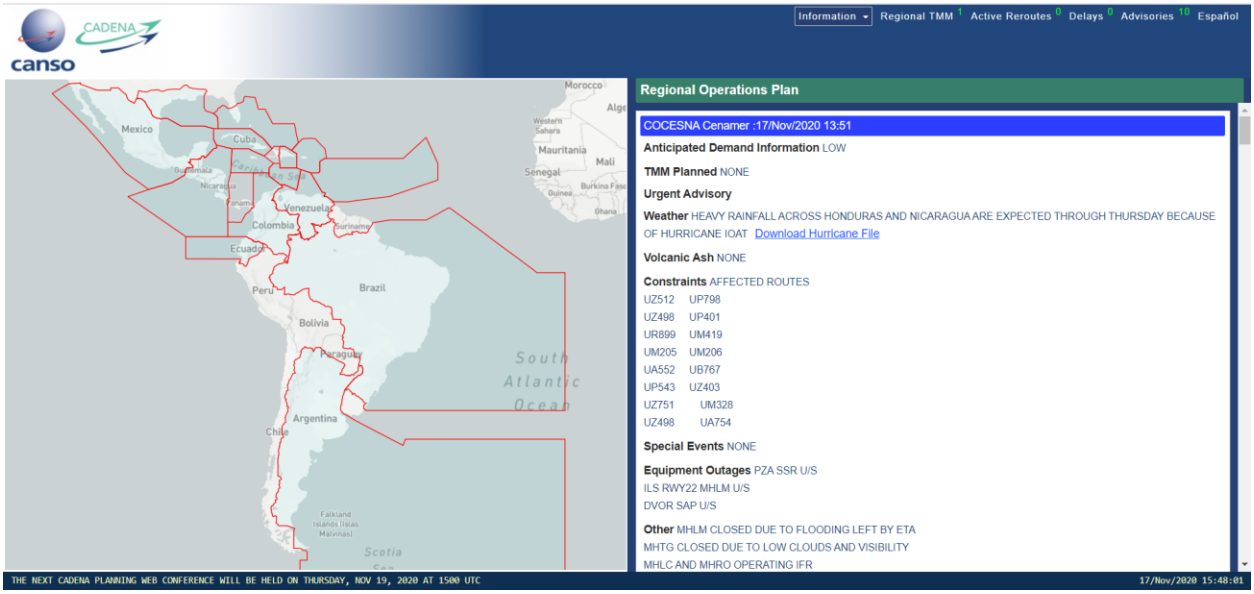


Figure 2: CADENA OIS Homepage

5.1.2 Regional TMM

Regarding the CADENA procedures for planning, coordinating and implementing cross border TMMs, please see Section 4.3 to 4.7.

When a TMM will be used to balance demand and capacity, participating CADENA FMUs will use the "ATFM Solutions/Traffic Management measures" page (shown in Figure 3) after login to input TMMs.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering data into the various fields.

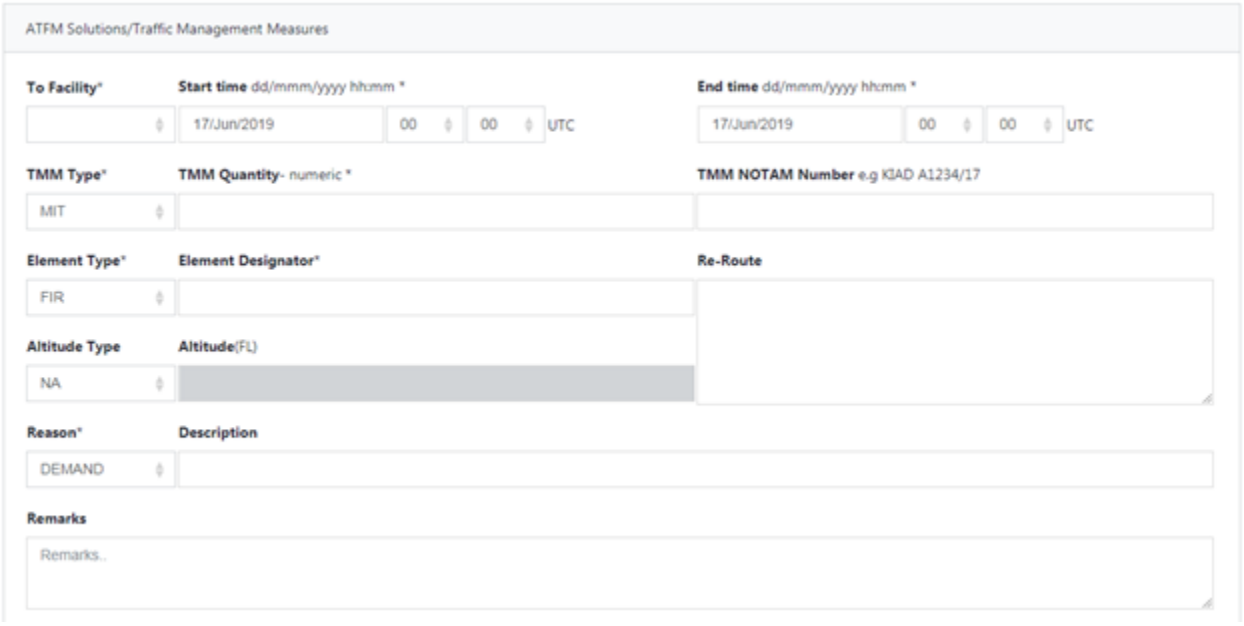


Figure 3: Traffic Management Measures page

5.1.3 Active Reroutes

Regarding the CADENA procedures for planning, coordinating and implementing cross border reroutes, please see Section 4.3 to 4.7.

When a TMM will be utilized to balance demand and capacity, participating CADENA FMUs utilize the "ATFM Solutions/Traffic Management measures" page (shown in Figure 3 above -- with TMM type set to Reroute) after login to input reroutes.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering data into the various fields.

5.1.4 Advisories

Advisories are messages used to notify the stakeholders of information that may directly impact operations. Examples include: major earthquakes, volcanic eruptions, airport closures, upcoming major airspace changes, etc. An advisory may be entered as either FYI (For Your Information) or Urgent.

When an Advisory will be entered, participating CADENA FMUs utilize the "Advisories" section (shown in Figure 4) after login to input advisory information.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering data into the various fields.

