International Civil Aviation Organization

MIDANPIRG Steering Group

Fourth Meeting (MSG/4)
(Cairo, Egypt, 24 - 26 November 2014)

Agenda Item 4: MID Region Air Navigation Planning

MID REGION SURVEILLANCE STRATEGY

(Presented by the Secretariat)

SUMMARY

This paper presents the MID Region Mode S IC codes allocation process, MID Surveillance Strategy and the ADS-B surveillance implementation and monitoring.

Action by the meeting is at paragraph 3.

REFERENCES

- CNS SG/6 Report
- MIDANPIRG/14 Report
- MID Region Process for Mode S IC Codes Allocation

1. INTRODUCTION

1.1 Two types of radar are used for the surveillance of aircraft. Primary Surveillance Radar (PSR) uses the return from the aircraft structure to determine range and bearing. Secondary Surveillance Radar (SSR) triggers a response from aircraft equipped with a transponder and is able to obtain, in addition to range and bearing, the aircraft's identity and altitude other detail.

1.2 The ADS-B is not traditional radar based surveillance of aircrafts. ADS-B is a major change in surveillance philosophy – instead of using ground based radar to interrogate aircraft and determine their positions; each aircraft will broadcast its own position and then automatically report it. ADS-B surveillance is easier and less expensive to deploy than ground radar. This means that airspace which previously had no radar and only procedural separation services can now have the benefits of ATC services.

1.3 The CNS SG/6 meeting was successfully held in Tehran, Iran 9-11 September 2014.

2. DISCUSSION

2.1 The meeting may wish to recall that the MID Region IC codes are allocated in accordance with MIDANPIRG/13 *CONCLUSION 13/4-MID REGION PROCESS FOR MODE S IC CODES ALLOCATION*. The latest Mode S IC Allocations are at **Appendix A**.

2.2 MIDANPIRG/14 meeting was apprised of a recent incident where an IC Code conflict was observed; accordingly, the meeting emphasized that when programming Mode S Interrogators, Mode S Operators have to comply with the allocated IC provided in the latest issued IC allocation; and develop an IC and coverage map programming procedures, taking their own specificities into account. As a minimum, the local procedures have to include the following verification steps, to be completed for each interrogator parameter change:

a) verification of the compliance of the programming parameters with the IC allocation data, including: position of the radar; IC; lockout range and coverage map, if applicable;

b) verification of the validity status of the IC allocation used for programming;

c) verification of parameters related to II/SI Code Operation, if applicable and default parameters to apply when the coverage map is not correctly loaded;

d) when operating in a cluster, verification that all cluster States parameters are compliant with the IC allocation data; and

e) verification of the correct application of the programmed data, including following radar chain switch-over and switch-off/switch-on cycles.

2.3 MIDANPIRG/14 meeting noted that using the MICA application it is possible to extract the allocation and request for mode S IC codes for their own radars provided that they are registered and can access the MICA application at:

https://extranet.eurocontrol.int/http://webprisme.cfmu.eurocontrol.int/mica/Index.action.

2.4 Based on the above, MIDANPIRG/14 meeting urged States to assign focal points to use the MICA application; and request training on the application, as deemed necessary. In this respect the ICAO MID Regional Office sent State Letter AN 7/27-14/116 dated 27 April 2014, replies received from only five (6) States (Bahrain, Egypt, Kuwait, Qatar, Sudan and UAE), also no State requested training. The updated list of focal points is at **Appendix B**.

2.5 MIDANPIRG/14 meeting encouraged Mode S Radar Operators States to include the necessary verification in their local programming procedures; and tasked the CNS SG to include the verification procedure in the MID Region process for Mode S IC codes allocation. Therefore, the secretariat in coordination with EUROCONTROL updated the MID Region process for Mode S IC codes allocation as at **Appendix C** to this working paper. This process was reviewed by the CNS SG/6 meeting. Accordingly, the CNS SG/6 meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 6/12: MID REGION PROCESS FOR MODE S IC CODES ALLOCATION

*That, the MID Region process for Mode S IC codes allocation at **Appendix 5H** (Appendix C to this working paper) be adopted.*

2.6 MIDANPIRG/14 meeting noted that the updated MID Surveillance Strategy incorporates AN-Conf/12 Recommendation 1/7 and timelines for the ADS-B implementation. The meeting also reviewed the status of surveillance data exchange in the MID Region. Accordingly, the meeting urged States to share surveillance data in particular (ADS-B) data to enhance safety, increase efficiency and achieve seamless surveillance; and agreed to Conclusion 14/27 adopting the MID Surveillance Strategy as at **Appendix D**.

2.7 The meeting may wish to note that the ADS-B is one of the technologies mentioned in the GANP which supports many ASBU Modules in particular SURF, ASUR, SNET, ASEP, OPFL. Accordingly, ADS-B is an important technology enabler for the implementation of many ASBU modules.

2.8 Based on the above, the CNS SG/6 meeting encouraged States to implement ADS-B Out. Furthermore, the CNS SG/6 meeting reviewed the Draft template at **Appendix E**, to be used for the monitoring of the ADS-B out implementation and agreed that States and users provide their comments on the template to the ICAO MID Regional Office for the consolidation of a final version which may be included in volume III of the MID eANP. Accordingly, the meeting may wish to agree to the following Draft Conclusion :

Why	Encourage States to Plan, implement and report ADS-B implementation
What	ADS-B implementation plans and reports
Who	MSG/4 and States
When	November 2014 / 15 January 2015

DRAFT MSG CONCLUSION 4/XX: ADS-B IMPLEMENTATION AND DATA SHARING

*That, recognizing the importance of ADS-B technology; MID States are encouraged to plan/implement ADS-B and provide ICAO MID Regional Office by **15 January 2015** their plans/progress reports using **Appendix E**.*

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) endorse the CNS SG/6 Draft Conclusion in para 2.5;

b) encourage States that have not yet done so, to provide their focal point for Surveillance and MICA application;

c) support ADS-B implementation as appropriate;

d) review **Appendix E** and urge States to provide updates (progress reports) on ADS-B implementation by **15 January 2015**; and

e) agree on the Draft MSG Conclusion in para 2.8.

Mode S IC Allocation

Allocations

Region:	MID	Allocation Reference between:		and:		Ad hoc:	Yes
Country:		Allocation Status:	Issued	Cluster:		Regular:	Yes
Organisation:		Sensor Id:		Interrogator Code:		Processing Cycle:	

Allocation Ref	Organisation	Sensor ID	Status	IC	Effective Date	Cluster	Process ID	Country	Regions
MICA/ALLOC 461	NANSC	Aswan ERR	Issued	II = 02	2009-05-14		Ad Hoc 2009-05-	Egypt	MID
MICA/ALLOC 462	NANSC	Asyut ERR	Issued	II = 03	2009-05-14		Ad Hoc 2009-05-	Egypt	MID
MICA/ALLOC 464	NANSC	Hurghada ERR	Issued	II = 05	2009-05-14		Ad Hoc 2009-05-	Egypt	MID
MICA/ALLOC 465	NANSC	Mersa Matruh ERR	Issued	II = 06	2009-05-14		Ad Hoc 2009-05-	Egypt	MID
MICA/ALLOC 467	Lebanon DGCA	Baysour	Issued	II = 02	2009-04-23		Ad Hoc 2009-04-	Lebanon	MID
MICA/ALLOC 529	GACA	MADINAH	Issued	II = 04	2010-03-17		Ad Hoc 2010-04-	Saudi Arabia	MID
MICA/ALLOC 530	GACA	RAFHA	Issued	II = 05	2010-03-17		Ad Hoc 2010-04-	Saudi Arabia	MID
MICA/ALLOC 531	GACA	TURAIF	Issued	II = 10	2010-03-17		Ad Hoc 2010-04-	Saudi Arabia	MID
MICA/ALLOC 567	GACA	AL JOUF	Issued	II = 08	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 568	GACA	AL-WEJAH	Issued	II = 01	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 569	GACA	GASSIM	Issued	II = 03	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 570	GACA	HAIL	Issued	II = 02	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 571	GACA	KAIA	Issued	II = 08	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 572	GACA	TABUK	Issued	II = 06	2010-10-21		ICAC 11	Saudi Arabia	MID
MICA/ALLOC 615	MOTC	Muscat	Issued	II = 11	2010-06-29		Ad Hoc 2010-06-	Oman	MID
MICA/ALLOC 630	NANSC	Cairo ERR	Issued	II = 11	2011-04-07		ICAC 12	Egypt	MID
MICA/ALLOC 631	GACA	ABHA	Issued	II = 02	2011-04-07		ICAC 12	Saudi Arabia	MID
MICA/ALLOC 632	GACA	BAHA	Issued	II = 06	2011-04-07		ICAC 12	Saudi Arabia	MID
MICA/ALLOC 633	GACA	KFIA	Issued	II = 08	2011-04-07		ICAC 12	Saudi Arabia	MID
MICA/ALLOC 634	GACA	KKIA	Issued	II = 01	2011-04-07		ICAC 12	Saudi Arabia	MID
MICA/ALLOC 635	GACA	QAISUMAH	Issued	II = 06	2011-04-07		ICAC 12	Saudi Arabia	MID

Allocation Ref	Organisation	Sensor ID	Status	IC	Effective Date	Cluster	Process ID	Country	Regions
MICA/ALLOC 636	GACA	SODA	Issued	II = 11	2011-04-07		ICAC 12	Saudi Arabia	MID
MICA/ALLOC 644	GACA	Training Station	Issued	II = 09	2011-03-02		Ad Hoc 2011-03-	Saudi Arabia	MID
MICA/ALLOC 674	GACA	AFIF	Issued	II = 10	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 675	GACA	HARAD	Issued	II = 11	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 676	GACA	Khayber	Issued	II = 07	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 677	GACA	SHARURAH	Issued	II = 08	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 678	GACA	SHAYBAH	Issued	II = 07	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 679	GACA	WADI AL-DAWASIR	Issued	II = 07	2011-09-22		ICAC 13	Saudi Arabia	MID
MICA/ALLOC 743	BCAA	Site 116	Issued	II = 04	2011-12-17		Ad Hoc 2011-12-	Bahrain	MID
MICA/ALLOC 744	BCAA	Site 117	Issued	II = 09	2011-12-17		Ad Hoc 2011-12-	Bahrain	MID
MICA/ALLOC 823	Jordan CARC	ModeS-1	Issued	II = 12	2012-08-23		ICAC 15	Jordan	MID
MICA/ALLOC 884	DGCA Kuwait	ASR	Issued	II = 07	2013-07-25		ICAC 17	Kuwait	MID
MICA/ALLOC 973	Abu Dhabi	AUH	Issued	II = 01	2014-01-09		ICAC 18	United Arab Emirates	MID
MICA/ALLOC 974	Dubai Air	DWC Thales	Issued	II = 06	2014-01-09		ICAC 18	United Arab Emirates	MID
MICA/ALLOC 975	Dubai Air	DXB Thales	Issued	II = 03	2014-01-09		ICAC 18	United Arab Emirates	MID
MICA/ALLOC 977	GCAA Air	RAK	Issued	II = 05	2014-01-09		ICAC 18	United Arab Emirates	MID
MICA/ALLOC 1000	QCAA	SIR-S	Issued	II = 02	2014-06-26		ICAC 19	Qatar	MID

APPENDIX B

MODE S INTERROGATOR CODE (IC) ALLOCATIONS & SURVEILLANCE FOCAL POINTS

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Yemen				

APPENDIX C

EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION

Requirements for the coordinated allocation and use of Mode S Interrogator Codes in the ICAO Middle East Region

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The introduction of SSR Mode S interrogators requires a coordinated approach to the allocation and implementation of the Interrogator Codes.

Provisions regarding the implementation and monitoring of Mode S IC allocations have been defined by ICAO.

