

Supporting
European
Aviation



Interrogator Code Conflict

MICA Workshop for ICAO MID States
Agenda Item #4

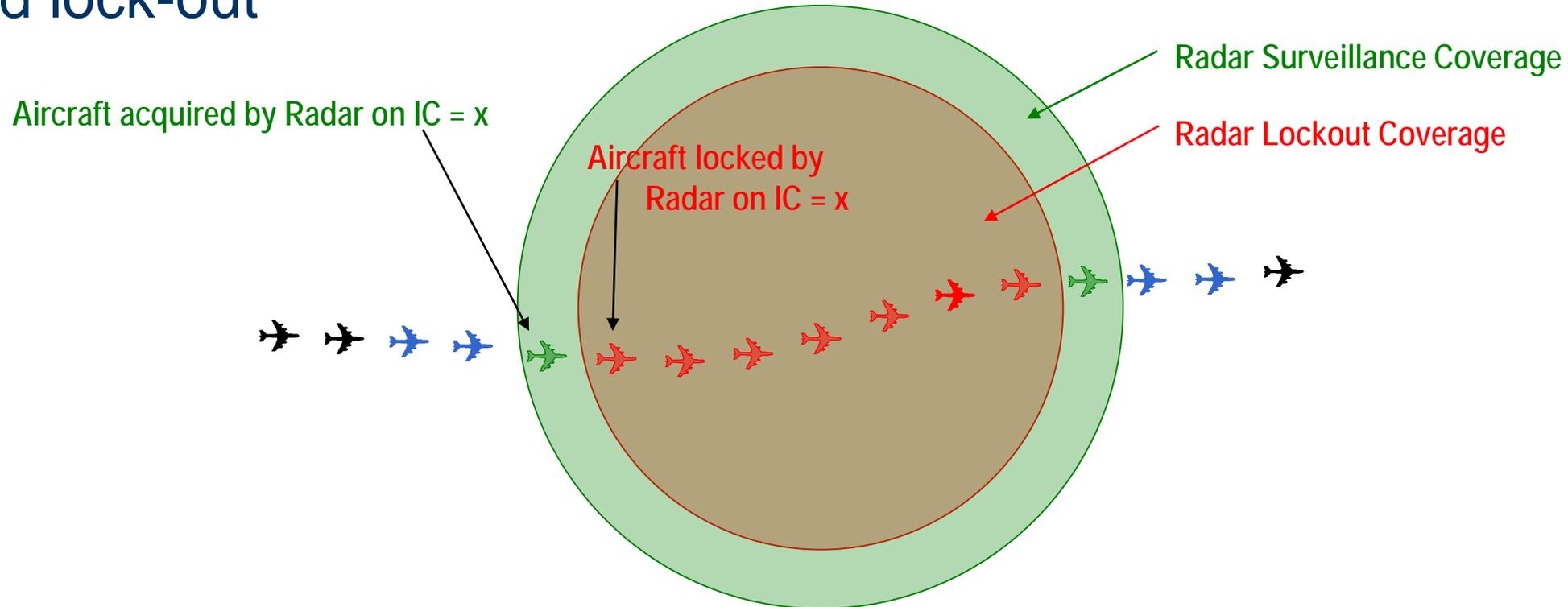
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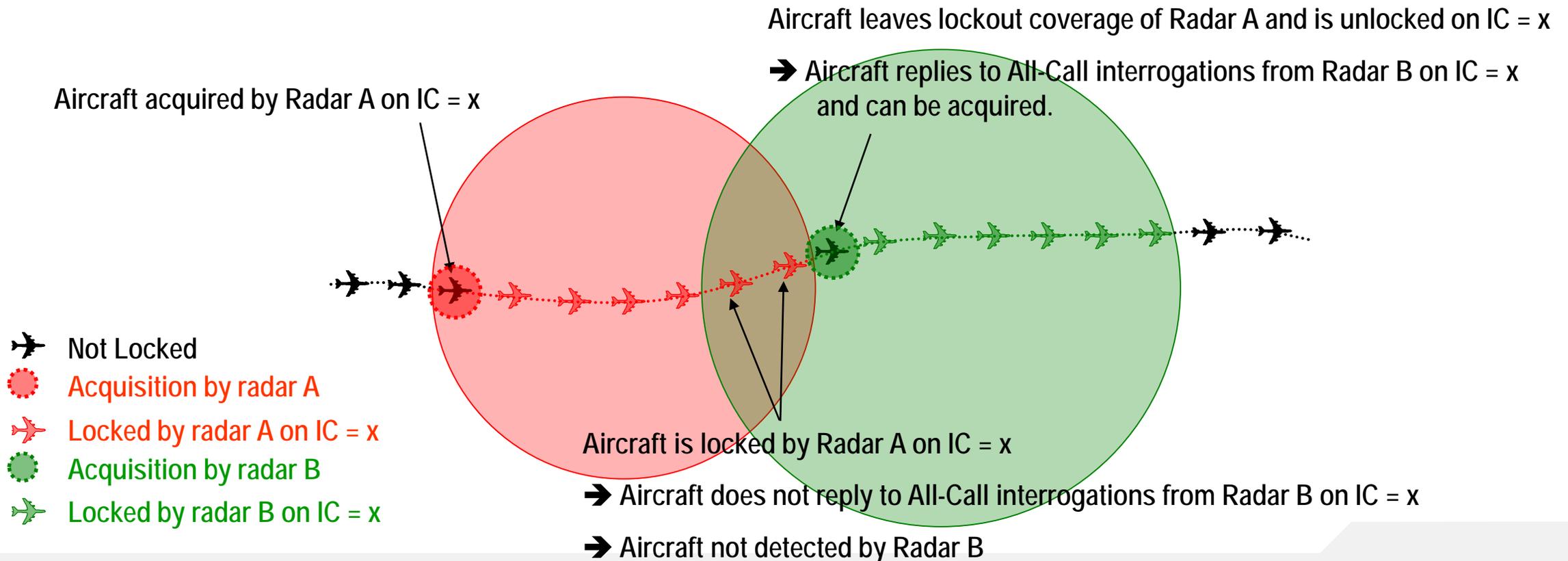
Reminder: Aircraft acquisition, selective interrogations and lock-out