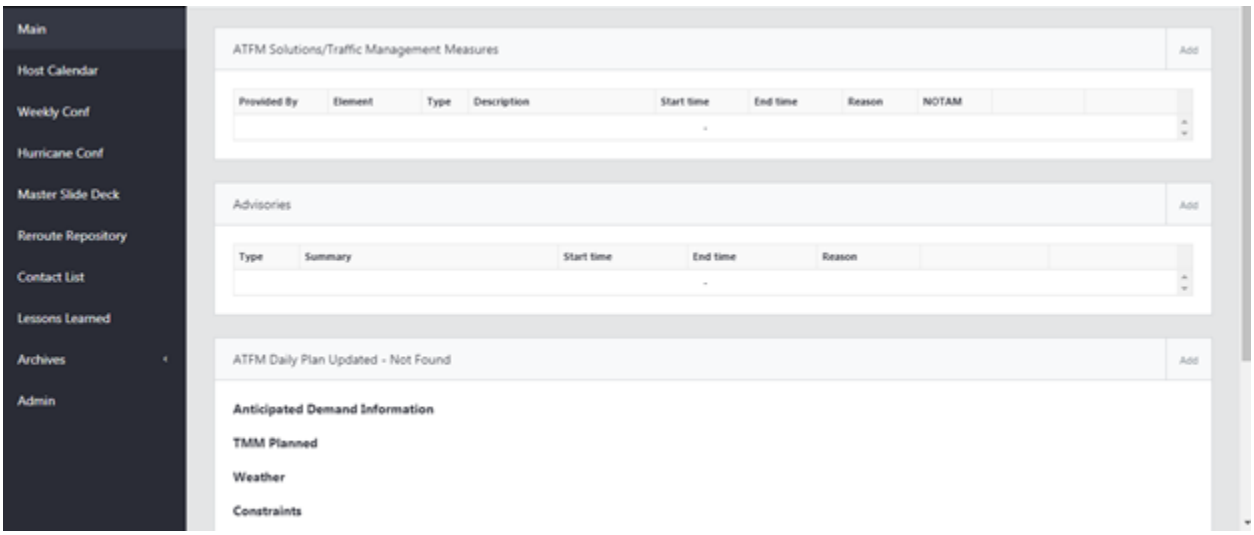


Figure 4: Advisories section

5.1.5 ATFM Daily Plan (ADP)

Each day, participating ANSPs input their ATFM Daily Plans (ADP) after login into the CADENA OIS see Figure 5). Each ANSP's ADP outlines anticipated demand, weather, volcanic ash, constraints, traffic management measures, equipment outages, and special events.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering data into the various fields.

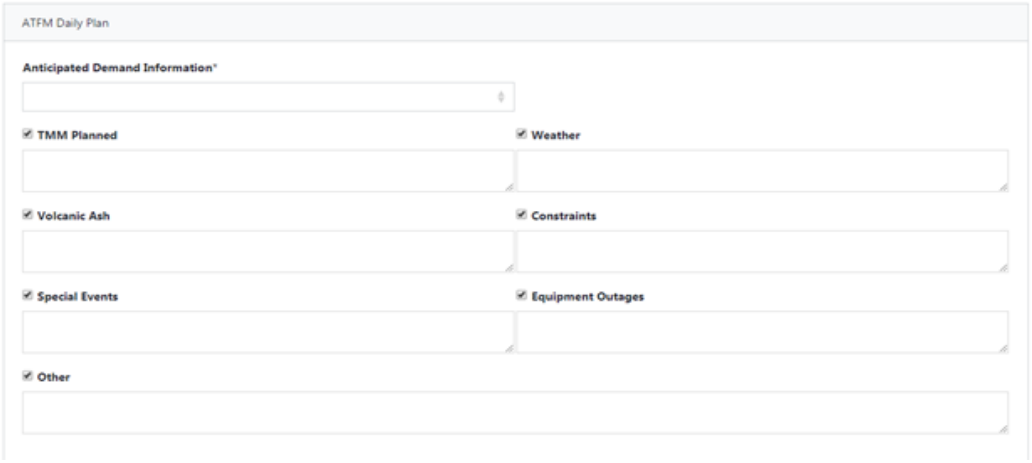


Figure 5: ATFM Daily Plan page

5.1.6 Delay Information

Delay Information is used to notify the stakeholders of airport departure delays. Delay Information is entered by either an ANSP or an Airlines and data is displayed in 15-minute increments. Delay Information that has been entered into the System will remain available for four hours after entry, unless the delay information is updated.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering Delay Information data into the various fields.

5.1.7 ADP Link Files

ADP Link Files are information files. They contain operational information that ANSPs would like to make the stakeholder community aware of. Such information might include information regarding Head-of-State visits that could result in operational delays, carnival dates and details, sporting events that could result in increased air traffic.

After an ANSP enters an ADP Link File, it is displayed directly below “OTHER” in the ATFM Daily Plan.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for uploading ADP Link Files.

5.1.8 Settings Information

System Users with login credentials may select any or all of four categories of information for which to receive email notifications. The categories include:

- New Urgent Advisories
- New Departure Delays

- New Contingency Form
- New Chat Messages

A User's default setting is to receive none of the messages. Thus, a User must select the category of messages he/she wishes to receive via push notification.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for adjusting the Settings.

5.2 CADENA Traffic Management Measure Log

Participating CADENA FMUs shall log all external and, as appropriate, internal TMMs in the TMM Log. When a TMM is expired or is cancelled, the TMM will be archived for future analysis and quality assurance review.

6 CADENA and Contingency Planning

6.1 Background

CADENA has focused on two aspects of Contingency Planning: 1) Establishing ATFM plans and checklists to help mitigate the impact of disruptions to air traffic operations caused by unplanned equipment outages, hurricane impacts, etc. and, 2) Establishing plans and checklists to mitigate disruptions to the provision of ATFM/CDM caused by unplanned equipment outages at any one of the participating CADENA FMUs.

6.2 Disruptions to Air Traffic Operations

CADENA has gained extensive experience in dealing with disruptions to Air Traffic operations in the Regions. Examples include: the long-term impact of the lightning strike in 2017 at the Kingston ACC; the devastating impact of Hurricane Maria in September 2017; the impact of active volcanoes in the Regions; the power outage at CENAMER ACC that resulted in the complete loss of communications, navigation, and surveillance. CADENA understands the importance of preparing for disruptions and gathering the information related to:

- 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)
- 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)

Based on CADENA's experience with such events and the associated lessons learned, CADENA has recognised that the key steps to help ANSPs and prepare for the unexpected include the development of:

- A description of potential events that can disrupt air traffic operations.
- A checklist of initial ATFM/CDM steps for responding to a disruptive event.
- The process for evaluating the effectiveness of ATFM measures during an event and for adjusting throughout the event.
- The ATFM/CDM-related steps necessary to recover from a disruptive event.
- The CADENA points of contact, roles, and responsibilities.
- The lessons learned documentation and post-event reports.

  NOTE: *These steps are based on the third edition of ICAO Doc 9971, "Manual on Collaborative Air Traffic Flow Management," Section 2.4.*

As a result, CADENA has developed:

- The "Contingency Events and Checklists" shown in APPENDIX D to mitigate the impact of such events through a ready-reference checklist when the unexpected happens.
- The Point of Contact List of CADENA for each ANSP and the stakeholders. This list is posted on the CADENA OIS as a ready reference.
- The Lessons Learned document, which is available to CADENA ANSPs through the CADENA OIS.

6.3 Planned Airway System Alternatives (PASA) Contingency Routes

During significant events such as a complete outage of an FIR or the impact of a major hurricane, CADENA has developed, in collaboration between the airlines and participating ANSPs, the Planned Airway System Alternatives (PASA) contingency routes that can be used to temporarily route around the impacted airspace.

The PASA route database is based on routes that are already in use by the airlines and have been approved by the participating ANSPs. The route database is reviewed and updated on a quarterly basis and is available on the CADENA OIS under the "Information" tab on the CADENA OIS homepage and then under "Reroute Repository."