In the ICAO European region, the management of the plan is exercised by EUROCONTROL on behalf of the European regional office of ICAO. EUROCONTROL has put in place a cell (the MICA Cell) to provide the centralised service of Interrogator Code (IC) allocation to Mode S Operators through their competent Focal Point. To support the coordinated allocation and implementation of the IC to Mode S interrogators in the ICAO European region, the Mode S IC allocation process has been formalized in the “EUROCONTROL Specification for the Mode S IC Allocation Coordination and IC Conflict Management” document.

Mode S interrogators are also installed in the ICAO Middle East region. The operational coverage of some of these interrogators is overlapping coverage of Mode S interrogators installed in the ICAO European region. In order to avoid any Mode S IC conflict with operational Mode S interrogator, it is therefore critical to coordinate the Mode S IC allocation in the ICAO Middle East region in close cooperation with the ICAO Middle East regional office.The Mode S IC allocation process applied in the ICAO European region will also be applied for IC allocation to Mode S interrogators in the ICAO Middle East region. This process is based on 168 days (approximately 6 months) cycles, aligned on AIRAC effective dates. The IC allocation to Mode S interrogators in the ICAO Middle East region and the ICAO European region will be processed together during the same MICA cycles.

This document defines processes applicable to the use of the centralised Mode S interrogator code allocation service in charge of coordinating interrogator code allocations within the ICAO European region and ICAO Middle-East region. It specifies the detailed procedures for Mode S Operators to obtain a coordinated Mode S interrogator code and particularly the interfaces between the Mode S Operators, the single ICAO Middle-East Regional Officer CNS acting as Focal Point for all competent States of ICAO Middle-East region, and the EUROCONTROL centralised Mode S interrogator code allocation service.

This document also specifies the procedures in place to manage interrogator code conflicts and the resolution of issues with respect to the interrogator code allocation plan.

In addition, the IC allocation in the ICAO European region relies on required Mode S interrogator performances and airborne carriage. The last part of this document introduces recommended functionalities for Mode S interrogators and transponders which could compromise future IC allocations if not implemented in that region.

1. Introduction

1.1 Purpose of the document

The purpose of this document is to lay down recommendations and requirements for an efficient support of the EUROCONTROL MICA Cell to the allocation of Mode S Interrogator Code by the ICAO Middle East regional office.

It describes the process and procedures in order to coordinate the Mode S Interrogator Code (IC) allocation for Mode S interrogators with a fixed position within the International Civil Aviation Organisation (ICAO) Middle-East (MID) region.

This document defines the procedures and the role of the following parties involved in the process:

- Mode S Operators
- ICAO MID regional office
- International Organisations
- MID Focal Point(s)
- EUROCONTROL Mode S IC Allocation Cell (hereinafter MICA Cell)

The document also describes the management and resolution of IC allocation and IC conflict issues.

1.2 Context

Whilst traditional Mode A/C Secondary Surveillance Radar (SSR) stations continuously interrogate all aircraft within their range, Mode S interrogators perform selective interrogations.

In order to avoid ambiguity in the operation of the system it is essential that each eligible Mode S interrogator is allocated an eligible Interrogator Code (IC) and is protected from interference by other Mode S interrogators operating in overlapping or contiguous airspace. The coverage areas of two Mode S interrogators using the same IC must not overlap, except if they are grouped in a cluster or if other appropriate operational mitigations are in place.

The introduction of Mode S interrogators has identified the need for a coordinated approach to the allocation and implementation of the ICs used by ground-based, airborne and shipborne platforms.

Note: systems such as ACAS or current Multilateration systems do not require the co-ordinated allocation of an IC. Even if they use Mode S interrogations and replies, they do not rely on "All Call" for acquisition or perform lockout.

Interrogator Codes can be either Interrogator Identifiers (II) or Surveillance Identifiers (SI). The design of the Mode S system limits the number of Interrogator Codes available (excluding II zero) to 15 II codes and 63 SI codes. For more information, please refer to ANNEX A.

Due to the limited number of ICs, it is necessary to have a centralised IC allocation system to ensure an optimised allocation and a safe operation. In the ICAO EUR region, the centralised IC allocation system is exercised by EUROCONTROL on behalf of the European regional office of ICAO. The MICA Cell has been created to provide the centralised service of IC allocation to Mode S Operators through their competent State Focal Point.

In 2011, the ICAO MID regional office requested EUROCONTROL to formally provide support for Mode S interrogator code allocation in ICAO MID region. It has been agreed that the MICA Cell will also support the ICAO MID regional office, with the same standard bi-annual MICA cycle (see Section 5) as that for Mode S interrogators within EUR region. This includes a coordinated listing of IC and coverage for Mode S interrogators in MID region. It has also been agreed that a single ICAO MID Regional Officer CNS will coordinate directly with the MICA Cell for all countries in MID region.

1.3 Abbreviations

ANSP	Air Navigation Service Provider
EANPG	European Air Navigation Planning Group
EMS	European Mode S Station
EU	European Union
EUR	Europe (ICAO region)
IC	Interrogator Code
ICAO	International Civil Aviation Organisation
ICD	Interface Control Document
II	Interrogator Identifier
MICA	Mode S Interrogator Code Allocation
MICoG	Mode S Interrogator Code Coordination Group
MID	Middle-East (ICAO region)
SGEG	Surveillance Ground Environment Group
SI	Surveillance Identifier
SSR	Secondary Surveillance Radar
TRD	Test, Research and Development

1.4 Definitions

For the purpose of this EUROCONTROL Specification, the following definitions are applicable.

Cluster: a set of Mode S interrogators connected with each other in the same network and using the same IC to share track information in order to allow aircraft acquisition already acquired by other stations in the same cluster.

Competent State:

(a) in the case of an ANSP from an EU Member State or States having chosen to transpose the EU regulation, the State that has certified the provider in accordance with Commission Regulation (EC) No 1035/2011 repealing Regulation 2096/2005;

(b) in other cases for an EU Member State or States having chosen to transpose the EU regulation, the State within the area of responsibility in which the Mode S Operator operates, or intends to operate, an eligible Mode S interrogator.

(c) for States not subject to EU regulation, the State within the area of responsibility in which the Mode S Operator operates, or intends to operate, an eligible Mode S interrogator in accordance with the ICAO EUR FASID and Doc024 (European Principles And Procedures for the Allocation of Secondary Surveillance Radar Mode S Interrogator Codes (IC)).

(d) States from ICAO MID region

Eligible Interrogator Code: any code among the II codes and the SI codes, except:

1. II code 0;
2. the interrogator code(s) reserved for military entities, including intergovernmental organisations in particular North Atlantic Treaty Organisation (NATO) management and allocation;

Eligible Mode S Interrogator: Mode S interrogator for which at least one of the following conditions is satisfied:

1. the interrogator relies, at least partly, on Mode S all call interrogations and replies for Mode S targets acquisition; or
2. the interrogator locks out acquired Mode S targets in reply to Mode S all call interrogations, permanently or intermittently, in part or totality of its coverage; or
3. the interrogator uses multi-site communications protocols for data link applications;

Focal Point: a person representing one or several competent States or an international organisation applying for interrogator codes, who is responsible for the coordination of all matters concerning the IC allocations between the MICA Cell and the Mode S Operators in his area of oversight.

Interrogator Code Allocation Plan: the most recently approved complete set of interrogator code allocations.

Interrogator Code Allocation Plan Proposal: a proposal for a complete set of IC allocations, submitted by the interrogator code allocation service for approval by competent States.

Interrogator Code Allocation System: means a system within the European Air Traffic Management Network, and the associated procedures, through which a centralised service of interrogator code allocation (hereinafter interrogator code allocation service), for dealing with the processing of interrogator code applications and the distribution of an interrogator code allocation plan proposal, is provided for Mode S Operators through competent States.

Interrogator Code Application (hereinafter IC application): an application from a Mode S Operator for the allocation of an eligible interrogator code.

Interrogator Code Conflict: uncoordinated coverage overlap of two or more Mode S interrogators operating on the same interrogator code, potentially resulting in aircraft remaining undetected by at least one of the Mode S interrogators.

Lockout: protocol that allows the suppression of Mode S all call replies from already acquired Mode S targets.

Lockout Coverage: Mode S interrogator configuration defining where and how to apply lockout to Mode S targets. The Lockout Coverage can be provided in different formats depending on Mode S interrogator capabilities: European Mode S Coverage Map ICD, lockout range per sector, unique lockout range.

Lockout Coverage in European Mode S Coverage Map ICD format Map (hereinafter Lockout Map): Mode S interrogator configuration file defining where and how to apply lockout to Mode S targets.

MICA Cell: the EUROCONTROL Team operating the interrogator code allocation system in accordance with its associated procedures in order to provide a centralised interrogator code allocation service.

MICA Cycle: a recurrent 6 monthly procedure for Mode S IC allocation.

MICA Cycle Effective Date: the last date of a given MICA cycle.

MICA website: the Mode S IC Allocation web-based application (hereinafter MICA website) is used to coordinate and manage the allocation of eligible IC to eligible Mode S interrogators in ICAO EUR region and ICAO MID region. The access to the web application is managed through the Eurocontrol OneSkyOnline portal. The MICA website is part of the interrogator code allocation system.

Mode S: cooperative surveillance technique for air traffic control which enables the selective interrogation of aircraft and the extraction of air derived data through which new air traffic management functionalities can be developed.

Mode S All Call interrogations: messages that are normally used by Mode S interrogators to acquire Mode S targets entering their area of coverage.

Mode S interrogator: a system composed of antenna and electronics, supporting addressing of individual aircraft through the Mode Select, known as Mode S.

Mode S Operator: a person, organisation or enterprise operating or offering to operate a Mode S interrogator, including:

(a) Air navigation service providers;

(b) Mode S interrogators manufacturers;

(c) Airport operators;

(d) Military authorities;

(e) Research establishments;

(f) Any other entity entitled to operate a Mode S interrogator;

Mode S target: a platform equipped with a Mode S transponder.

Third Country: a country where the Mode S IC allocation is not coordinated by the EUROCONTROL MICA Cell.

1.5 References

[RD 1] ICAO Annex 10 to the Convention on International Civil Aviation

Aeronautical Telecommunications

Volume IV Surveillance and Collision Avoidance Systems

Amendment 85 or latest

[RD 2] EUROCONTROL Specification for the Mode S IC Allocation Coordination and IC Conflict Management
EUROCONTROLSPEC153
14th June 2013

1.6 Document structure

Section 2 describes how the IC Allocation coordination is organized in ICAO European region. The IC Allocation status in the ICAO European region and ICAO Middle East region is also provided in this chapter.

Section 3 provides details about the actors and their role in the IC allocation process.

Section 4 details the procedure to submit an IC application in order to request an IC allocation.

Section 5 details the Mode S IC allocation cycle (MICA cycle) which is the default procedure for processing IC applications.

Section 6 details the Ad-Hoc allocation process which is an alternative but more constraining procedure to process IC applications.

Section 7 provides details about the IC conflict reporting procedure.

Section 8 provides details on how to resolve IC allocation and conflict issues.

Section 9 provides some guidance for IC allocation in ICAO Middle East Region. In particular the Mode S interrogator performances are discussed.

2. IC Allocation Coordination in Europe

2.1 Organization

Provisions regarding the implementation and monitoring of Mode S IC allocations have been defined by ICAO.

In the ICAO EUR region, the management of the plan is exercised by EUROCONTROL on behalf of the European regional office of ICAO.

EUROCONTROL has put in place the MICA Cell to perform the allocation of the Interrogator Codes. In addition the Mode S Interrogator Codes Co-ordination Group (MICoG) had been created to oversee the allocation process and provide guidance to the MICA Cell. Presently, the Surveillance Ground Environment Group - Mode S Interrogator Codes Co-ordination Group (hereinafter SGEG-MICoG) performs this task. The SGEG-MICoG members are the Focal Points representing the National Regulatory Authorities of European States and those international organisations applying for IC.