- ✈ Aircraft not in line of sight of radar and/or not in power budget → does not receive All-Call interrogations
- ✈ Aircraft outside surveillance coverage → receives All-Call interrogations and replies, but replies not processed by radar
- ✈ Aircraft acquired by radar in surveillance coverage using All-Call replies → selective interrogations (Roll-Call)
→ not locked: receive All-Call interrogations and replies
- ✈ Aircraft locked by radar in lockout coverage → does not reply to All-Call interrogations

Definition of Interrogator Code Conflict

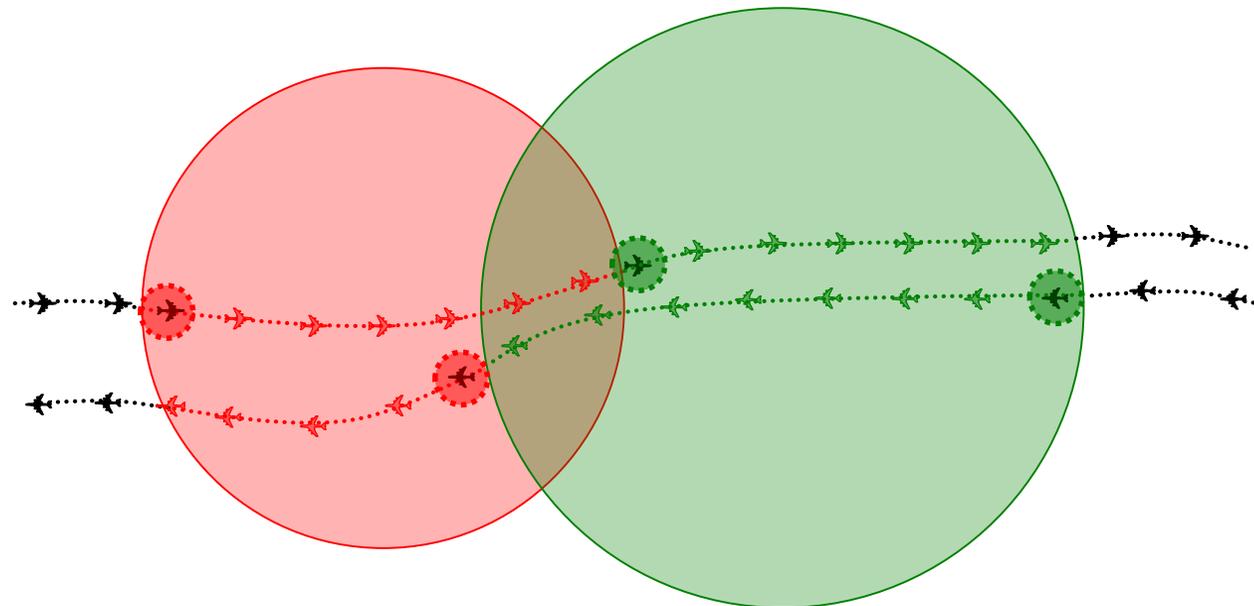
- An IC conflict is an uncoordinated overlap of lockout coverage of two or more Mode S radar operating on the same IC, potentially resulting in aircraft remaining undetected by at least one of the Mode S interrogators → Impact the All-Call acquisition of aircraft



