

Planning Criteria for SSR Mode S II Code

Workshop

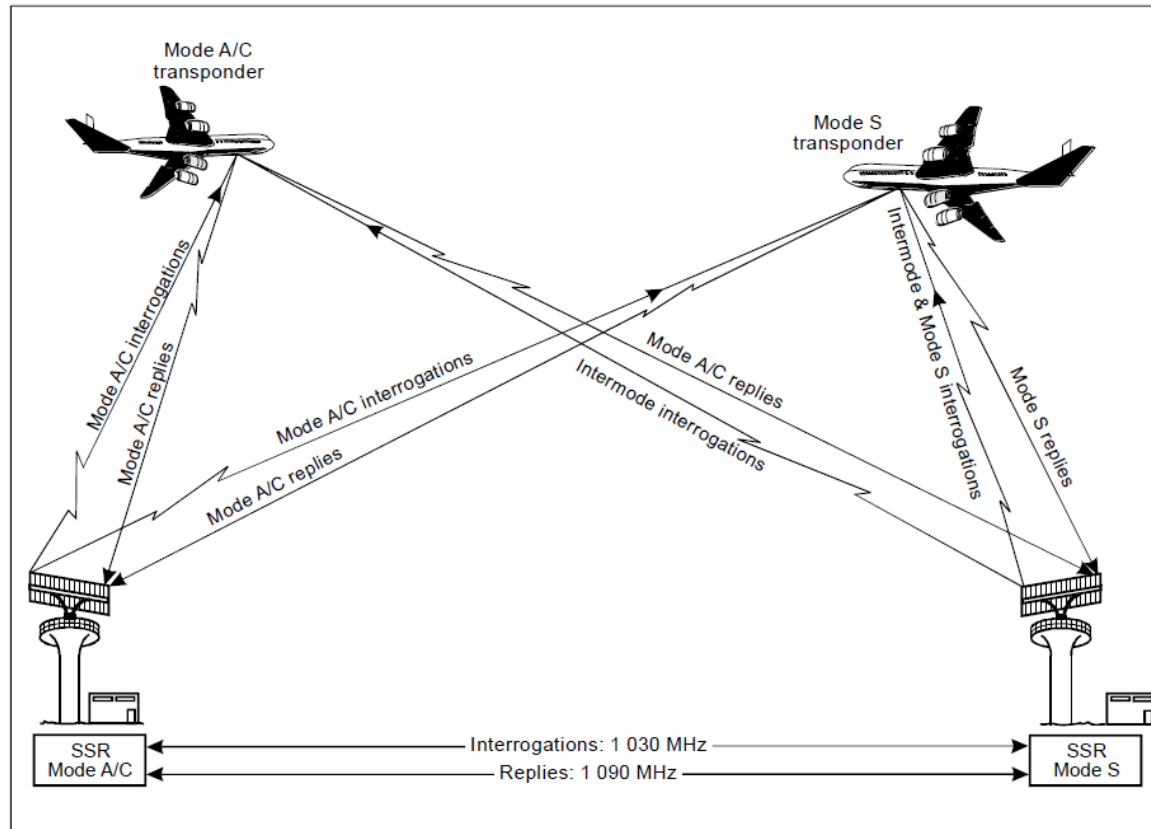
Mexico City, Mexico, 6 – 10 November 2017