The Focal Points are also responsible for the coordination of all matters concerning the IC allocations between the MICA Cell and the Mode S Operators in their area of oversight.

The Figure 1 here blow depicts the co-ordination for IC allocation to Mode S interrogators in ICAO EUR region.

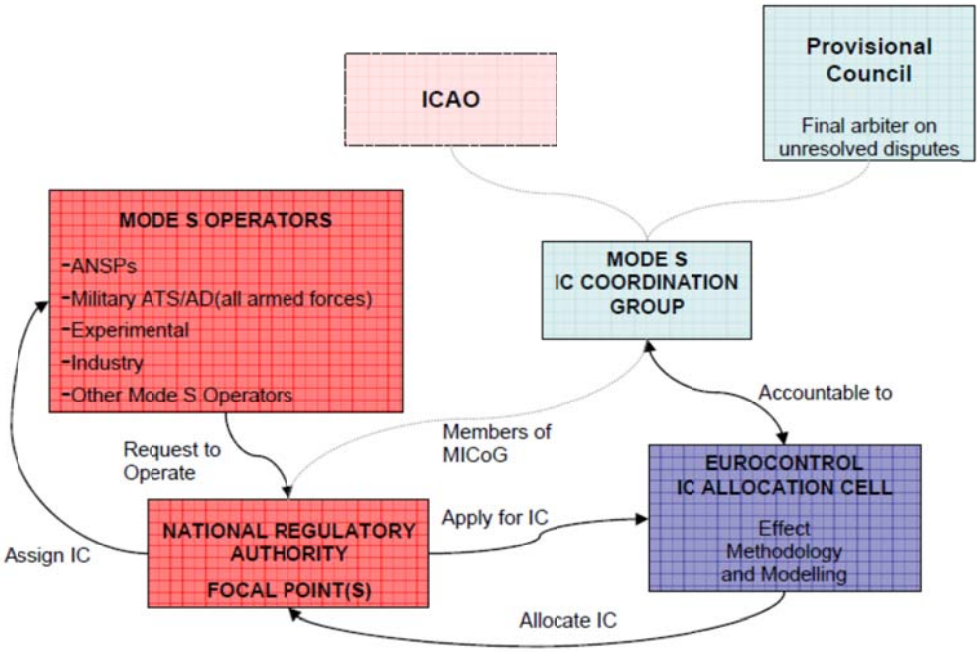


Figure 1: Mode S IC Allocation Coordination in Europe

2.2 IC Allocations Framework

IC allocation started with deployment of the first Mode S interrogators in Europe. The deployment of more Mode S interrogators required a coordinated process which was formalized in 2005:

Mode S Interrogator Codes Allocation Process 1.0

29 September 2005

From that date, the Mode S IC allocation is managed in cycle of 6 months.

To enforce the requirements and responsibilities on each participant, the following European Regulation was issued in 2009:

COMMISSION REGULATION (EC) No 262/2009 of 30 March 2009

laying down requirements for the coordinated allocation and use of Mode S interrogator codes for the single European sky

In 2013, the "EUROCONTROL Specification for the Mode S IC Allocation Coordination and IC Conflict Management" document ([RD 2]) has been issued. This EUROCONTROL specification defines processes applicable to the use of the centralised Mode S interrogator code allocation service (managed by the EUROCONTROL MICA Cell) in charge of coordinating IC allocations within the ICAO EUR region and ICAO MID region. It superseded the "Mode S Interrogator Codes Allocation Process 1.0" document identified above.

This document specifies the detailed procedures for Mode S Operators to obtain a coordinated Mode S IC and particularly the interfaces between the Mode S Operators, the Focal Points representing competent States in the ICAO EUR region, the single ICAO MID Focal Point representing all competent States of ICAO MID region and the EUROCONTROL centralised Mode S interrogator code allocation service.

This document also specifies the procedures in place to manage interrogator code conflicts and the resolution of issues with respect to the interrogator code allocation plan.

EU Member States that comply with this specification comply with a number of regulatory provisions of the European Regulation identified above.

In addition, a web application, called MICA website, has been developed to improve the processing and coordination of IC Allocation to Mode S interrogators in the European region.

2.3 IC Allocation Status

At the end of MICA Cycle 19 (June 2014), 364 Mode S interrogators were allocated an IC, either an II code or an SI code, in the ICAO EUR region.

The Figure 2 here below depicts the IC Allocation Status in the ICAO EUR region at the end of MICA Cycle 19.

Mode S interrogators are also installed in ICAO MID region. The operational coverage of some of these interrogators is overlapping coverages of Mode S interrogators installed in ICAO EUR region. In order to avoid any Mode S IC conflict with interrogator already operational in Mode S, it is therefore critical to coordinate the Mode S IC allocation in ICAO MID region in close cooperation with the ICAO MID regional office.

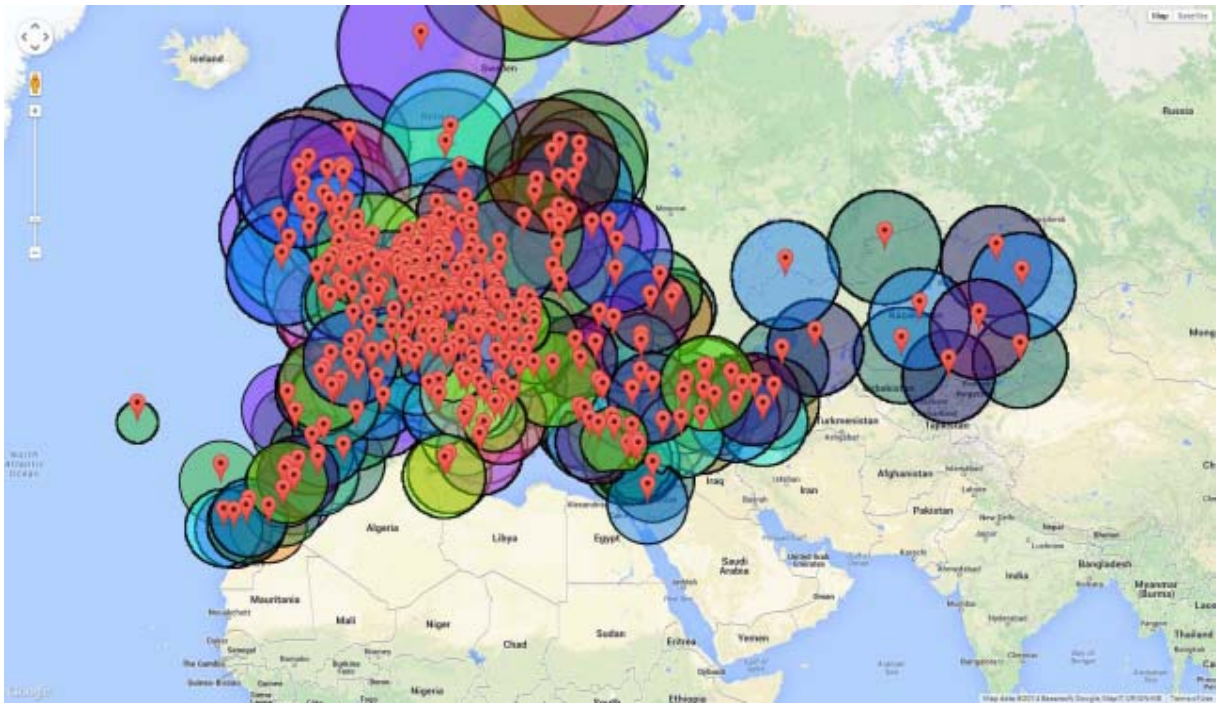


Figure 2: IC Allocation Status in European region at the end of MICA Cycle 19

At the end of MICA Cycle 19 (June 2014), 38 Mode S interrogators were allocated an II code in the Middle East region.

The Figure 3 here below depicts the IC Allocation Status in the ICAO MID region at the end of MICA Cycle 19.

Figure 3: IC Allocation Status in Middle East region at the end of MICA Cycle 19

3. General Requirements and Responsibilities

3.1 Focal Point Nomination

The ICAO MID regional office **shall** nominate an ICAO Middle East Regional Officer CNS to act as MID Focal Point for all Mode S Operators within the ICAO Middle East region. The MID Focal Point is responsible for the coordination of all matters concerning the allocation of ICs between the MICA Cell and Mode S Operators that operate in a State of the ICAO MID region.

The ICAO MID regional office **should** nominate a backup MID Focal Point to support and to replace the MID Focal Point in order to ensure continuity of service.

Note: It is expected that the Focal Point availability is ensured during standard business hours. There is no requirement for 24 hours a day, 7 days per week (24/7) availability.

The ICAO MID regional office **should** provide known points of contact for third countries to the MICA Cell through their MID Focal Point(s).

3.2 Focal Point Responsibilities

MID Focal Point(s) **shall** be registered on the MICA website. Prior to MICA website registration, MID Focal Point(s) **shall** self-register on the EUROCONTROL OneSkyOnline portal[1].

MID Focal Point(s) **shall** inform their respective civil and military Mode S Operators of their responsibilities described in this document.

MID Focal Point(s) **shall** transmit to the MICA Cell the MICA website registration requests they have received and accepted from Mode S Operators representing either civil or military organisations under their responsibility.

MID Focal Point(s) **shall** inform the MICA Cell within 6 months of when a Mode S interrogator ceases operation in order to permit the withdrawal of the corresponding IC allocation.

MID Focal Point(s) **shall** revalidate the IC allocations under their responsibility every 5 years and confirm to the MICA Cell via e-mail whether the issued IC allocations are still in use. This revalidation is to occur every 5 years following the effective date of the issued IC allocation. The IC allocation system automatically identifies which IC allocations need to be revalidated and notifies the MID Focal Point(s) for action. An IC allocation that has not been revalidated may be withdrawn from the allocation plan if it is no longer in use (see Section 3.5).

Note: The effective date of an IC allocation is either the end date of the MICA cycle (see Section 5) or the end date of the Ad-Hoc allocation process (see Section 6). The effective date of an IC allocation is indicated on the MICA website and will be part of any exported IC allocation file from the website.

3.3 Mode S Operator Responsibilities

Mode S Operators **should** be registered on the MICA website. Prior to this registration, they **shall** self-register on the EUROCONTROL OneSkyOnline portal[2] and send a request to their responsible MID Focal Point(s) to enable access to the MICA website.

[1] https://extranet.eurocontrol.int/http://was.eurocontrol.int/elsh/registerNewUserForApplication.do?eurocontrolresourceid=circa

[2] https://extranet.eurocontrol.int/http://was.eurocontrol.int/elsh/registerNewUserForApplication.do?eurocontrolresourceid=circa

Mode S Operators **shall** only operate an eligible Mode S interrogator, using an eligible IC and coverage map if they have received an issued IC allocation, for this purpose, from their responsible MID Focal Point(s).

Mode S Operators **shall** ensure that all Mode S interrogators under their responsibility of operation are programmed with the latest issued IC allocation.

Mode S Operators **shall** report to their responsible MID Focal Point(s) (at least every six months) any update on the installation and operation of eligible Mode S interrogators:

- Any change in the installation planning **shall** be reported.
- Any change in the operational status of the eligible Mode S interrogators **shall** be reported.

Mode S Operators **shall** develop their IC and associated lockout coverage programming procedures, to take into account their own specific arrangements. If Mode S Operators rely on the Mode S interrogator manufacturer to program the Mode S interrogator, they **shall** ensure that the manufacturer has developed programming procedures.

As a minimum, procedures **shall** include the following verification steps, to be completed for each IC allocation programming:

1. Verification of the compliance of programming parameters with the IC allocation data, including:
    - Position of the radar;
    - IC;
    - Lockout range and coverage map.
2. Verification of the validity status of the IC allocation used for programming.
3. Verification of following parameters:
    - Parameters related to II/SI Code Operation;
    - Default parameters to apply when the coverage map is not correctly loaded, if any.
4. When operating in a cluster, verification that the relevant parameters of cluster states are compliant with the IC allocation data.
5. Verification that the programmed data, including following radar chain switch-over and switch-off/switch-on cycles are applied correctly.