Impact of IC Conflict on Operation

- An aircraft locked on an IC by a Mode S radar cannot be acquired by another Mode S radar operating on the same IC in the region where lockout coverage are overlapping.
 - Incoming aircraft will be detected once leaving the overlapping region, i.e. once leaving the lockout coverage of the other radar on the same IC.
 - Once acquired, an aircraft is selectively interrogated until it leaves the radar coverage.
 - Outgoing aircraft are interrogated in the overlapping region (IC conflict region).

- ✈ Not Locked
- ☠ Acquisition by radar A
- ✈ Locked by radar A on IC = x
- ☠ Acquisition by radar B
- ✈ Locked by radar B on IC = x



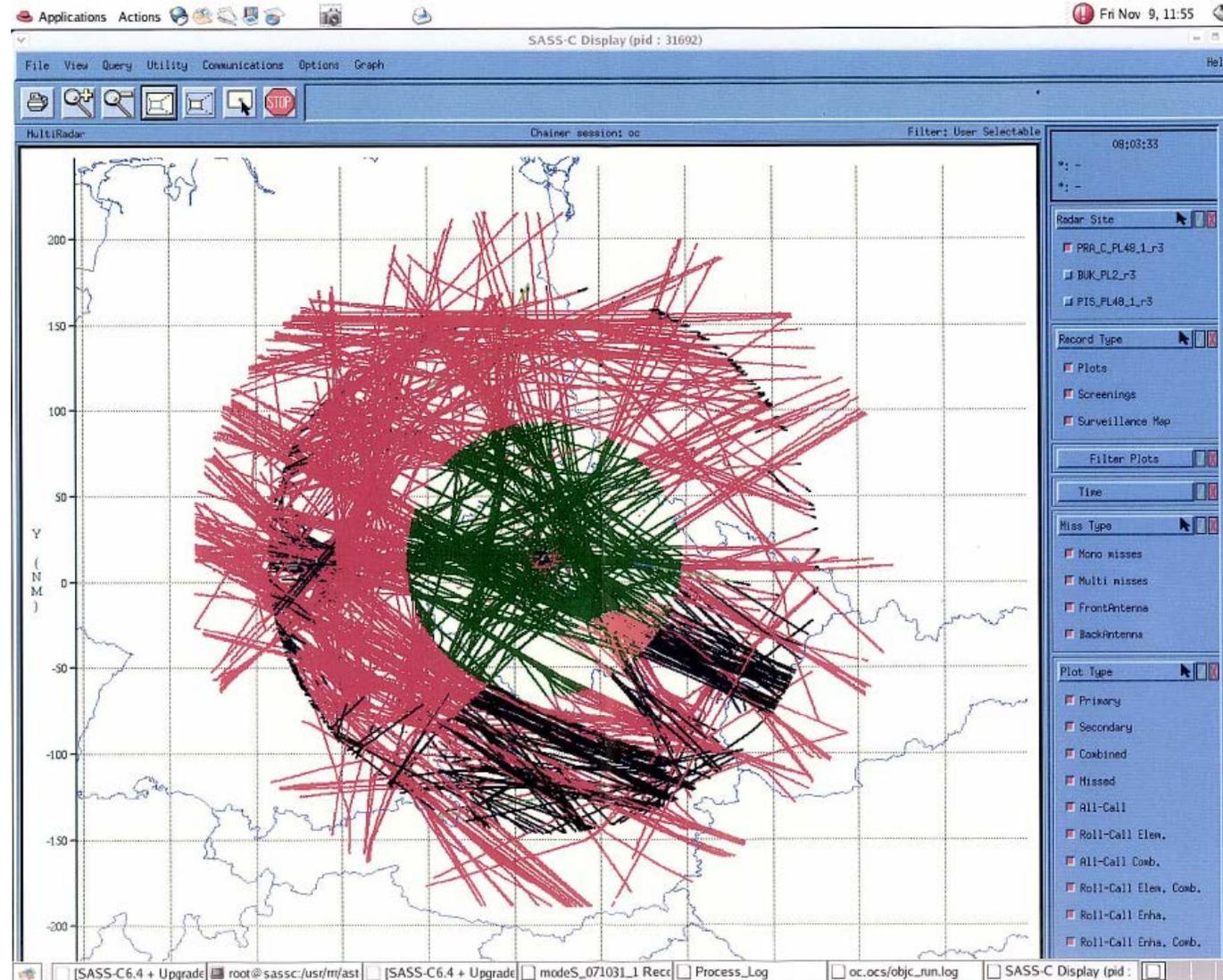
II/SI code operation and IC conflict

- In ICAO MID region, II codes and matching SI codes are not currently allocated to Mode S radars with overlapping coverage.
 - Only Mode S radars operating on **SI codes** have to enable the **II/SI code operation**
 - **All-Call replies** on the **matching II code** used to acquire aircraft which are **not SI code capable**
 - → Mode S transponders which are **not SI code capable shall not be locked-out on the matching II code** to enable the acquisition by Mode S radars operating on SI codes having the same matching II code
- Lockout of **not-SI code capable** aircraft by radar operating on SI code (e.g. wrong programming) will prevent acquisition of incoming **not SI code capable** aircraft in the overlapping coverage by radar operating on SI codes having the same matching II code
 - Few incoming aircraft only (that are **not SI capable**) are not correctly detected in the overlapping area

Example of IC Conflict

Incoming aircraft which are not detected by the Mode S radar are in black (Miss plots in SASS-C multi radar environment).

Outgoing aircraft are correctly detected till the end of the coverage.



Main Causes of IC Conflicts

1. Coverage map in EMS Map ICD format not loaded successfully on the radar
 - As a consequence the default parameters are applied.
 - Very often, default parameters are:
 - Default Lockout: Full Lockout
 - Default Range: 256NM
2. Mode S radar is not programmed in accordance with the latest issued IC allocation:
 - Operation on previous IC allocation or on maintenance configuration (coverage used during maintenance still programmed)
 - → Wrong coverage and/or wrong IC is programmed
3. One radar channel is correctly programmed, not the second