Robert Witzen
Loftur Jónasson
Mie Utsunomiya

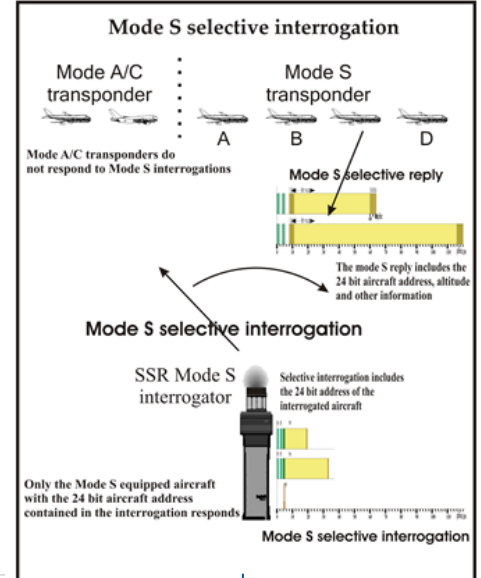
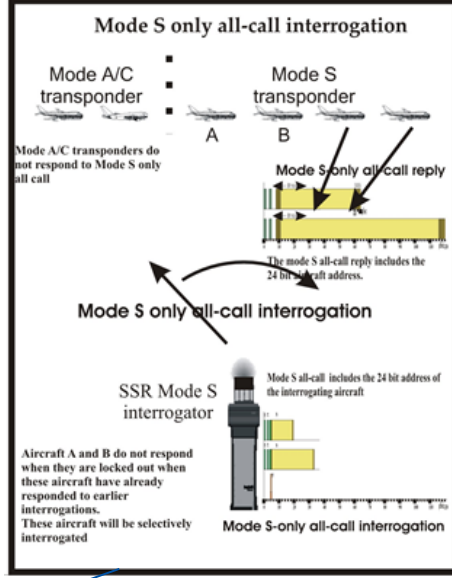
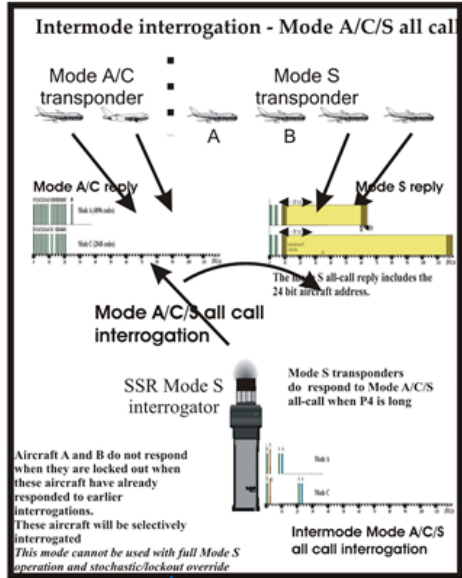
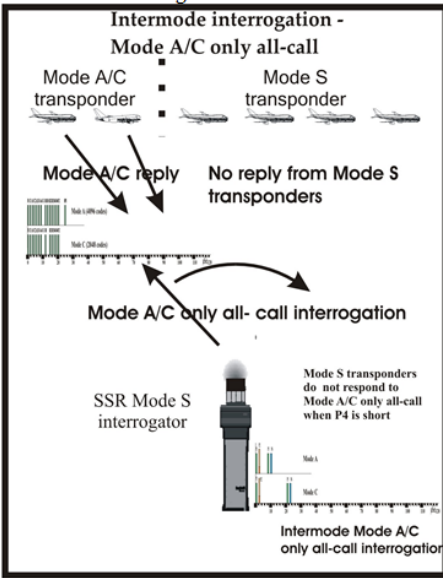
Outline

- **Introduction(SSR operation)**
- **What is SSR Mode S II code and why SSR Mode S II codes are needed?**
- **How to allocate SSR Mode S II codes?**

Introduction- SSR Operation



Introduction- SSR Mode S Operation



All call activities

Roll call activities

SSR MODE S

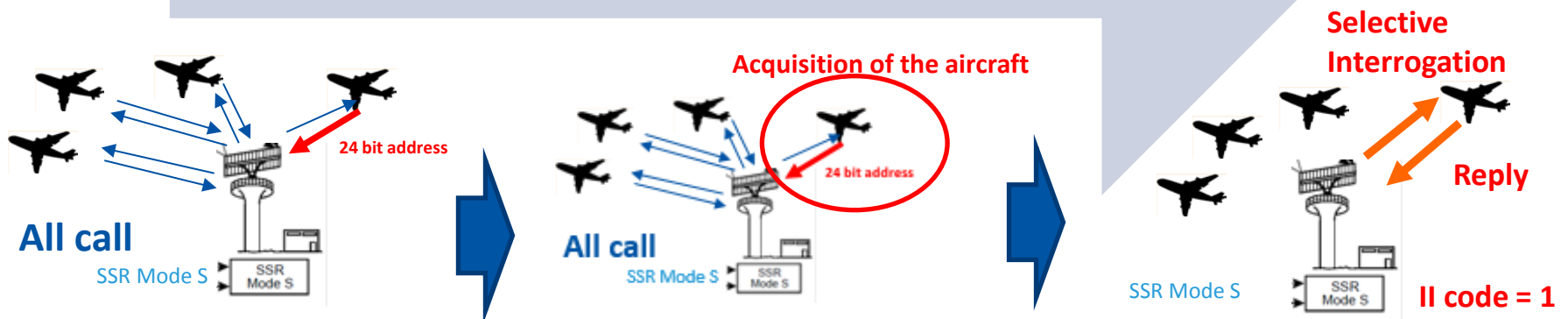


How SSR Mode S interrogator acquire all aircraft in coverage

Mode A/C and Mode S activities (All call)