The procedure results **shall** be recorded, dated, signed and archived for future reference.

3.4 International Organisation Responsibilities

International Organisations **shall** only operate an eligible Mode S interrogator, using an eligible IC and coverage map if they have received an issued IC allocation, for this purpose, from their responsible MID Focal Point(s).

International Organisations intending to operate, or operating, an eligible Mode S interrogator, using an eligible IC and coverage map, **shall** comply with all Mode S Operator responsibilities described in the current document.

3.5 MICA Cell Responsibilities

The MICA Cell **shall** maintain the interrogator code allocation plan.

The MICA Cell **shall** maintain the MICA website.

The MICA Cell **shall** inform Focal Point(s) about IC allocations that need to be revalidated (after the 5-year period).

The MICA Cell **shall** coordinate with the responsible Focal Point(s) when an IC allocation has not been revalidated. If it is determined that the IC allocation is no longer in use, it may be withdrawn from the allocation plan.

The MICA Cell **shall** develop and maintain complementary guidance material on the operation of the centralised Mode S interrogator code allocation service.

3.6 IC Allocation Coordinated Area

For the EUR region, the MICA Cell manages the Mode S IC Allocation coordination on behalf of the European regional office of ICAO.

The MICA Cell is also supporting the Middle East regional office in the coordination and allocation of Mode S ICs for the ICAO Middle East Region.

The list of countries where the Mode S IC Allocation coordination is managed or supported by the MICA Cell can be downloaded from the MICA website (MICA – List of Coordinated Countries.doc). This list provides the status at a given date and may be subject to modification.

Where a potential overlap exists between the coverage of an eligible Mode S interrogator located within the area of responsibility of a competent State whose IC allocation is carried out through the MICA Cell and the coverage of a Mode S interrogator located within the area of responsibility of a third country which is not in the list of coordinated countries, provided that the MID Focal Point(s) has communicated a point of contact for the third country to the MICA Cell, the MICA Cell **shall**:

a. inform the third country of the safety requirements related to the allocation and use of interrogator codes;

b. coordinate the use of ICs with that third country

4. IC Application Procedures

4.1 Mode S Operator Responsibilities

Civil or military Mode S Operators intending to operate, or operating, an eligible Mode S interrogator for which no IC has been allocated, **shall** submit an IC application to the responsible MID Focal Point, including the following key items, as a minimum:

- A unique application reference from the competent State;
- Full details of the Mode S Operator point of contact for Mode S IC allocation matters;
- Mode S interrogator name;
- Mode S interrogator use (operational or test);
- Mode S interrogator position using the World Geodetic System 1984 (WGS 84) reference (Latitude and Longitude in degree, minute, seconds format);
    - If the Mode S interrogator position is sensitive information (e.g. military interrogators), that position may be accurate to the minute.
- Antenna centre height above ground and ground altitude above mean sea level;
- Rotation period;
- Mode S interrogator manufacturer and model;
- Planned date of first Mode S transmission;
- Planned date of end of transmission in case of temporary allocation;
- Ad-Hoc allocation process requested;
    - The Operator **shall** justify why the IC application is to follow the Ad-Hoc allocation process. No justification is required if the IC application is for a TRD Mode S interrogator.
- Requested Mode S coverage;
    - expressed as a range (in NM) per sector
- Specific operational requirements;
- SI code capability;
- “II/SI code operation” capability;
- EMS Map ICD coverage map capability.
- Mode S interrogator operating in cluster or not.
    - second IC requested or not in case of cluster

Note: Fixed operational interrogators are normally allocated a single IC, unless they are operated in a cluster. In that case, a second IC may be allocated to the cluster for fallback modes of operation, and to test and integrate new clustered interrogators.

Mode S Operators **shall** either submit an IC application by using the MICA website or through the responsible MID Focal Point(s).

Note: An IC application form has been developed for this purpose and can be downloaded from the MICA website or from the EUROCONTROL MICA webpage.

When an IC application is submitted using the MICA website, an automatic notification e-mail is sent to inform the responsible MID Focal Point(s) and the MICA Cell.

Mode S Operators **shall** inform their MID Focal Point(s) of any changes in the installation or planning of eligible Mode S interrogators as soon as possible and at least every six months. IC applications which have not yet been processed **shall** also be updated to reflect those changes.

Note: The planned date of first Mode S transmission provided in an IC application will determine when the IC application will be processed by the MICA Cell. Therefore, once the planned date of first Mode S transmission changes and the IC application has not been processed, it is important to update this date information in the IC application.

4.2 MID Focal Point Responsibilities

MID Focal Point(s) **shall** check the validity of IC applications received from Mode S Operators, before they are submitted to the Mode S IC allocation system. The validity check shall include the key items listed in Section 4.1. That validity check depends on the way the IC application has been submitted by the Mode S Operator:

- If the IC application has been directly submitted on the MICA website, the MID Focal Point is informed by a notification e-mail sent by the MICA website. The MID Focal Point **shall** then use the MICA website to review and acknowledge this IC application.

  Upon acknowledgement, an automatic notification e-mail is sent by the MICA website to inform the IC application creator, the responsible MID Focal Point(s) and the MICA Cell.

- If the MID Focal Point has received from a Mode S Operator an IC application which has not been submitted on the MICA website, the MID Focal Point **shall** review and submit this IC application on the MICA website.

  Upon submission, an automatic notification e-mail is sent by the MICA website to inform the responsible MID Focal Point(s) and the MICA Cell.

- In the event of MICA website service unavailability for MID Focal Point IC Allocation submission:

  1. The MID Focal Point **may** submit the IC application by e-mail to the MICA Cell accompanied by the appropriate form which has been developed for that purpose (the IC application form can be downloaded from the MICA website or from the EUROCONTROL MICA webpage). In this case the MID Focal Point **shall** add full details about the MID Focal Point who is responsible for the coordination of the Mode S IC Allocation.

  2. Once the MICA Cell has submitted the IC application on the MICA website, the MID Focal Point **shall** review and acknowledge this IC application using the MICA website when service availability is resumed.

     Upon acknowledgement, an automatic notification e-mail is sent by the MICA website to inform the responsible MID Focal Point(s) and the MICA Cell.

MID Focal Point(s) **shall** submit and acknowledge IC applications on the MICA website before the requirement freeze date of the MICA cycle preceding the Mode S interrogator planned date of first Mode S transmission.

Note: Key MICA cycle dates are available on the MICA website.

IC applications requesting the Ad-Hoc allocation process (see Section 6) **shall** be submitted and acknowledged on the MICA website by the responsible MID Focal Point before being processed. IC applications may be processed in Ad-Hoc once issued IC allocations of the current cycle are published.

MID Focal Point(s) **shall** report to the MICA Cell any change in the installation planning of eligible Mode S interrogators received from Mode S Operators. IC applications which have not yet been processed **shall** be updated to reflect those changes.

4.3 MICA Cell Responsibilities

The MICA Cell **shall** validate IC applications on the MICA website in terms of their compliance with the format and data conventions, and for completeness, accuracy and timeliness.

- If the IC application cannot be validated (e.g. errors), the MICA Cell shall contact the responsible Focal Point(s) for corrective actions.
- Validated IC applications **shall** be integrated into the system by the MICA Cell.

  Upon integration, an automatic notification e-mail is sent by the MICA website to inform the IC application creator, the responsible Focal Point(s) and the MICA Cell.

If an IC application is provided by a Focal Point to the MICA Cell by e-mail:

1. The MICA Cell **shall** submit this IC application on the MICA website.

   Upon submission, an automatic notification e-mail is sent by the MICA website to inform the responsible Focal Point(s) and the MICA Cell that a new IC application has been created.
2. Once the Focal Point has acknowledged the IC application on the MICA website, the MICA Cell **shall** integrate this IC application. The IC application is then ready to be processed.

   Upon integration, an automatic notification e-mail is sent by the MICA website to inform the responsible Focal Point(s) and the MICA Cell.

The MICA Cell **shall** process submitted IC applications within the adequate MICA cycle on the basis of their planned date of first Mode S transmission (except for IC applications that follow the Ad-Hoc process).

5. Mode S IC Allocation Cycle

The IC allocation cycle is the standard procedure for processing IC applications and to issue corresponding IC allocations. An IC application is submitted to request an allocation for a new eligible Mode S interrogator or to request an update of an existing IC allocation.

There are only two Mode S IC allocation process cycles per year (at 168 days intervals). Each cycle is composed of 4 periods and foresees a contingency of 14 days.

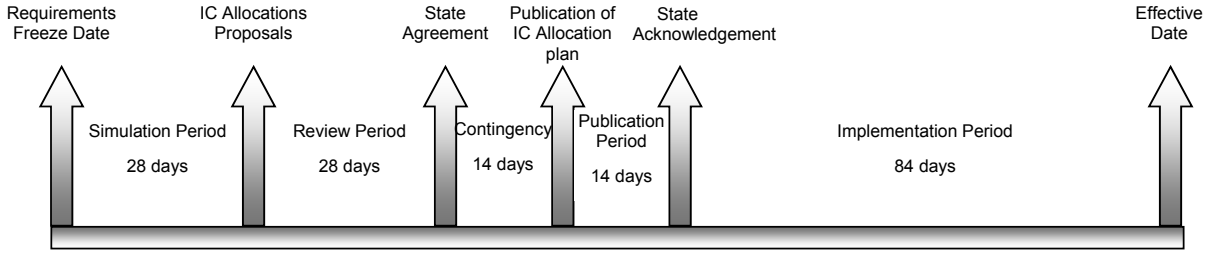


Figure 4: Mode S IC Allocation cycle (MICA cycle)

A flowchart describing the MICA cycle is provided in ANNEX C.

5.1 Simulation Period

The simulation period of the MICA cycle lasts 28 days. During this period, the MICA Cell performs interrogator code allocation plan update simulations and prepares a proposed update of the interrogator code allocation plan. This proposed update is to be approved during the subsequent review period.

5.1.1 Mode S Operator Responsibilities

This period does not apply to Mode S Operators.

5.1.2 MID Focal Point Responsibilities

This period does not apply to MID Focal Points.

5.1.3 MICA Cell Responsibilities

During the simulation period of a Mode S IC Allocation Cycle, the MICA Cell **shall**:

- perform interrogator code allocation plan update simulations on the basis of the pending IC applications
- prepare a proposed update of the interrogator code allocation plan for approval by the Focal Points representing the competent States that are affected by it

At the end of the 28-day simulation period, the MICA Cell **shall** create IC allocation proposals covering:

- pending IC applications for new Mode S interrogators,
- pending IC applications to modify the IC allocation of existing Mode S interrogators,

- changes to existing IC allocations impacted by the proposed interrogator code allocation plan update[3].

Upon creation of the IC allocation proposals, an automatic e-mail notification is sent by the MICA website to inform all Focal Points and the MICA Cell. This notification contains the list of all IC allocation proposals that constitute the proposed interrogator code allocation plan update.

The proposed update of the interrogator code allocation plan **shall** be free of IC conflict.

The IC allocations proposed by MICA Cell **shall** to the greatest extent meet the following operational requirements of the IC applications:

- Mode S interrogator planned date of first Mode S transmission
- Requested Mode S coverage
- Any specific operational requirements

IC allocation proposals **shall** be available online on the MICA website where they can be accessed by all Focal Points for review.

5.2 Review Period

The review period of the MICA cycle lasts 28 days. During this period, the Focal Points review the IC allocation proposals that constitute the proposed interrogator code allocation plan update. An acknowledgement is required from the Focal Points representing competent States that are affected by the proposed interrogator code allocation plan.

5.2.1 Mode S Operator Responsibilities

Mode S operator may access the MICA website to consult the status of the IC allocations proposed for the Mode S interrogators that they operate or plan to operate.