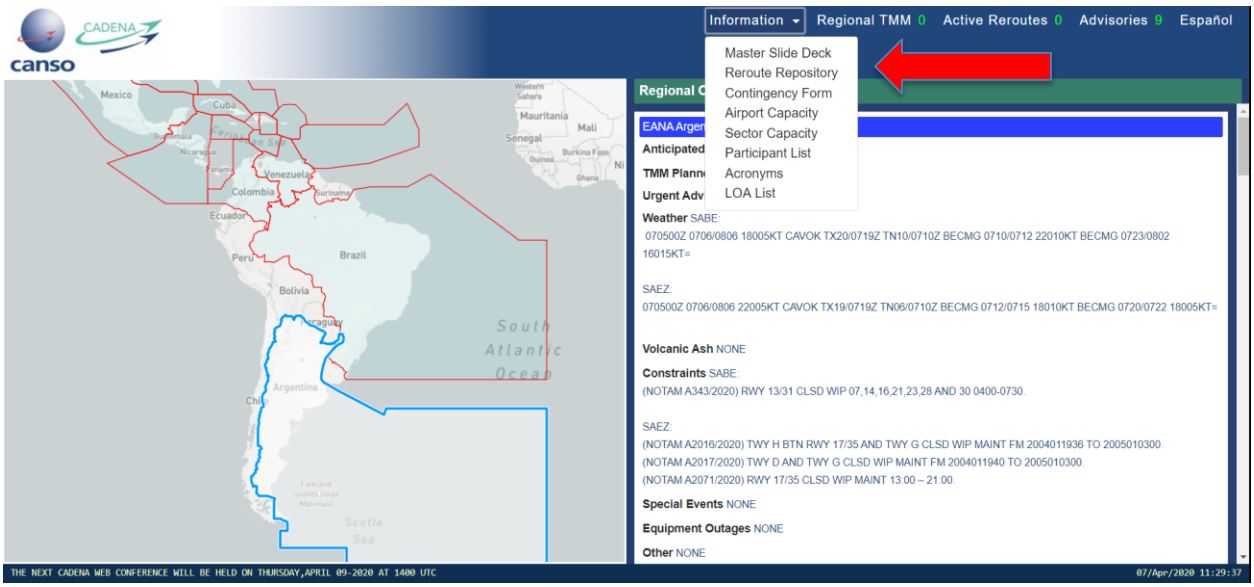


Figure 6: Information Pulldown Menu

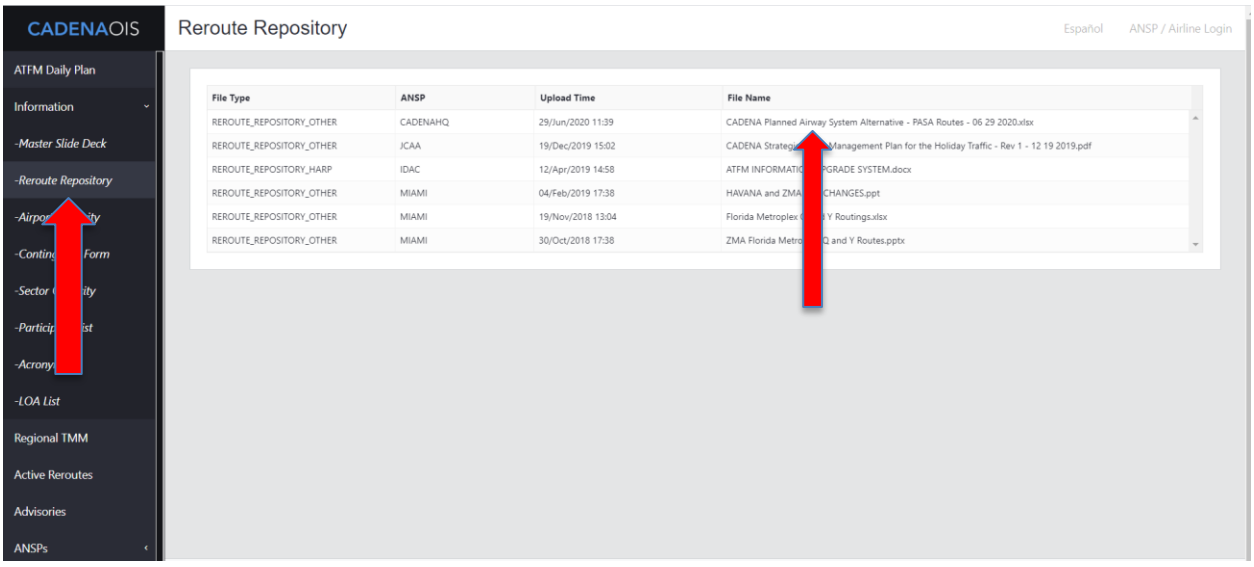


Figure 7: Location of PASA contingency routes

The excel spreadsheet can be downloaded by double clicking on the "CADENA Planned Airway System Alternatives – contingency route" entry.

When an event occurs that requires implementation of the PASA contingency routes, CADENA will schedule and convene an Ad Hoc Web Conference to coordinate the use of specific routes. The Host for

the Ad Hoc Web Conference will depend on which ANSP is impacted and which FMU is available to serve as Host.

The Host will facilitate the collaborative discussion and ensure the following points are covered:

- Review the known details regarding the event that led to application of the routes.
- Discuss which routes may and will be used to circumnavigate the impacted airspace(s).
- Ensure the receiving ANSPs can support the routes.
- Ensure the airlines and other airspace users have adequate time to plan and fuel for the routes. Normally, a three to four hour lead-time planning window is preferred.
- Determine how long the routes will be in effect.
- Determine, to the extent possible, the demand on the routes in an appropriate time segment (such as per 15 minutes, or per hour).
- Establish, if necessary, TMMs to manage the demand.
- Determine the strategy for exiting the routes and returning to normal operations when the event ends.

Airlines and ANSPs have the ability to submit Planned Airway System Alternatives (PASA) Route Requests after login to the CADENA OIS.

Refer to the latest version of the CADENA OIS Manual to see step-by-step information for entering PASA Route Request information.

6.4 CADENA Contingency Form

The CADENA Contingency Form was collaboratively developed by the CADENA Team 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.

This form will be completed and uploaded to the CADENA OIS by the participating ANSP that has taken the lead for a contingency event. This task may be delegated to another participating ANSP or CADENA Headquarters if workload during an event requires.

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 ☐ MDCS

☐ MTEG ☐ KZMA ☐ KZWY ☐ 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.