 - IC conflict when the radar revert to the second channel
4. Problems due to miscellaneous wrong programming or limited capability (e.g. range programming using power)
5. Mode S radar operating in Mode S without IC allocation

Measures to avoid creating an IC conflict

1. Modify default radar parameters. The default lockout to apply if the coverage map fails to load should be set to “No lockout” and the default range should be set to a short range (60NM for example).
 - Default Lockout: No Lockout
 - Default Range: 60NM
2. Ensure that an IC has been allocated to the Mode S interrogator prior to start Mode S transmission.
3. Develop programming procedure to ensure that parameters are correctly programmed in the Mode S interrogator during the installation/validation.
 - The latest IC allocation shall be programmed
 - The surveillance/lockout coverage map and IC should be programmed correctly programmed on both channels.
 - Programming of II/SI code operation

IC Conflict Management Steps

- Detection of the IC Conflict
 - In general delayed acquisition of incoming aircraft.
 - This has to be achieved on a timely manner (real-time required?).
- Implement a fall-back mode of operation
 - One possibility is to apply (Stochastic) Lockout Override
- Report the IC conflict in order to resolve it as fast as possible.

IC Conflict Reporting and Resolution

- When a Mode S Operator identifies a potential IC conflict impacting a Mode S radar under his responsibility, he has to:
 - Report the potential IC conflict to the responsible national Focal Point(s), to the ICAO MID Regional Officer(s) acting as regional Focal Point(s), and to the MICA Cell
 - Make available, through the MICA website if registered, any related information for other Mode S Operators.
 - 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 on the MICA website.
 - Inform the Focal Point(s) and the MICA Cell once the potential cause of the IC conflict has been identified, and once the IC conflict is resolved.

IC conflict Reporting and Resolution (2)

- When a **Focal Point** is notified of an IC conflict within his area of responsibility, the Focal Point has to provide the necessary assistance and advice to achieve an early resolution of the IC conflict.
- The **MICA Cell** should provide whatever assistance and advice it can to facilitate the dissemination of information and early resolution of the conflict.