Mode S operators shall not program IC allocation proposals in Mode S interrogators.

5.2.2 MID Focal Point Responsibilities

The proposed updated interrogator code allocation plan **shall** be subject to the approval, through their MID Focal Point(s), by all competent States that are affected by the update of the plan.

MID Focal Point(s) **should** check the suitability of the proposed IC allocations with the responsible Mode S Operators for the Mode S interrogators installed or planned to be installed in a member State of the ICAO MID region.

MID Focal Point(s) **shall** use the MICA website to accept or reject IC allocation proposals for planned or existing Mode S interrogators in a member State of the ICAO MID region before the end of the review period. Once an IC allocation proposal is accepted or rejected, its status is updated on the MICA website and an automatic e-mail notification is sent by the MICA website to inform the responsible MID Focal Point(s) and the MICA Cell.

In the event of MICA website service unavailability, the MID Focal Point **shall** contact the MICA Cell by e-mail to indicate acceptance or rejection of the proposed IC allocations.

If an IC allocation proposal is rejected by a MID Focal Point, this **shall** be duly justified.

[3] It may be necessary to change existing IC allocations in order to accommodate the IC applications.

5.2.3 MICA Cell Responsibilities

If any of the proposed IC allocations are rejected within the first 14 days of the review period, the MICA Cell **shall** prepare a new proposed IC allocation plan update.

Note: If any IC allocation proposal is rejected after the initial 14 days of the review period, the MICA Cell will attempt to provide a new IC allocation proposal which is acceptable. As a measure of last resort, the MICA Cell will cancel an unacceptable IC allocation proposal and the corresponding IC application will be re-processed in the next MICA cycle.

If a Focal Point contacts the MICA Cell by e-mail to accept or reject the IC allocation proposals, the MICA Cell **shall** use the MICA website on behalf of the Focal Point to submit the acceptance or rejection of these IC allocation proposals. Once an IC allocation proposal is accepted or rejected, its status is updated on the MICA website and an automatic e-mail notification is sent by the MICA website to inform the responsible Focal Point(s) and the MICA Cell.

5.3 Publication Period

The publication period of the MICA cycle lasts 14 days. On the first day of the publication period, the MICA Cell updates the interrogator code allocation plan and communicates it to all Focal Points. All IC allocation proposals which have not been rejected are issued on the MICA website.

An automatic e-mail notification containing the list of all issued IC allocations is sent by the MICA website to inform all Focal Points and the MICA Cell. An automatic e-mail notification is also sent by the MICA website to the Mode S Operators if IC allocations are issued for the Mode S interrogators they operate.

5.3.1 Mode S Operator Responsibilities

Mode S operator may access the MICA website to consult or export the IC allocations issued for the Mode S interrogators that they operate or plan to operate.

Mode S operators shall not program issued IC allocations in Mode S interrogators during the publication period.

5.3.2 MID Focal Point Responsibilities

Within the 14 days of reception of the updated interrogator code allocation plan, MID Focal Point(s) **shall**:

- Communicate issued IC allocations covering pending IC applications as well as changes to existing IC allocations impacted by the update of the interrogator code allocation plan to the relevant Mode S Operators under their responsibility;
- Provide the implementation sequence to all impacted Mode S Operators;

  Note: IC allocation programming may need to be carefully sequenced in order to avoid temporary IC conflicts.
- Acknowledge issued IC allocations under their responsibility by using the MICA website;

  Upon acknowledgement, an automatic e-mail notification is sent by the MICA website to inform the responsible MID Focal Point(s) and the MICA Cell.

In the event of MICA website service unavailability, the MID Focal Point **shall** contact the MICA Cell by e-mail to submit the acknowledgement.

5.3.3 MICA Cell Responsibilities

On the first day of the publication period, the MICA Cell **shall**:

- Update and communicate to all Focal Points the interrogator code allocation plan which has been approved, without prejudice to national procedures for the communication of information on Mode S interrogators operated by military
- Provide the implementation sequence to all Focal Points

If a Focal Point contacts the MICA Cell by e-mail to acknowledge issued IC allocations, the MICA Cell **shall** acknowledge these issued IC allocations on behalf of the Focal Point on the MICA website. Upon acknowledgement, an automatic notification e-mail is sent by the MICA website to inform the responsible Focal Point(s) and the MICA Cell.

5.4 Implementation Period

The implementation period of the MICA cycle lasts 84 days. The end date of this period is also the end date of the MICA cycle and the MICA cycle effective date.

All changes to existing IC allocations issued during the Mode S IC allocation cycle must be programmed in Mode S interrogators before the end of the implementation period.

IC allocations issued for new Mode S interrogators should be programmed conforming as much as possible to the planned date of first Mode S transmission provided in the IC application.

The programming of IC allocations which are covered by the implementation sequence must be coordinated as described in the implementation sequence. An example of the implementation sequence diagram is provided in ANNEX D.

5.4.1 Mode S Operator Responsibilities

When programming a Mode S interrogator, Mode S Operators **shall** comply with:

- The allocated IC provided in the issued IC allocation;
- The surveillance and lockout coverage provided in the issued IC allocation;
- The implementation sequence document and coordinate IC Allocation programming with other Mode S Operators if necessary;

Prior to programming an issued IC allocation in a Mode S interrogator, the Mode S Operator **shall** perform the following verification steps:

1. verify if the issued IC allocation is identified in the implementation sequence document
    a. If the IC allocation is not identified in the implementation sequence, then no coordination with other Mode S Operators is required.

       The Mode S Operator may proceed to program the IC allocation in the Mode S interrogator and skip the below steps 2 and 3.
    b. If the IC allocation is identified in the implementation sequence, then coordination with other Mode S Operators may be required.

       Step 2 **shall** be performed.
2. verify the position of the issued IC allocation in the implementation sequence

a. If the IC allocation is at the beginning of the implementation sequence, the programming of this IC allocation does not depend on any other IC allocation programming.

   The Mode S Operator **should** proceed to program the IC allocation in the Mode S interrogator as soon as possible.

b. If the IC allocation is not at the beginning of the implementation sequence, there is a dependency on the programming of other Mode S interrogators which precede it in the implementation sequence.

   Step 3 **shall** be performed.

3. verify on the MICA website if all preceding IC allocations in the implementation sequence for other Modes S interrogators have been programmed

   a. If all preceding IC allocations in the implementation sequence are confirmed on the MICA website as being implemented, the Mode S Operator **should** program the IC allocation in the Mode S interrogator as soon as possible in case of changes to existing IC allocations.

   b. If any of the preceding IC allocations in the implementation sequence are not confirmed on the MICA website as being implemented, the Mode S Operator **shall** wait before programming the IC allocation.

Mode S Operators **shall** implement all changes to existing IC allocations before the end of the implementation period.

Once an issued IC allocation has been programmed, the responsible Mode S Operator **shall** inform his responsible MID Focal Point(s) and, if he's registered on the MICA website, **shall** confirm its implementation on the MICA website.

When the implementation of an IC allocation is confirmed on the MICA website, the status of the issued IC allocation is updated on the MICA website and an automatic notification e-mail is sent by the MICA website to inform the responsible Mode S Operator(s), the responsible MID Focal Point(s) and the MICA Cell that issued IC allocation has been programmed into the respective Mode S interrogator.

This IC allocation implementation confirmation mechanism enables the IC allocation system to provide to all registered users on the MICA website the up-to-date status of the implementation of the interrogator code allocation plan in Mode S interrogators.

Mode S Operators **shall** contact their responsible MID Focal Point(s) if they encounter problems or difficulties when implementing IC allocations.

5.4.2 MID Focal Point Responsibilities

MID Focal Point(s) **shall** ensure that all changes to existing IC allocations are programmed before the end of the implementation period.

When a MID Focal Point is informed that an IC allocation is programmed, he **shall** verify that the implementation status of that IC allocation is confirmed on the MICA website. If not, the MID Focal Point **shall** confirm the implementation. Upon confirmation of implementation, the status of the issued IC allocation is updated on the MICA website and an automatic e-mail notification is sent by the MICA website to inform the responsible Mode S Operator(s), the responsible MID Focal Point(s) and the MICA Cell.

In the event of MICA website service unavailability to confirm the implementation of an issued IC allocation, the MID Focal Point **shall** contact the MICA Cell by e-mail to confirm the implementation of the issued IC allocation.

5.4.3 MICA Cell Responsibilities

If a Focal Point contacts the MICA Cell by e-mail to confirm the implementation of an issued IC allocation, the MICA Cell **shall** confirm the implementation of the issued IC allocation on behalf of the Focal Point on the MICA website. Upon confirmation of implementation, the status of the issued IC allocation is updated on the MICA website and an automatic e-mail notification is sent by the MICA website to inform the responsible Mode S Operator(s), the responsible Focal Point(s) and the MICA Cell.

6. Ad-hoc Allocation Process

IC applications may be processed on an Ad-Hoc basis, but this process must not impact any existing Mode S IC allocations issued to other Mode S interrogators.

The Ad-Hoc process is suited for IC applications for TRD Mode S interrogators as there is no need to allocate a de-conflicted interrogator code. It is not recommended to apply this process for operational Mode S interrogator IC applications. Indeed, as no change will be made to existing issued IC allocations, the provided allocation may be far more constraining than one provided within a standard MICA cycle (see Section 5).

To avoid any impact on the proposed IC allocation plan update, Ad-Hoc IC applications are only processed after the publication of the issued IC allocations of the current MICA cycle.

The time frame of the Ad-Hoc allocation process in the MICA cycle is provided in the figure below.

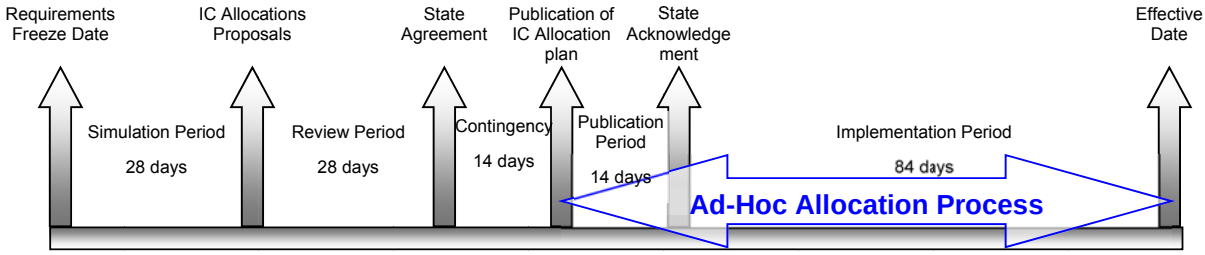


Figure 5: Ad-Hoc Allocation Process Time Frame in MICA Cycle

In general, the Ad-Hoc process is a short process lasting 15 days.

6.1 Simulation Period

During the simulation period of the Ad-Hoc allocation process, the MICA Cell performs interrogator code allocation plan update simulations on the basis of the pending IC applications and prepares a proposed update of the interrogator code allocation plan for approval by the competent States that are affected by it.

As the number of Ad-Hoc IC applications to be processed is usually low and no change to the existing IC allocations is made, the IC allocation proposals are created within a few days.

6.1.1 Mode S Operator Responsibilities

This period does not apply to Mode S Operators.

6.1.2 MID Focal Point Responsibilities

This period does not apply to MID Focal Points.

6.1.3 MICA Cell Responsibilities

The responsibilities on the MICA Cell are identical to those detailed within the Mode S IC Allocation Cycle (see Section 4.1.3) with the exception of:

- The MICA Cell **shall** issue IC allocation proposals which only cover Ad-Hoc IC applications. No change will be made to existing IC allocations issued for other Mode S interrogators.