- To perform surveillance of SSR Mode A/C equipped aircraft
- To acquire new Mode S aircraft
 - ⑩ 24 bit address and
 - ⑩ Position of the aircraft

Mode S **selective Interrogation** (Roll call)

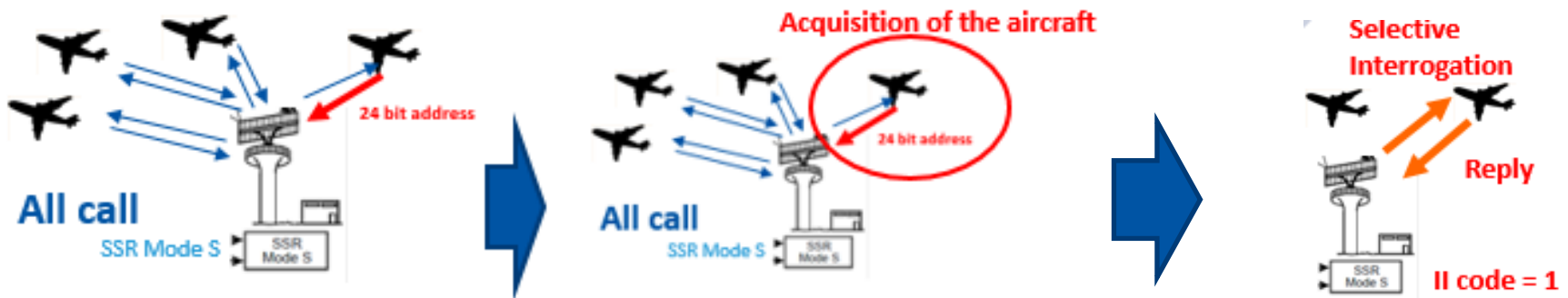


Selective addressing

Both the SSR Mode S ground station and the aircraft are capable of identifying each other.

Aircraft side : 24 bit address is required
Then...what should be used for ground side???

IC codes are required



What is IC codes

The SSR Mode S ground station is identified by its interrogator code (IC), which can either be an Interrogator Identifier (II) code or a Surveillance Identifier (SI) code.

Four bits are available for 16 different II codes.

- II code 0 requires special handling.
- **II codes 1-15 for assignment to fixed Mode S ground stations with overlapping coverage.**

Frequency Finder is the tool to manage those II codes.

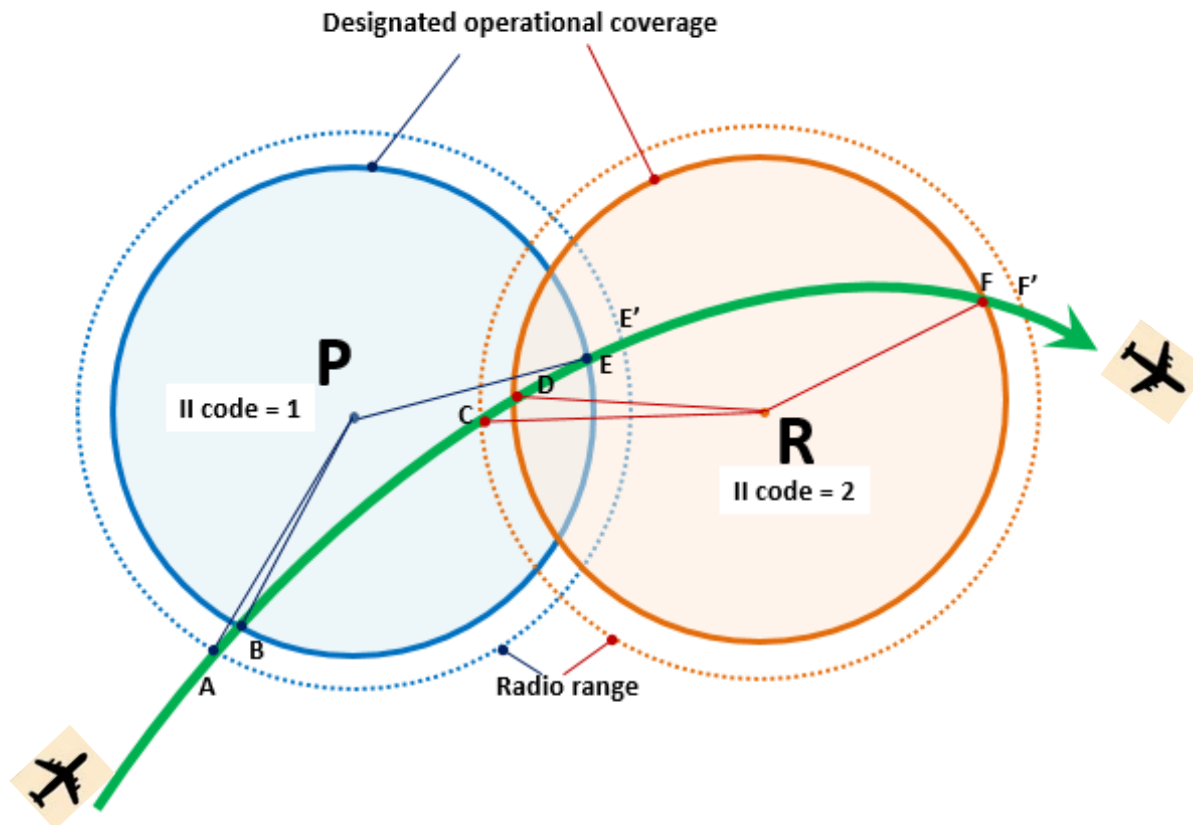
In some regions certain II codes have been reserved for specific purposes and are not available for general assignment.