Figure 8: CADENA Contingency Form

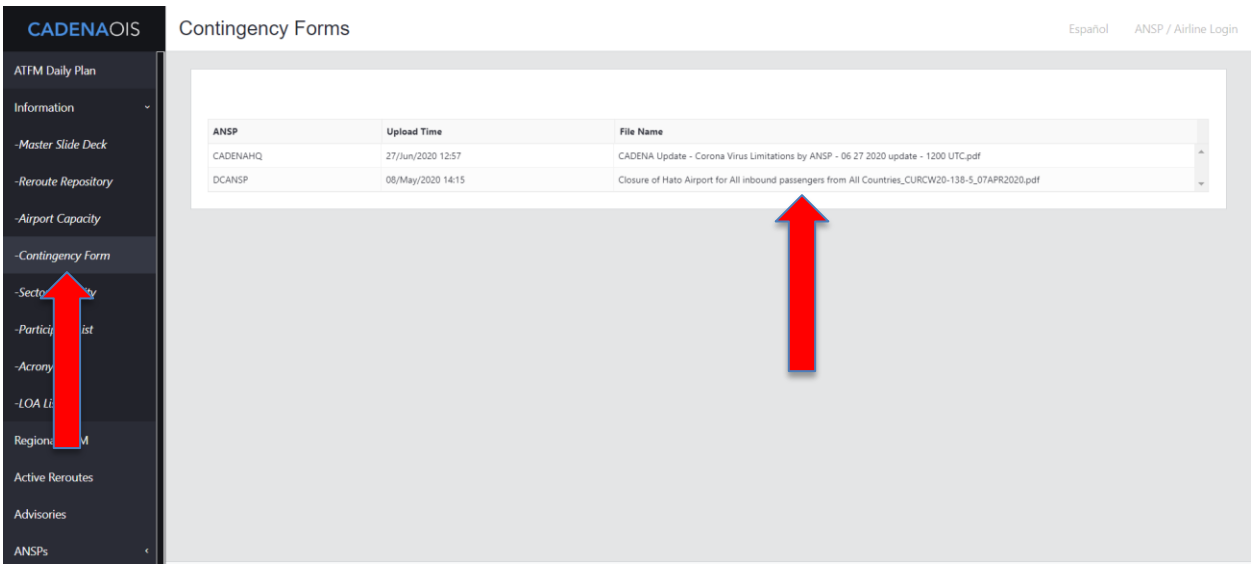


Figure 9: Location of a CADENA Contingency Form on the CADENA OIS

7 CADENA Key Performance Indicators

7.1 Background

Key performance Indicators (KPIs) for measuring ATM operational performance will enable the participating CADENA ANSPs to conduct performance monitoring to identify performance gaps in service delivery and to determine areas that need improvement. This analysis is a valuable training aid for all system participants to improve future decisions and to identify new metrics correlated to system efficiency and safety. While the performance of every facet of ATM can be measured with appropriate KPIs and data collection capabilities, CADENA will focus on those indicators that most directly address the elements over which CADENA has the most influence, namely, the goals of maximizing the use of available capacity, providing the most efficient trajectories and the highest predictability for the stakeholders.

7.2 KPIs for CADENA ANSPs

Because each ANSP is different and each airport is unique in terms of operational challenges, performance targets and resource requirements will always differ. Therefore, KPIs will vary based on its value for each ANSP and possibly each airport. KPIs are quantitative and therefore require key event times (e.g., actual and scheduled gate times and actual runway landing and departure times) to be recorded.

Capacity utilization measures demand relative to available runway and airspace capacity. Capacity values must be developed for the airport and airspace sectors. While capacity can be influenced by factors outside the control of the ANSP, fixed, or nominal, capacities provide an important reference for understanding the total system performance under normal operating conditions and provide a basis to work from when determining the impact of operational factors limiting capacity. While the range of

resources varies, understanding and specifying the capacity of each resource is a critical responsibility and the first step in this KPI.

Flight trajectory compares actual trajectory against a reference ideal trajectory. The difference between the actual trajectory and the ideal trajectory is an efficiency gap. Flight time and distance can be readily monetized and used to determine a flight's cost index. CADENA ANSPs can begin by tracking these values by key city pair.

ANSP attributable delay records the causal reasons for a delay and allows the ANSP to assess its influence in mitigating the delay and improving efficiency. ANSPs should monitor and record the causal factor, the total and average minutes of delay, and the number of delayed flights as a percentage of total flights.

Figure 6 describes the characteristics and considerations for the KPIs of:

- Peak declared capacity for an airport
- Peak service rate for an airport
- Operational cancellations
- Arrival delays
- Departure delays

PEAK AIRPORT DECLARED CAPACITY	
DEFINITION	Number of available arrival and departure slots per time interval, for the airport as a whole (land and airside). Peak airport declared capacity is the highest hourly airport declared capacity of the day. It is used to set a limit on the number of movements per hour or fraction thereof.
UTILITY/WHY	Measure the maximum number of available arrival, departure and global airport slots per time interval at coordinated and facilitated airports.
DATA	Number of movements per hour.
QUESTION	When reviewing the performance of the past season, to what extent was the peak capacity aligned with the peak service rate?
FORMULA	Maximum daily value of declared capacity (arrival, departure or global) for a given season.
Considerations: Some airports provide a variation of declared hourly capacity values during the day. The airport declared capacity could be quite complex and may contain various rolling parameters to control the concentration of demand.	
PEAK SERVICE RATE	
DEFINITION	Highest sustainable hourly runway throughput (arrivals plus departures on all runways) achieved during a selected time interval.
UTILITY/WHY	Evaluate the highest sustainable hourly runway throughput achieved during the time interval (a month, season or year)
DATA	Number of arrivals and/or departures.

QUESTION	What is the highest sustainable number of aircraft movements that a congested airport can achieve under optimal conditions?
FORMULA	Percent of movements per time bin (i.e.10-min) during a selected time interval.
Considerations: The indicator measures operational throughput when demand exceeds capacity. In case of low demand, the indicator measures the demonstrated capacity. Peak service rate can be used in conjunction with Efficiency KPIs to understand the drivers of the indicator (low demand, constrained capacity, etc.)	
OPERATIONAL CANCELLATIONS	
DEFINITION	Number of cancelled flights in a given time composed of scheduled arrival or departure flights which were contained in the daily list of flight schedules produced before the day of operations or after a flight plan has been received, but for which actual landing or take-off occurred.
UTILITY/WHY	Measure the effect of capacity disruption on traffic and the impact of the flow management strategy during significant airport capacity drops, or other areas which causes an airline or multiple airlines to cancel flights.
DATA	Number of cancelled movements.
QUESTION	What is the effect of operational disruption and/or ineffective flow management techniques on scheduled flight cancellations?
FORMULA	Sum of all cancelled arrival and departure flights to or from a given airport.
Considerations: Guidelines should be distributed to airport operators and stakeholders on how to provide operational cancellation data.	
ARRIVAL DELAYS	
DEFINITION	This indicator is calculated for the inbound flow at a destination airport. For all flights arriving at the airport, it takes that portion of the pre-departure delay which is caused by landing restrictions at the destination airport, or for airborne flights which are held in air. The indicator is the average generated ATFM delay per inbound flight.
UTILITY/WHY	Measure the effect that inbound demand/capacity imbalances have on punctuality.
DATA	ATFM delay, number of IFR arrivals, and causality.
QUESTION	What is the effect of the demand and capacity balancing on off-block delays at departure stand and on airborne traffic when the arrival airport capacity is constrained?
FORMULA	Sum of all arrival ATFM delays divided by the sum of all inbound flights.
Considerations: Causality should be based on IATA Codes 81 Restriction due to en-route or capacity; 82 Restriction due to staff shortage or equipment failure en-route; 84 Restriction due to weather at destination (for airborne aircraft); and 89 Restriction due to airport/runway closed, industrial action, staff shortage, political unrest, noise abatement, night curfew, and special flights.	

DEPARTURE DELAYS	
DEFINITION	Measures off-block delays at the departure airport due to expected or actual constraints before taxi-out.
UTILITY/WHY	Measure the effect that constraints have on off-block punctuality.
DATA	Number of delay minutes, number of departures, causality.
QUESTION	What is the effect of departure queuing techniques on the delay experienced at the departure stand?
FORMULA	Sum of all delays divided by the sum of all outbound flights.
Considerations: Causality should be based on IATA Codes 81 Restriction due to en-route or capacity; 82 Restriction due to staff shortage or equipment failure en-route; 83 Restriction at destination; 84 Restriction due to weather at destination; and 89 Restriction at airport of departure, airport/runway closed due obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights, start-up and pushback.	