- The IC allocations proposed by MICA Cell may not meet the following operational requirements of the IC applications:
    - Mode S interrogator planned date of first Mode S transmission in case the IC application is received at short notice;
    - Requested Mode S coverage;
    - Specific operational requirements;

6.2 Review Period

Contrary to the standard MICA cycle review period of 28 days, the Ad-Hoc process review period is generally limited to 14 days. An acknowledgement is required from the Focal Points representing the competent States that are affected by the proposed interrogator code allocation plan update.

If an IC allocation proposal is rejected, the MICA Cell may prepare an updated IC allocation proposal. Nevertheless, due to the limitations inherent to the Ad-Hoc process, it may not be possible to fulfil all the requirements requested by the Mode S Operator. In such case, the unsuitable IC allocation proposal is withdrawn and the IC application will be processed in the next MICA cycle (see Section 5).

6.2.1 Mode S Operator Responsibilities

Mode S operator may access the MICA website to consult the status of the IC allocations proposed for the Mode S interrogators that they operate or plan to operate.

Mode S operators shall not program IC allocation proposals in Mode S interrogators.

6.2.2 MID Focal Point Responsibilities

The responsibilities on the MID Focal Point are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.2.2).

6.2.3 MICA Cell Responsibilities

The responsibilities on the MICA Cell are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.2.3) with the exception of:

- If an IC allocation proposal is rejected, the MICA Cell may prepare an updated IC allocation proposal.

6.3 Publication Period

Once the review period of the Ad-Hoc process is finalised, the MICA Cell updates the interrogator code allocation plan and communicates it to all Focal Points. All IC allocation proposals which have not been rejected are issued on the MICA website. This date of issue becomes the effective date for the IC allocations processed in Ad-Hoc.

Once IC allocations are issued, an automatic e-mail notification is sent by the MICA website to inform all Focal Points and the MICA Cell. This notification contains the list of all issued IC allocations.

No coordination with other Modes S operators is required as there is no change to the existing Mode S allocations issued for other Mode S interrogators.

6.3.1 Mode S Operator Responsibilities

Mode S operator may access the MICA website to consult or export the IC allocations issued for the Mode S interrogators that they operate or plan to operate.

Mode S operators shall not program issued IC allocations in Mode S interrogators during the publication period.

6.3.2 MID Focal Point Responsibilities

The responsibilities on the MID Focal Point are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.3.2) with the exception of:

- There is no time limit to communicate issued IC allocations to the relevant Mode S Operators;
- There is no implementation sequence to be provided to the Mode S Operators;

6.3.3 MICA Cell Responsibilities

The responsibilities on the MICA Cell are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.3.3) with the exception of:

- There is no implementation sequence to be provided to the Focal Points;

6.4 Implementation Period

IC allocations processed Ad-Hoc can be programmed by the Mode S Operators once they are issued by the MICA Cell.

6.4.1 Mode S Operator Responsibilities

When programming a Mode S interrogator, Mode S Operators **shall** comply with:

- The allocated IC provided in the issued IC allocation;
- The surveillance and lockout coverage provided in the issued IC allocation;

Once an issued IC allocation has been programmed, the responsible Mode S Operator **shall** inform his responsible MID Focal Point(s). If he is registered on the MICA website, he **shall** confirm its implementation on the MICA website

When the implementation of an IC allocation is confirmed on the MICA website, the status of the issued IC allocation is updated on the MICA website and an automatic e-mail notification is sent by the MICA website to inform the responsible Mode S Operator(s), the responsible MID Focal Point(s) and the MICA Cell that the issued IC allocation has been programmed into the respective Mode S interrogator.

This IC allocation implementation confirmation mechanism enables the IC allocation system to provide to all registered users on the MICA website the up-to-date status of the implementation of the interrogator code allocation plan in Mode S interrogators.

Mode S Operators **shall** contact their responsible MID Focal Point(s) if they encounter problems or difficulties when implementing IC allocations.

6.4.2 MID Focal Point Responsibilities

The responsibilities on the MID Focal Point are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.4.2) apart that there is no impacted IC allocation to be considered.

6.4.3 MICA Cell Responsibilities

The responsibilities on the MICA Cell are identical to those detailed within the Mode S IC Allocation Cycle (see Section 5.4.3).

7. IC Conflict Reporting

7.1 Introduction

Operating Mode S interrogators may be impacted by an IC conflict or may be the source of an IC conflict.

An IC conflict is defined as an uncoordinated overlap of lockout coverage of two or more Mode S interrogators operating on the same IC, potentially resulting in aircraft remaining undetected by at least one of the Mode S interrogators.

The Mode S IC allocation system provides a means to report an IC conflict through a reporting mechanism implemented in the MICA website.

7.2 IC Conflict Reporting Procedure

7.2.1 Mode S Operator Responsibilities

Mode S Operator **should** assess the possible impact on air traffic services of Interrogator Code conflicts, and the corresponding potential loss of Mode S target surveillance data from the impacted Mode S interrogators, taking into account their operational requirements and available redundancy.

Unless the potential loss of Mode S target surveillance data has been assessed to have no safety significance, Mode S operators **should**:

- implement monitoring means to detect interrogator code conflicts caused by other Mode S interrogators impacting eligible Mode S interrogators they operate on any operational interrogator code;
- ensure that the interrogator code conflict detection provided by the implemented monitoring means is achieved in a timely manner and within a coverage that satisfy their safety requirements;
- identify and implement as appropriate, a fallback mode of operation to mitigate the possible interrogator code conflict hazards on any operational code;
- ensure that the implemented fallback mode of operation does not create any interrogator code conflict with other Mode S interrogators referred to by the interrogator code allocation plan.

When a Mode S Operator identifies a potential IC conflict impacting a Mode S interrogator under his responsibility, he **shall**:

1. Report the potential IC conflict to his representative MID Focal Point(s) and make available, through the MICA website (if he's registered), any related information for other Mode S Operators.

   Once reported on the MICA website, the system will send an automatic e-mail notification to inform all registered users (MICA Cell, Focal Points and Mode S Operators) that a potential IC conflict has been identified.

2. Report the potential IC conflict accompanied with the related information to the MICA Cell if it has not been possible to report it on the MICA website.

3. Investigate the conflict and coordinate bilaterally with appropriate Mode S Operators to determine the potential cause of conflict. Mode S Operators contact details are provided on the MICA Contact List which is published by the MICA Cell on the MICA website.
4. Advise the MICA Cell, respective MID Focal Point(s) and relevant Mode S Operators once the potential cause of the conflict has been identified.
5. Advise the MICA Cell, respective MID Focal Point(s) and appropriate Mode S Operators once the conflict has been resolved.

7.2.2 MID Focal Point Responsibilities

When a MID Focal Point is notified by a Mode S Operator of an IC conflict within his area of responsibility, the MID Focal Point **shall** provide the necessary assistance and advice to achieve an early resolution of the IC conflict.

If the Mode S Operator has not been able to report the conflict on the MICA website, the MID Focal Point **shall** report the IC conflict on the MICA website with any related information.

The MID Focal Point **shall** ensure that all appropriate parties that might be affected by the IC conflict are informed:

- Mode S Operator(s) who might be the cause of conflict and responsible Focal Point(s)
- Mode S Operator(s) who might be impacted by the conflict and responsible Focal Point(s)
- MICA Cell

When a MID Focal Point is notified that a conflict might originate from within his area of responsibility, he **shall** ensure that the relevant Mode S Operator(s) cooperate to identify the cause of the conflict and take the necessary actions in a timely manner.

7.2.3 MICA Cell

If a potential IC conflict accompanied with the related information has been reported to the MICA Cell but has not been reported on the MICA website, the MICA Cell **shall** report it on the MICA website accompanied with any related information provided by the Mode S Operator.

The MICA Cell **should** provide whatever assistance and advice it can to facilitate the dissemination of information and early resolution of the conflict.

8. Resolution of IC Allocation and IC Conflict Issues

8.1 IC Allocation Issues

The Mode S IC allocation process is executed in a constrained environment. Notably, to avoid overlapping coverage with other Mode S interrogators using the same IC, an IC allocation proposed by the MICA Cell may not meet the requested operational requirements of the IC application. As a result the MICA Cell allocation proposal for a Mode S interrogator may contain operational restrictions.

These operational restrictions may not be acceptable to the concerned Focal Point and the IC allocation proposal for the Mode S interrogator can be rejected.

Other proposals may lead to unacceptable operational restrictions on existing IC allocations for other Mode S interrogators. If no other acceptable IC allocation can be proposed, then no IC allocation will be issued at the end of the IC Allocation process for the Mode S interrogator. As a consequence, the update of the interrogator code allocation plan will not contain an IC allocation covering the IC application submitted for the Mode S interrogator.

If no IC allocation has been issued, the MICA Cell will perform the following actions:

1. Re-process the IC application in the next Mode S IC Allocation cycle.
2. Investigate and propose an interim IC allocation to the responsible Focal Point(s), i.e. a temporary IC allocation that would be valid until a satisfactory IC allocation is issued. This temporary IC allocation may be on a test IC or on an operational IC with operational restrictions. This temporary IC allocation should permit to start the Mode S interrogator installation and test.
3. Attempt to determine IC allocation options in close collaboration with the Focal Point(s) of competent States that could participate in the identification of an acceptable proposal for all parties.

8.2 IC Conflict Issues

Operation of Mode S interrogators may be impacted by an IC conflict. This may prevent them to reliably detect incoming traffic, potentially compromising the safety of air navigation. Mode S interrogators impacted by such conflicts may need to apply the appropriate fallback mode of operation to mitigate the IC conflict.

The IC conflict resolution depends on the collaboration between Mode S Operators (see Section 7). In the event of lack of collaboration, the MICA Cell will initiate mediation with the Focal Points of the competent States concerned.

8.3 Resolution of Issues

Dispute may happen during the Mode S IC Allocation process. Discussions with the impacted Mode S operator(s) and the responsible Focal Point(s) may be sufficient to find a solution.

If no solution is found, a final arbiter to unresolved dispute is required.

The MID Focal Point(s) shall manage disputes inside the ICAO Middle East region.

Final arbiter has to be identified to resolve disputes that could occur between countries of ICAO EUR region and ICAO MID region.

9. Guidance for IC allocation in ICAO MID Region

9.1 Mode S Interrogators Performances

9.1.1 SI code capability

It is recommended for Mode S Interrogators to support SI code capability.

Initially, for technical reasons, only Interrogator Identifier codes (II codes) 1 to 15 were defined and allocated as Interrogator Codes in the ICAO EUR region. Due to the expected number of Mode S interrogators, measures were later taken to allow the use of additional Surveillance Identifier codes (SI codes) 1 to 63.

Only SI code capable Mode S targets will be correctly detected by Mode S interrogators operating on SI code. ICAO annex 10 requires all Mode S transponders to be SI code capable however the experience shows that there are still old versions of Mode S transponders flying without the SI code capability.

9.1.2 II/SI code operation

It is recommended for Mode S Interrogators to support II/SI code operation.

Normally, the use of SI codes requires that all Mode S targets within the coverage of Mode S interrogators are equipped for this purpose. However, specifications were developed by EUROCONTROL for an II/SI code operation which enables the early use of SI codes by Mode S interrogators in an environment where not all Mode S targets are equipped for the use of SI codes.

A Mode S interrogator which operates on an SI code with II/SI code operation enabled will correctly detect both SI capable and II only capable Mode S targets.

For more information, please refer to ANNEX B.

9.1.2.1 II/SI code operation in ICAO Middle East region

Even if the current number of Mode S interrogators installed in ICAO MID region is not as high as in the ICAO EUR region, there is no guarantee that allocating only II code to Mode S interrogators in the ICAO MID region will remain possible in the future.

Without any regulation to support SI code allocation (on Mode S interrogators to support SI code and II/SI code operation), it may not be possible to keep on allocating Interrogator Code to Mode S interrogators in the future, preventing them to operate in Mode S.