Figure 10: KPI Characteristics and Considerations

8 Space Launch and Recovery

8.1 Background

CADENA acknowledges the importance of the operational integration of commercial space operators into the CADENA regional ANSPs and airline operators. Cape Canaveral Air Force Station (CCAFS) located on Florida's central Atlantic coastline is the primary launch site for the United States Eastern Range with multiple, adjacent CADENA FIRs. Space operations are growing rapidly and ensuring operational safety throughout the global airspace system during launches and recoveries is of primary importance to CADENA.

To that end, CADENA has begun a partnership with the FAA's ATO Space Operations at the Air Traffic Control System Command Center (ATCSCC) to help promote operational safety and efficiency during space launches and recoveries through the implementation of the following procedures.

8.2 Procedures

FAA ATO Space Operations is invited and encouraged to:

- Participate in the CADENA Weekly Planning Web Conferences and present slides with applicable material.
- Participate in CADENA Ad Hoc Web Conferences and present applicable material to stakeholders.
- Advise relevant parties via appropriate channels of pertinent real-time launch or reentry information, including but not limited to, launch delays or off-nominal debris generating events that elicit a contingency response.
- Include applicable documents and information on the CADENA OIS under the ATCSCC page, in Advisories, and in other sections of the CADENA OIS, as appropriate.

ANSPs:

- When an Aircraft Hazard Area (typically for the de-orbit and splashdown of a rocket booster section) is coordinated to be in an ANSP's airspace, the affected FMU will post an Urgent Advisory, along with the applicable NOTAM information, on the CADENA OIS at least 24 hours prior to the launch window.

9 End-to-End Route Optimization

9.1 Background

Based on feedback from the airline stakeholders, CADENA is aware that there are opportunities to achieve fuel savings and reduce CO2 emissions by working collaboratively to help optimize a flight's end-to-end routing. In today's environment, after the flight plan has been filed and the aircraft is enroute, pilots will often receive "direct" routings from air traffic controllers. While this can help shorten the route, the aircraft has already been fueled for the longer route and must still carry that extra fuel to destination.

By working with the airlines' operations centers ahead of time, optimum city-pair routes can be developed by the airlines, reviewed by the effected ANSPs, and approved for filing by dispatchers so that fuel savings and CO2 reductions can be achieved.

9.2 Procedures

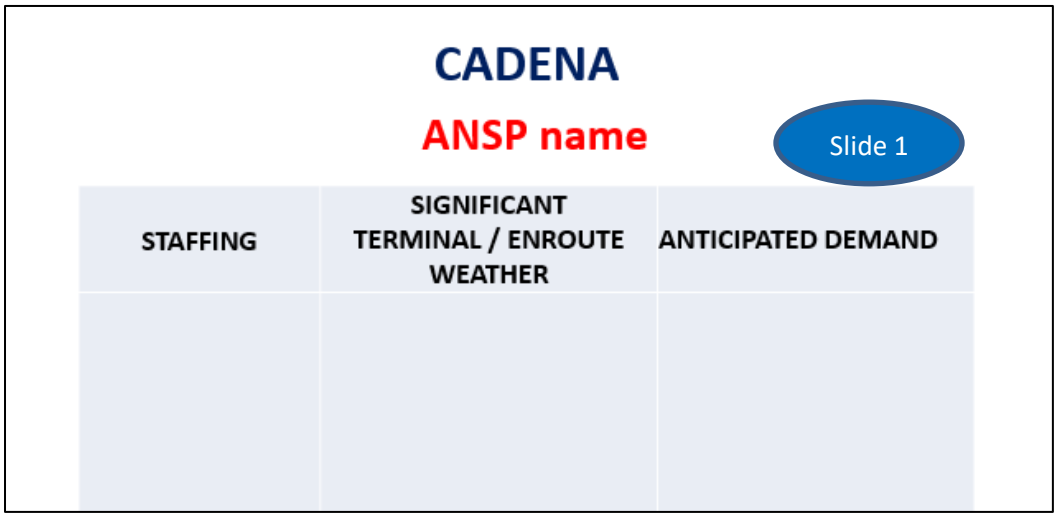
Throughout each month, airlines are invited to send a PASA Route Request, or an email, to CADENA Headquarters (HQ) with their end-to-end optimum route requests.

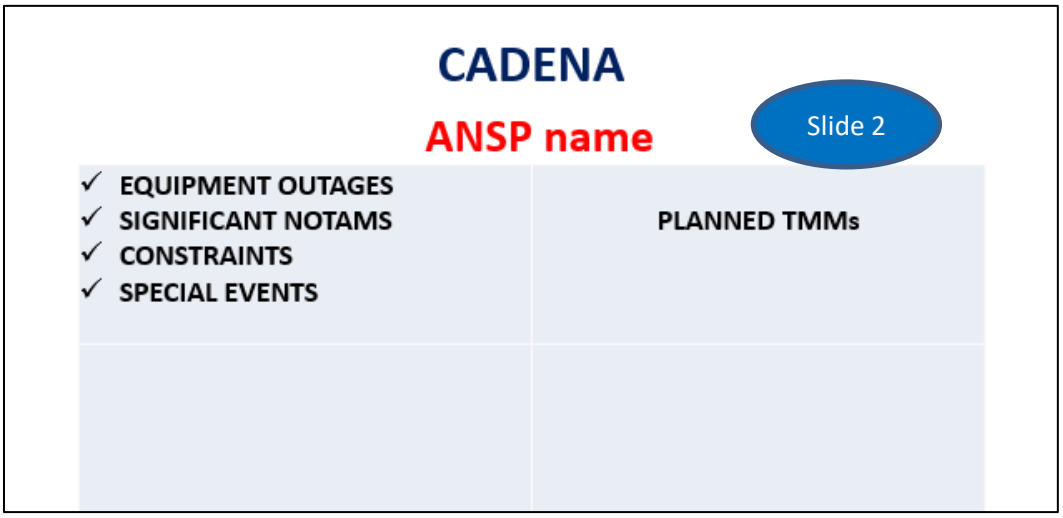
CADENA HQ will coordinate the route with each effected ANSP and provide feedback to the requesting airline.