9.1.2.2 II/SI code operation in the European Union

In order to facilitate and support the use of SI code in European Union, requirements on SI code and II/SI code support capabilities have been lay down in article 3 of COMMISSION REGULATION (EC) No 262/2009:

Article 3

Interoperability and performance requirements:

Mode S operators shall ensure that the radar head electronics constituent of their Mode S interrogators using an operational interrogator code:

1. support the use of SI codes and II codes in compliance with the International Civil Aviation Organisation provisions[4]
2. support the use of II/SI code operation in compliance with the requirements specified in Annex B

9.1.3 Mode S Coverage

Several formats exist to define the Mode S coverage:

- Mode S responsibility map (in European Mode S Coverage Map ICD format[5]).
    - This map format has been developed by EUROCONTROL in the frame of the POEMS contract[6]. System Maps are geodesic maps (latitude/longitude) sub-divided into horizontal cells of approx. 5NM by 5NM (latitude of Paris) and an associated vertical extent.
    - When supported by the Mode S interrogator, the coverage allocated during the Mode S IC Allocation Cycle is provided in this format.
- Sectored Range
    - The circular coverage is divided into sectors (by default 32 sectors). Surveillance and Lockout ranges are provided per sector.
    - When coverage map in EMS Map ICD format is not supported by the interrogator, then surveillance and lockout coverage allocated to the radar are provided in this format.
- Global Range for the circular coverage.
    - One unique surveillance range and one unique lockout range are provided for the circular coverage.
    - When none of the both formats above are supported, then this format is used.

Mode S Operators are encouraged to support the use of European Mode S coverage maps.

As these coverage maps are all aligned on the same common origin and have the same cell size, coverage maps can be joint without overlapping which is optimal in terms of allocation volume and RF band usage (as there may be no gap between coverage of neighbouring Mode S interrogators on the same Interrogator Code, aircraft lockout is optimized).

The second solution is less optimal as their will be gaps between allocated coverage. Nevertheless to use range per sector is better than to apply the same range to the circular coverage (Third solution).

Concerning the third solution, the maximum range without overlap of neighbouring Mode S interrogators on the same IC will be used as the circular range.

[4] Chapter 3 'Surveillance radar systems', Section 3.1.2.5.2.1.2 'IC: Interrogator code' of ICAO Annex 10 'Aeronautical Telecommunications', Volume IV 'Surveillance Radar and Collision Avoidance Systems' (Third Edition, July 2002, incorporating Amendment 77).

[5] European Mode S Station Coverage Map Interface Control Document, Edition 1.16

[6] European Mode S Station Functional Specification, Edition 3.11

9.2 Requirements for airborne carriage

It is required for Mode S targets to support SI code capability.

In ICAO Annex 10 Vol. IV - §2.1.5.1.7.1: “SI code capability shall be provided in accordance with the provisions of 2.1.5.1.7 for all Mode S transponders installed on or after 1 January 2003 and by all Mode S transponders by 1 January 2005.”

Airspace regulation should enforce the carriage of Mode S transponder capable to support SI capability as defined in ICAO Annex 10 Vol. IV.

Middle East ICAO office should verify and ensure the correct transponder capability in order to allow the use of SI codes in the ICAO MID region.

It is already possible to start using SI code without having 100% of the fleet SI capable. However in this case Mode S ground stations shall have the II/SI code operation capability in order to acquire aircraft which are not SI capable.

When using II/SI code operation aircrafts which are not SI cable must not be locked-out. Depending on the number of aircrafts which are not SI capable, the II/SI code operation may increase the RF pollution.

9.3 MICoG working arrangement

SGEG-MICoG working arrangement has been created to oversee the allocation process and provide guidance to the MICA Cell. SGEG-MICoG members are the Focal Points representing the National Regulatory Authorities of European States and those international organisations applying for Interrogator Codes.

As Focal Point for all countries in ICAO MID region, the ICAO MID regional officer is invited to be a SGEG-MICoG member and to attend SGEG-MICoG meetings (twice a year).

ICAO MID regional office should determine the necessity to meet Middle East Mode S Operators at regular interval to discuss about technical problems and other topics related to Mode S interrogators installation in ICAO MID region. The MICA cell would not participate to Middle East Mode S Operators meetings.

The ICAO MID regional officer could submit problems encountered in ICAO MID region during the SGEG-MICoG meeting.

ANNEX A – Discrete Code Allocation

A.1 II code and mobile interrogators

II code 0 has been reserved by ICAO for Mode S interrogators that have not been assigned with a unique discrete Interrogator Code and are authorized to transmit (please refer to §3.1.2.5.2.1.4.2 of [RD 1] for more information).

Mode S interrogators using II code 0 in accordance with the ICAO Standards and Recommended Practices do not need to be subject to the coordinated IC allocation process.

Discrete code allocations are not issued for mobile installations for which special modes of acquisition on II code 0 are used.

SI codes matching II code 0 (SI 16, SI 32, SI 48) are not allocated.

Note: as not all Mode S aircraft are SI capable, II/SI code operation has to be programmed on stations operating both on II code and matching SI codes in order to acquire both SI capable and non SI capable aircraft. As there is no requirement to support II/SI code operation for mobile stations interrogating on II code 0, matching SI codes (SI 16, SI 32, SI 48) are currently not allocated by MICA Cell.

A.2 Test, Research and Development Mode S interrogators on II code 14

In order to save interrogator codes for operational ATC (and Air Defence…) Mode S interrogators, SGEG-MICoG decided that, when transmitting for non-essential Test, Research or Development (TRD) activities, interrogators should operate on a reserved, shared interrogator code: II 14.

Due to the mode of operation of TRD stations on II code 14 (no constraint on II/SI Code Operation programming (see ANNEX B for more information on II/SI Code Operation)), SI codes matching II 14 (SI 14, SI 30, SI 46, SI 62) are currently not allocated to operational Mode S interrogators. As a consequence, SI codes matching II 14 may currently be allocated to TRD stations.

In order to avoid unnecessary RF pollution in the 1090 MHz band, SGEG-MICoG decided that TRD sites with allocated II code 14 would need to use permanent lockout in their entire coverage, and would not be allowed to use All Call lockout override.

SGEG-MICoG is aware that this is a very restrictive mode of operation which does not guarantee detection performances when two or more TRD stations with overlap transmit concurrently. Therefore SGEG-MICoG agreed on the following:

- Should a TRD operator require guaranteed detection performances for limited trials, he can initiate a co-ordination with overlapping TRD operators to make sure that they do not transmit at the same time (informing the MICA Cell and regulators as well). The TRD operator is responsible for initiating this co-ordination. When TRD operators do not need guaranteed detection performances, they can transmit without coordinating with other TRD operators, as long as they do not conflict with critical operations announced by others through the above mechanism.
- Should a TRD operator need to operate for extended periods with guaranteed performance (for transponder monitoring for instance), then he should apply for a distinct code allocation, using the normal IC allocation request procedure. This request will be processed by the MICA Cell, with due regard to the operational requirements, as for any other IC application.

- Should a TRD operator need to test and evaluate modes of operation that are normally not allowed on code 14 (e.g. lockout override…), then he should apply for an exemption, using the normal IC allocation request procedure. This request will be processed by the MICA Cell, with due regard to the operational requirements, as for any other IC application.

An IC application has to be submitted to get an IC allocation to test systems. However, as there is no need to prevent conflict situation on II 14, applications for TRD stations are most of the time processed in Ad-Hoc.

A.3 Specific Interrogator Codes for specific military operations

II code 15 is currently reserved in ICAO EUR region for NATO management. It is not available for allocation as part of the process run by EUROCONTROL.

SI codes matching II code 15 (SI 15, SI 31, SI 47, SI 63) are reserved for military operations in ICAO EUR region (see MICoG Report Meeting #25). They are not available for allocation as part of the process run by EUROCONTROL. The management of these codes is the responsibility of NATO.

This decision only applies to non-fixed, deployable military installations.

Fixed military interrogators are still eligible to get a discrete Interrogator Code following the normal Mode S IC allocation process. In that case, they have to coordinate with the Focal Point responsible of the country where the fixed military interrogators will be installed.

A NATO Focal Point has been nominated and is member of SGEG-MICoG.

ICAO Middle East regional office has to decide how to use II code 15.

ICAO Middle East regional office has to decide how to use SI codes matching II code 15.

A.4 Interrogator Codes allocated to operational Mode S interrogators

All other ICs, i.e. those IC which have not been detailed previously in this Annex, are available for allocation to operational eligible Mode S interrogators:

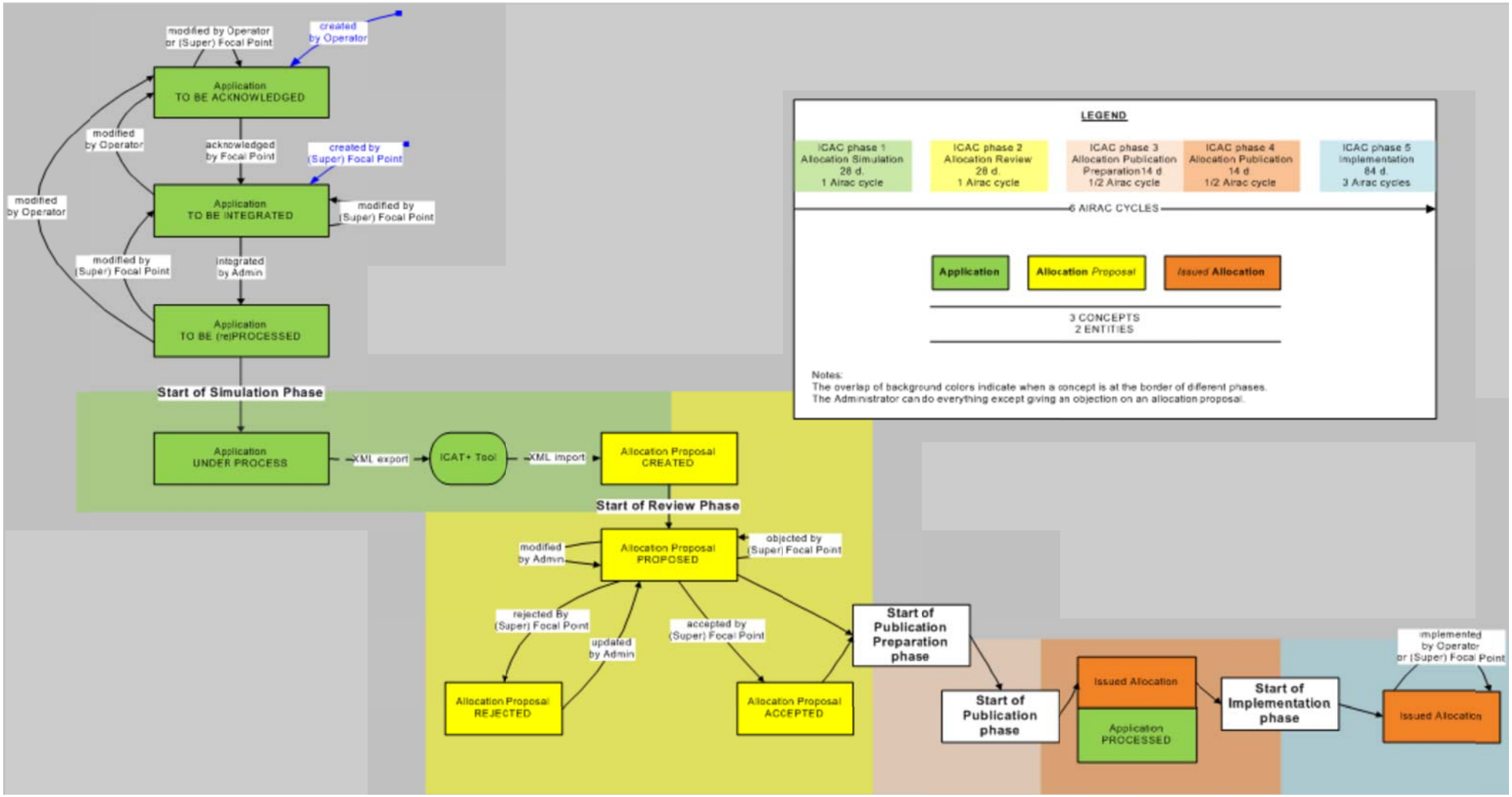
- II code 01 and matching SI codes (SI 01, SI 17, SI 33, SI 49)
- II code 02 and matching SI codes (SI 02, SI 18, SI 34, SI 50)
- II code 03 and matching SI codes (SI 03, SI 19, SI 35, SI 51)
- II code 04 and matching SI codes (SI 04, SI 20, SI 36, SI 52)
- II code 05 and matching SI codes (SI 05, SI 21, SI 37, SI 53)
- II code 06 and matching SI codes (SI 06, SI 22, SI 38, SI 54)
- II code 07 and matching SI codes (SI 07, SI 23, SI 39, SI 55)
- II code 08 and matching SI codes (SI 08, SI 24, SI 40, SI 56)
- II code 09 and matching SI codes (SI 09, SI 25, SI 41, SI 57)
- II code 10 and matching SI codes (SI 10, SI 26, SI 42, SI 58)
- II code 11 and matching SI codes (SI 11, SI 27, SI 43, SI 59)

- II code 12 and matching SI codes (SI 12, SI 28, SI 44, SI 60)
- II code 13 and matching SI codes (SI 13, SI 29, SI 45, SI 61)

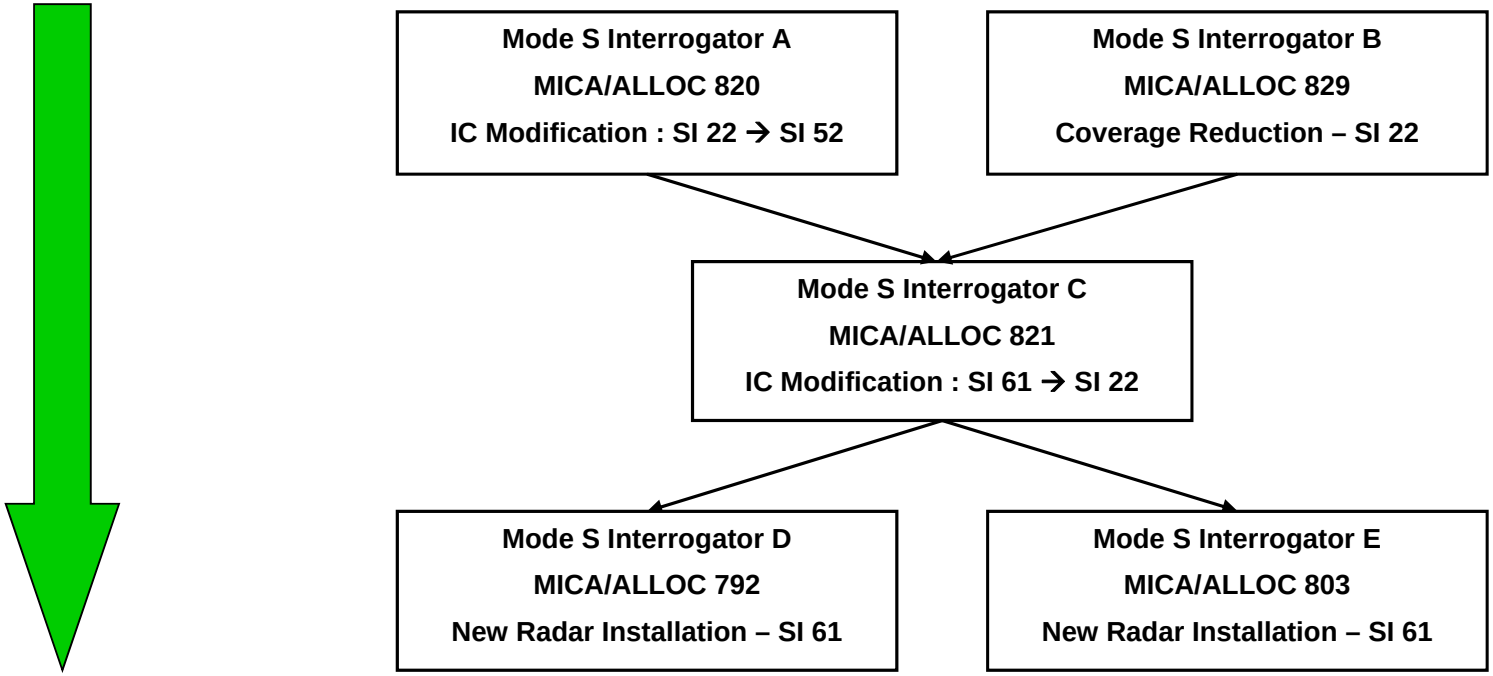
ANNEX B – II/SI code operation

1. Mode S interrogators, when operating with an SI code and if enabled by an appropriate operational parameter, shall also acquire targets through all call replies which are encoded using the matching II code.
2. Mode S interrogators, when operating with an SI code and if enabled by an appropriate operational parameter, shall consider transponders replying with all call replies encoded using the matching II code as non-SI equipped transponders, irrespectively of the SI capability reported in the data link capability report.
3. Mode S interrogators, when operating with an SI code and if enabled by an appropriate operational parameter, shall interrogate transponders lacking SI code capability using the Mode S multisite lockout protocol messages foreseen for II code operation. The II code to be used shall be the matching II code.
4. Mode S interrogators, when operating with an SI code and if enabled by an appropriate operational parameter, shall be configurable by the operator to either:
    - not use lockout on the matching II code for transponders lacking SI code capability, or
    - use intermittent lockout on the matching II code for transponders lacking SI code capability.
5. Mode S interrogators, when operating with an II code and if enabled by an appropriate operational parameter, shall be configurable by the operator to either:
    - not use lockout for transponders which report no SI capability in their data link capability report or cannot report their data link capability, or
    - use intermittent lockout for transponders which report no SI capability in their data link capability report or cannot report their data link capability.
6. When the II/SI code operation is activated, the lockout maps shall not be taken into account for transponders lacking SI code capability.

ANNEX C – Mode S IC Allocation Cycle Flow



ANNEX D – Implementation Sequence Diagram



In the Implementation Sequence Diagram provided above, the sequence of Mode S radar programming is the following:

1. The IC programmed in **Mode S Interrogator A** has to be changed from SI 22 to SI 52 conforming to MICA/ALLOC 820.

   The coverage programmed in **Mode S Interrogator B** on SI 22 has to be modified conforming to MICA/ALLOC 829.

   As these 2 IC allocations are at the beginning of the implementation sequence diagram, the programming of these IC allocations does not depend on the programming of any IC allocation.

   MICA/ALLOC 820 and MICA/ALLOC 829 must be programmed before the end of the Implementation Period of MICA Cycle.

2. As MICA/ALLOC 821 is not at the beginning of the implementation sequence, the programming of this IC allocation depends on the programming of the IC allocations which precede it in the implementation sequence: MICA/ALLOC 820 and MICA/ALLOC 829.

   Once step 1 above is done, the IC programmed in **Mode S Interrogator C** has to be changed from SI 61 to SI 22 conforming to MICA/ALLOC 821.

   MICA/ALLOC 821 must be programmed before the end of the Implementation Period of MICA Cycle.

3. As MICA/ALLOC 792 and MICA/ALLOC 803 are not at the beginning of the implementation sequence, the programming of these IC allocations depends on the programming of the IC allocation which precedes them in the implementation sequence: MICA/ALLOC 821.

   Once step 2 above is done, **Mode S Interrogator D** can be programmed on SI 61 conforming to MICA/ALLOC 792 and **Mode S Interrogator E** can be programmed on SI 61 conforming to MICA/ALLOC 803.

APPENDIX D

MID REGION SURVEILLANCE STRATEGY

Considering that:

a) Cooperation between States is the key to achieve harmonized ATM system operations;

b) States are implementing CNS/ATM systems to gain safety, efficiency and environmental benefits;

c) the future air traffic environment will require increased use of aircraft-derived surveillance information;

d) the 12th Air Navigation Conference endorsed Aviation System Block Upgrades (ASBU) framework with modules specifying effective use of ADS-B/MLAT and associated communication technologies in bridging surveillance gaps and its role in supporting future trajectory-based ATM operating concepts;

e) cooperation between States is key towards improving flight efficiency and enhancing safety involving the use of ADS-B technology;

f) the 38th ICAO Assembly endorsed 4th edition of the Global Air Navigation Capacity & Efficiency Plan along with technology roadmaps;

g) SARPs, PANS and guidance material for the use of ADS-B have been developed;

h) ADS-B avionics and ground systems are available;

i) Multilateration is a technology that can supplement SSR, ADS-B and SMR; and

The MID Region Surveillance Strategy is to:

1) implement surveillance technologies in close collaboration with users;

2) be evolutionary and consistent with the Global Air Navigation Plan taking into consideration MID Region priorities;

3) maximize contiguous coverage and use of ADS-B on major routes/terminal areas;

4) implement ADS-B according to MID Region Air Navigation agreed priorities and set 2017 as implementation timeline;

5) prioritize ADS-B implementation in areas where there is no radar coverage followed by areas where implementation would otherwise bring capacity and operational efficiencies and when cost/benefit models warrant it;

6) identify sub-regional areas where the implementation of ADS-B would result in a positive cost/benefit in the near term, while taking into account overall Regional developments and implementation of ADS-B in adjacent homogeneous ATM areas;

7) ensure that the surveillance technologies including ADS-B deployment should be associated at early stages in coordination with the States/Regional/International Organizations responsible for the control of adjacent areas,;

8) share ADS-B data to enhance safety, increase efficiency and achieve seamless surveillance;

9) ensure before implementing ADS-B that aircraft are equipped with adequate avionics;

10) minimise the reliance on voice position reporting, for surveillance of aircraft;

11) utilise the SSR Mode 'S' capabilities, fully and reduce reliance on 4 digit octal code;

12) make use of ADS-C when ADS-B, SSR or multilateration not supported;

13) encourage Multilateration for surface, terminal & area surveillance;

14) improve safety through sharing ATS surveillance data across FIR boundaries;

15) increase use of Aircraft Derived Data; and

16) ensure that implementation of Surveillance technologies are harmonized, compatible and interoperable with respect to operational procedures, supporting data link and ATM applications;

17) implement surveillance technologies following successful trial programmes with regards to safety and operational feasibility, taking into account studies and implementation experiences from other ICAO Regions;

18) request airspace users periodically to provide information on aircrafts surveillance equipage,

19) consider implementing surveillance for surface movement control by the implementing the required technologies as per the global plan roadmaps and MID Air Navigation Strategy; in the Global plan; and

20) ensure that implementation is according to SARPs, ASBU working document; and MIDANPIRG conclusions and according to MID Surveillance Strategy and implementation should be monitored to ensure collaborative development and alignment with the MID Region projects.

APPENDIX E

Status of ADS-B OUT implementation

State	Mandate	Ground Station Capabilities	Flight Level	ATC Procedure	Data sharing Protocol	Data sharing States
Bahrain	12 Dec 2014	ADS-B GS accept DO260, DO260A, DO260B by June 2015,	At or above FL 290 (ADS-B air Space) Below FL 290 (none ADS-B airspace)	Published Will publish 12 NOV 2014	ASTERIX Cat. 21 Version 0.23 UAE Oman	UAE Dec 2014 Oman
Egypt						
Iran						
Iraq						
Jordan						
Kuwait	April 2016	ADS-B GS Accept DO260,DO260A,DO260B ASTERIX (CAT 21 VER 0.26)	Will Be Implemented by April 2016	Will be Published by April 2016	N/A	N/A
Lebanon						
Libya						
Oman						
Qatar						
Saudi Arabia						
Sudan						
Syria						
UAE						
Yemen						

- END -