When the end-to-end optimum routes has been approved for use by all the ANSPs, CADENA HQ will:

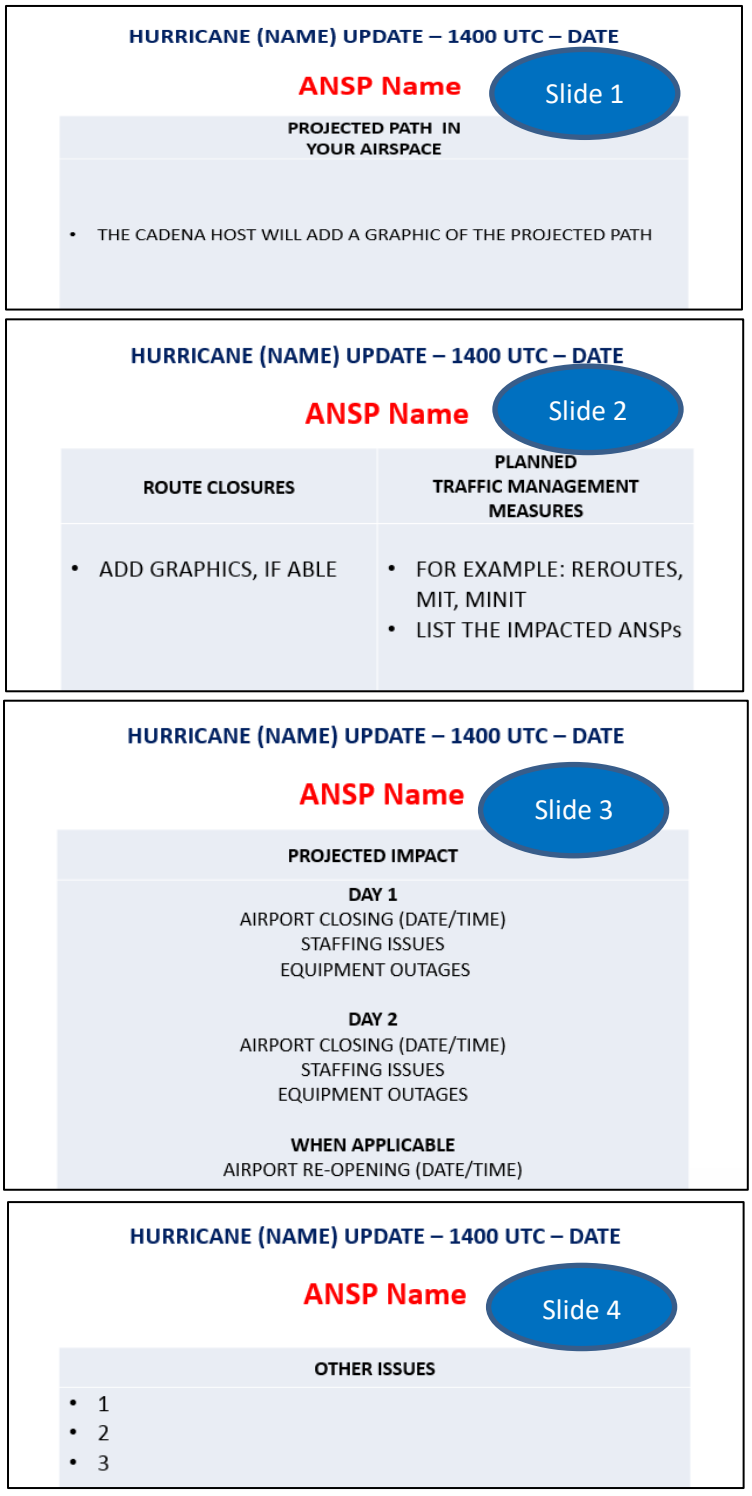
- Notify the requesting airline that the route is approved.
- Add the approved route to the PASA database.

APPENDIX A: SAMPLE WEEKLY PLANNING WEB CONFERENCE SLIDES





APPENDIX B: SAMPLE HURRICANE / TROPICAL STORM WEB CONFERENCE SLIDES



APPENDIX C: CADENA ATFM/CDM PLANNING WEB CONFERENCE FORMAT

CADENA participants agree to use the following web conference format. It follows the format specified in ICAO DOC 9971, *Manual on Collaborative Air Traffic Flow Management.*

Greeting and introductions

NOTE: A representative from IDAC's or EANA's FMU will open the GoToMeeting conference bridge and welcome participants to the web conference. This welcome by IDAC/EANA will serve as the roll call. Thus, the Host does not need to perform a roll call.

"Good morning to everyone and welcome to the (date) CADENA Planning Web Conference. We will be covering the time frame from XXXX UTC, (date) to XXXX UTC, (date). We will start with a brief overview of the weather followed by updates from the flow management units."

Situation

- The current situation is:

Issues

- We will be discussing:

Common Weather Products

- Working from: (Name and show a snapshot of the applicable weather product. Provide brief overview of the situation).

Planning discussion

- Ask each ANSP to provide a briefing on their information. The current briefing sequence is by geographic areas from south to north and then east to west across the regional airspace.
- Each ANSP should be prepared to brief the following topics:
  - Significant weather and atmospheric conditions:
    - Thunderstorm activity.
    - Turbulence.
    - Volcanic ash plumes.
  - Terminal discussion for select airports:
    - Projected terminal demand.
    - Airport constraints, such as construction projects or NAVAID outages, which may impact AARs and ADRs
  - Anticipated TMMs – terminal:
    - Expanded miles-in-trail.
    - Potential airborne holding.
    - Potential ground stops.
    - Triggering events.
  - En route discussion:

- En route constraints, such as frequency outages.
- NAVAID outages.
- Sector capacity issues.
- Route discussion and issues.

- Anticipated TMMs – en route:
  - Expanded miles-in-trail.
  - Potential airborne holding.
  - Special events.

Additions to the plan, including any pertinent tactical updates

- Provide any needed additions or clarifications.

Stakeholder input, comments, and questions

- Ask if there are any questions from the stakeholders.

Closing

- "Thank you for your participation. This concludes the (date) CADENA Planning Web Conference. Our next Planning Web Conference will be held on (date) at XXXX UTC."

APPENDIX D: CONTINGENCY EVENTS AND CHECKLISTS

There are fourteen checklists for the following events:

1. Evacuation of an ACC
2. Radar Failure
3. A/G Communication Failure
4. Telephone or Landline Failure
5. Power Failure
6. FDPS Failure
7. Staff Shortage
8. Work Stoppage (Strike)
9. Hurricane or Tropical Storm
10. Volcanic Eruption
11. Earthquake
12. Aircraft Accident/Incident
13. FMU Outage
14. Off-Nominal (Unusual) Event

1: Evacuation of an ACC	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
● 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	● Notify CADENA and ICAO leadership as soon as possible ● Gather information on: ○ 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 ***NOTE:*** *The situation may require scheduling a daily webex for the first few days of the event* ● For a potential long-term evacuation, discuss and coordinate alternate routes ● Evaluate potential demand on the alternate routes and coordinate TMMs, as applicable
2: Radar Failure	**Impacted Facility: ACC (Name) or TMA (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
● Stop departure traffic under your FMU's jurisdiction that is	● Notify CADENA and ICAO leadership ● Gather information on: ○ How long is the radar expected to be out of service?

filed to/through the impacted airspace • Notify your adjoining FMUs via landline • 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	○ What is the impact to demand and capacity? ○ Have aircraft diverted? ○ If so, how many and to which airports? • If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps • For a potential long-term outage, discuss and coordinate alternate routes
3: A/G Comm Failure	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
• Stop departure traffic under your FMU's jurisdiction that is filed to/through the impacted airspace • Notify adjoining FMUs via landline • Coordinate re-routes for existing, airborne traffic, if necessary • Coordinate airborne holding, if necessary • Notify stakeholders, as able • Post an Urgent Advisory on the CADENA OIS	• Notify CADENA and ICAO leadership • Gather information on: ○ How long is the A/G comm 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? • If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps • For a potential long-term outage, discuss and coordinate alternate routes
4: Telephone Or Landline Failure	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
• Notify adjoining FMUs via any means available • Post an Urgent Advisory on the CADENA OIS	• Notify CADENA and ICAO leadership • Gather information on: ○ How long will it take to restore the telephone system or landline to service? ○ What is the impact to demand and capacity? • If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps

5: Power Failure	Impacted Facility: ACC (Name) or TMA (Name)
Initial ATFM Action	**Follow-Up ATFM Actions**

• If necessary, stop departure traffic under your FMU's jurisdiction that is filed to/through the impacted airspace
• Notify adjoining FMUs via landline
• Coordinate re-routes for existing, airborne traffic, if necessary
• Coordinate airborne holding, if necessary
• Notify stakeholders, as able
• Post an Urgent Advisory on the CADENA OIS
	• Notify CADENA and ICAO leadership
	• Gather information on:
	  ○ How long is the power 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?
	• If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps

6: FDPS Failure	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**

• Notify adjoining FMUs via landline
• Notify stakeholders, as able
• Post an Urgent Advisory on the CADENA OIS
	• Notify CADENA and ICAO leadership
	• Gather information on:
	  ○ How long is the FDPS expected to be out of service?
	  ○ What is the impact to demand and capacity?
	• If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps

7: Staff Shortage	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**

• Notify adjoining FMUs via landline
• Coordinate TMMs, if needed, to balance demand if the capacity is reduced by the staff shortage
	• Notify CADENA and ICAO leadership
	• Gather information on:
	  ○ How long is the staff shortage expected to last?
	  ○ If capacity is reduced, will TMMs be required to manage traffic demand?
	• If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps

8: Work Stoppage (Strike)	**Impacted Facility: ACC (Name) or TMA (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**

• If necessary, stop departure traffic under your FMU's jurisdiction that is filed to/through the impacted airspace
• Notify adjoining FMUs via landline
• Coordinate re-routes for existing, airborne traffic, if necessary
• Coordinate airborne holding, if necessary
• Notify stakeholders, as able
• Post an Urgent Advisory on the CADENA OIS
	• Notify CADENA and ICAO leadership
	• Gather information on:
	  ○ How long is the strike expected to last?
	  ○ Will TMMs be required to manage excess traffic demand?
	• If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps

9: Hurricane or Tropical Storm	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**

• FMUs will monitor their tropical weather resources, and when possible, advise CADENA leadership 2 to 3 days before a hurricane or tropical storm will impact their FIR
• Prepare to gather and report information related to:
  ○ Projected path
  ○ Projected duration per affected airport
  ○ Projected capacity for airport recovery
  ○ If airport services are affected, then the priority for recovery
  ○ Projected airport closures and openings
  ○ Projected route closures and openings
  ○ Reports of significant equipment outages
  ○ Staffing issues
	• Starting 2 to 3 days before landfall at a participating ANSP, CADENA leadership will schedule a daily 1400 UTC (or at the time coordinated) CADENA Hurricane Web Conference
	• The Host will be selected based on the location and the projected path of the hurricane
	• Only those ANSPs affected by the hurricane and its bands, and those where traffic may be rerouted, will be required to participate in the hurricane web conference.
	• Notification of the pending hurricane web conference will be announced through the CADENA OIS
	• Impacted ANSPs will upload the applicable set of PowerPoint slides via the CADENA OIS for the Host by 1200 UTC (during U.S. daylight savings time) each day the hurricane web conference is conducted
	• As a backup, the slides can be emailed to the Host

○ Planned TMMs	
10: Volcanic Eruption	**Impacted Facility: ACC (Name) or TMA (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
● Notify adjoining FMUs via landline ● Notify stakeholders, as able ● Post an Urgent Advisory on the CADENA OIS ● Update the Volcanic Ash portion of the ATFM Daily Plan on the CADENA OIS	● If the situation is severe, notify CADENA and ICAO leadership ● Gather information on: ○ How significant is the eruption and its impact to airport and sector capacity? ○ Will TMMs be required to manage excess traffic demand? ○ Have aircraft diverted? ○ If so, how many and to which airports? ● If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps
11: Earthquake	**Impacted Facility: ACC (Name) or TMA (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
● Notify adjoining FMUs via landline ● Notify stakeholders, as able ● Post an Urgent Advisory on the CADENA OIS	● If damage is severe and traffic flow management will be required to manage the event, notify CADENA and ICAO leadership ● Gather information on: ○ Will TMMs be required to manage traffic demand to airports providing relief services? ○ Have aircraft diverted? ○ If so, how many and to which airports? ● If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps
12: Aircraft Accident / Incident	**Impacted Facility: TMA (Name) or Airport (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
● If the accident/incident has reduced airport or sector capacity ● Notify adjoining FMUs via landline ● Coordinate appropriate TMMs to manage the demand	● If accident/incident will require air traffic flow management to manage the event, notify CADENA and ICAO leadership ● Gather information on: ○ What is the reduced AAR or sector capacity? ○ Will TMMs be required to manage excess traffic demand?

• Post an Urgent Advisory on the CADENA OIS	○ Have aircraft diverted? ○ If so, how many and to which airports? • If circumstances require, CADENA leadership will schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps
13: FMU Outage	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
• If an FMU is rendered out of service, first consideration should be given to moving to a back-up facility • If a back-up facility is not available, notify CADENA leadership by any means available	• If circumstances require, CADENA leadership will schedule and conduct a CADENA ad hoc web conference, including adjoining FMUs, to relay available information and establish next steps
14: Off-Nominal (Unusual) Event	**Impacted Facility: ACC (Name)**
Initial ATFM Action	**Follow-Up ATFM Actions**
• Whichever FMU receives the information first, notify your adjoining FMUs • Notify stakeholders, as able • Post an Urgent Advisory on the CADENA OIS	• Notify CADENA and ICAO leadership as soon as possible • Gather information on: ○ What is the impact of the event to current and future air traffic operations? ○ What is the expected duration of the event? • 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 • For a potential long-term impact, discuss and coordinate an on-going communication strategy

APPENDIX E: ADDENDUM TO THE LETTER OF AGREEMENT

SUBJECT: AIR TRAFFIC FLOW MANAGEMENT (ATFM) COLLABORATION

1. PURPOSE

The purpose of this addendum is to facilitate the safe and efficient movement of air traffic and establish continuity of operations through Air Traffic Flow Management (ATFM) and Collaborative Decision Making (CDM) procedures between the ANSP1 FMU1 located in (city/country), and the ANSP1 FMU2 located in

(city/country). This addendum will promote coordination and collaboration between FMU1 and FMU2 regarding Traffic Management Measures (TMMs) and the routing of aircraft in and out of the ANSP1 FIR and the ANSP2 FIR. FMU1 and FMU2 will be the primary points of contact for coordinating TMMs and operations between ANSP1's ACC and ANSP2's ACC

2. SCOPE

This addendum establishes ATFM/CDM procedures and communications protocol that promote a seamless operational atmosphere which incorporates operational procedures and practices. The procedures outlined herein are to be used by the FMU1 and the FMU2 to assist in providing ATFM services.

This addendum is not intended to replace any local agreements or any other LOAs between the ANSP1's ACC and ANSP2's ACC.

3. BACKGROUND

Traffic Flow Management continues to evolve as new procedures and technologies are developed. As such, it is possible that FMU1 TMMs may include and affect departures from ANSP2's airports and ANSP2's airspaces. Likewise, FMU2 TMMs may include and affect departures from ANSP1's airports and ANSP1's airspaces.

ANSP1 and ANSP2 have established Air Traffic Services (ATS) operational agreements creating cross-border communications and a seamless operational atmosphere. This addendum incorporates FMU1's and FMU2's operational procedures and practices.

4. COORDINATION PROCEDURES

4.1. Communication Systems

The means of communication to be used for pre-tactical and tactical ATFM coordination shall be those listed in the main LOA as well as:

a. Dedicated commercial telephone numbers for ATFM coordination (commercial telephone numbers are shown in the annex to this addendum);
b. Web-based capabilities; and
c. Any other means of communication available.

4.2. low Management Coordination

The initiating FMU will request and start the coordination with the impacted FMU(s). The initiating FMU should bring, at a minimum, the following parameters to the coordination discussion:

a. Cause of flow control implementation;
b. Location where restrictions are applied (e.g., airports, fixes/waypoints, or airways);

c. Objects of restrictions (objects of restrictions shall be only the aircraft which are arriving or departing from the affected airport, portion of airspace, or portion of route, etc.);
d. Types of TMMs. (Several TMMs types are listed below, however, this list is not exhaustive and other TMMs may be developed and coordinated to meet operational needs.)
    - Miles-in-trail (MIT);
    - Minutes-in-trail (MINIT);
    - Fix balancing;
    - Re-routing;
    - Mandatory re-routing scenarios;
    - Level capping scenarios;
    - Re-routing;
    - Minimum departure intervals (MDIs);
    - Ground Stops (GS); and
    - Airborne holding.
e. Start/End time; and
f. Expected time of next coordination (if possible) or cancellation notice.

Information provision and/or coordination shall be done periodically while the flow management measures are being applied.

If urgent action is not necessary, flow management shall be requested **at least 180 minutes (OR EARLIEST POSSIBLE TIME)** prior to the time when the restriction becomes effective, to ensure that all Units have sufficient time to process the flow management measures and to collaboratively discuss any amendments to the measures to suit operational requirements.

5. RESPONSIBILITIES

5.1. Responsibilities of FMU1 operations are:
a. FMU1 will ensure FMU2 is informed of situations and conditions in the ANSP1's FIR that may require implementing TMMs that have an operational impact on ANSP2's airport/airspace;
b. FMU1 will coordinate with FMU2 before implementing TMMs that may impact ANSP2's airport/airspace presenting the parameters discussed in section 4.2d; and
c. FMU1 must include FMU2 TMMs in the ATFM operations plan (OP) when it is likely that the ANSP1's stakeholders will be affected by these measures.
d. After appropriate coordination, FMU1 must include FMU2 TMMs on the CADENA OIS (where applicable).

5.2. Responsibilities of FMU2 operations are:
a. FMU2 will ensure FMU1 is informed of situations and conditions in the ANSP2's FIR that may require implementing TMMs that have an operational impact on ANSP1's airport/airspace;
b. FMU2 will coordinate with FMU1 before implementing TMMs that may impact ANSP1's airport/airspace presenting the parameters discussed in section 4.2d; and
c. FMU2 must include FMU1 TMMs in the ATFM operations plan (OP) when it is likely that the ANSP2's stakeholders will be affected by these measures.

d. After appropriate coordination, FMU2 must include FMU1 TMMs on the CADENA OIS (where applicable).

5.3. Responsibilities of FMU1 and FMU2

a. To streamline coordination, FMU2 will be FMU1's sole point of contact with ANSP2 and FMU1 will be FMU2's sole point of contact with ANSP1 in regard to cross-border TMMs and routing of aircraft;
b. FMU1 and FMU2 will implement and manage TMMs, as necessary, to relieve congestion and to ensure the orderly flow of air traffic consistent with an equitable distribution of delays;
c. FMU1 and FMU2 will make every effort to limit the impact of TMMs on stakeholders and implement only those measures that will adequately address system constraints;
d. FMU1 and FMU2 will ensure that the most appropriate and least restrictive TMMs are applied;
e. The principal TMMs to be implemented will consist of those listed in section 4.2D of this document;
f. FMU1 and FMU2 will collaborate on the design of preferred routes and severe weather avoidance routes that involve the use of the ANSP1's airspace or resources and ANSP2's airspace or resources;
g. FMU1 and FMU2 shall cancel in a timely and effective manner, implemented TMMs, once the initiating FMU has determined that the relevant system constraint has been resolved; and
h. FMU1 and FMU2 will provide feedback and share data on the impact and assessment of joint TMMs, as required

6. EXEMPTED AIRCRAFT

The following flights shall be exempted from ATFM restrictions:

I. State Flights
II. Flights engaged in Search and Rescue Operations
III. Hospital/Medivac flights

In addition to those exemptions listed above, the FMU 1 and FMU 2 may pre-tactically coordinate any other flights that may be exempted from ATFM restrictions

7. IMPLEMENTATION

The procedures outlined in this addendum will be implemented by operational personnel at FMU1 and at FMU2.

The telephone numbers for FMU1 and FMU2 personnel can be found in Annex 2.

ACRONYMS

ACC	Area control centre
AAR	Airport arrival rate
ABHLD	Airborne hold
ADP	ATFM Daily Plan
ADR	Airport departure rate
AFP	Airspace flow program
AIM	Aeronautical Information Management
ALT	Altitude
ANSP	Air navigation service provider
ARO	Airport reservation office
ARR	Arrival
ATC	Air traffic control
ATCO	Air traffic controller
ATCSCC	Air Traffic Control System Command Center
ATCT	Airport traffic control tower
ATFM	Air traffic flow management
ATM	Air traffic management
ATO	Air Traffic Organization
ATS	Air traffic services
CANSO	Civil Air Navigation Services Organisation
CADENA	CANSO Air Traffic Flow Management Data Exchange Network for the Americas Americas
CDM	Collaborative decision making
CERAP	Combined center/radar approach control
CGNA	Centro de Gerenciamento da Navegação Aérea
CNS	Communication, navigation, surveillance
COCESNA	Corporacion Centroamericana de Servicios de Navegacion Area
DC-ANSP	Dutch Caribbean Air Navigation Service Provider
DECEA	Department of Airspace Control
EANA	Empresa Argentina de Navegación Aérea
ECNA	Empresa Cubana de Navegación Aérea
FAA	United States Federal Aviation Administration

FIR	Flight information region
FMU	Flow management unit
FXBAL	Fix balancing
GDP	Ground delay program
GS	Ground stop
ICAO	International Civil Aviation Organization
IDAC	Instituto Dominicano de Aviación Civil
INAC	Instituto Nacional de Aeronáutica Civil
JCAA	Jamaica Civil Aviation Authority
LAC3	Latin American and Caribbean CEO Committee
LVLCP	Level capping
MDI	Minimum departure interval
MIN	Minutes
MIT	Miles in trail
MINIT	Minutes in trail
NM	Nautical miles
NOTAM	Notice to airmen
OIS	Operational Information System
OTS	Out of service
PERTI	Plan, Execute, Review, Train, Improve
RERTE	Reroute
RIG	Regional Implementation Group
ROP	Regional Operations Plan
SAR	Search and rescue
SENEAM	Servicios a la Navegación en el Espacio Aéreo Mexicano
SPD	Speed
TMA	Terminal management area
TMC	Traffic management coordinator
TMM	Traffic management measure
TMO	Traffic management officer
TTCAA	Trinidad and Tobago Civil Aviation Authority
UAEAC	Unidad Administrativa Especial Aeronáutica Civil

U/S	Unserviceable
UTC	Coordinated universal time
VIP	Very important person