For aircraft complying with the provisions of Annex 10, Volume IV, Amendment 73 (or later) an additional 63 codes known as SI codes can be used, which adds significant complexity required for the assignment and operation with SI codes.

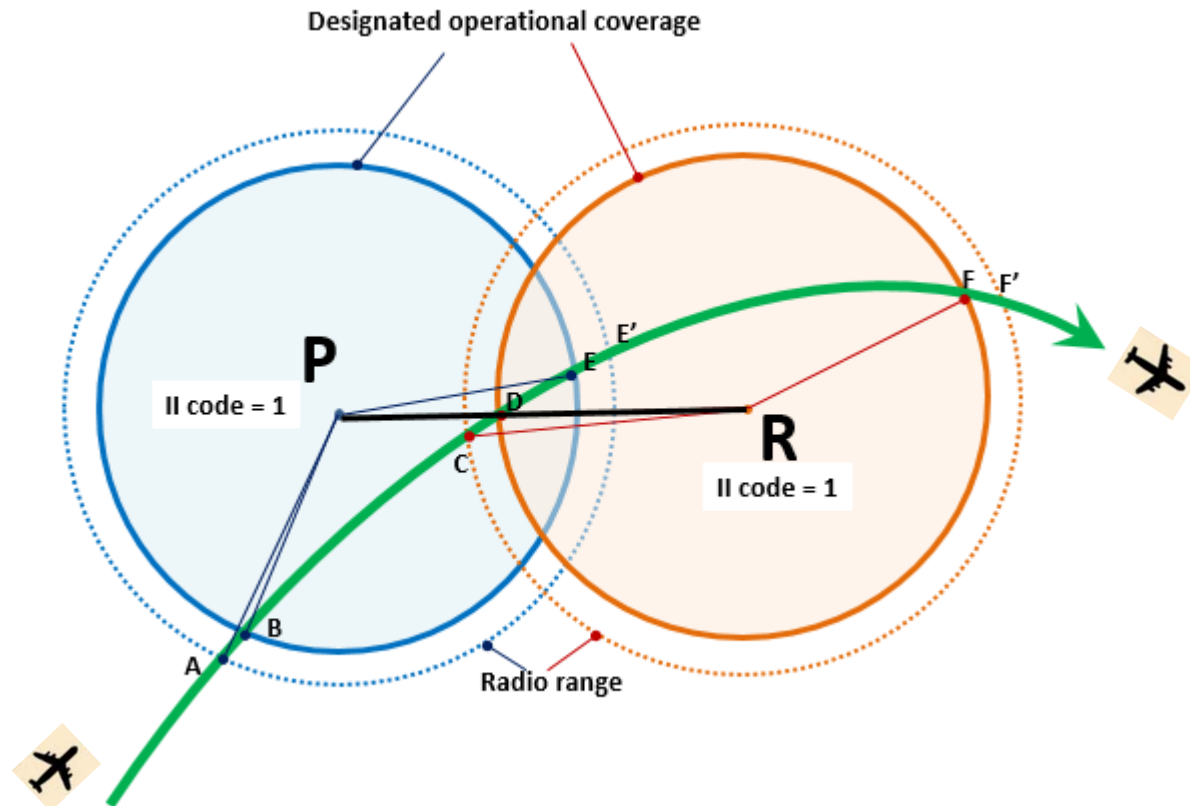
Coordination of II codes of adjacent SSR Mode S interrogators

- When adjacent Mode S ground stations have overlapping designated operational coverage
- Between adjacent States and regions
- Should coordinate with other authorities such as Military radars...

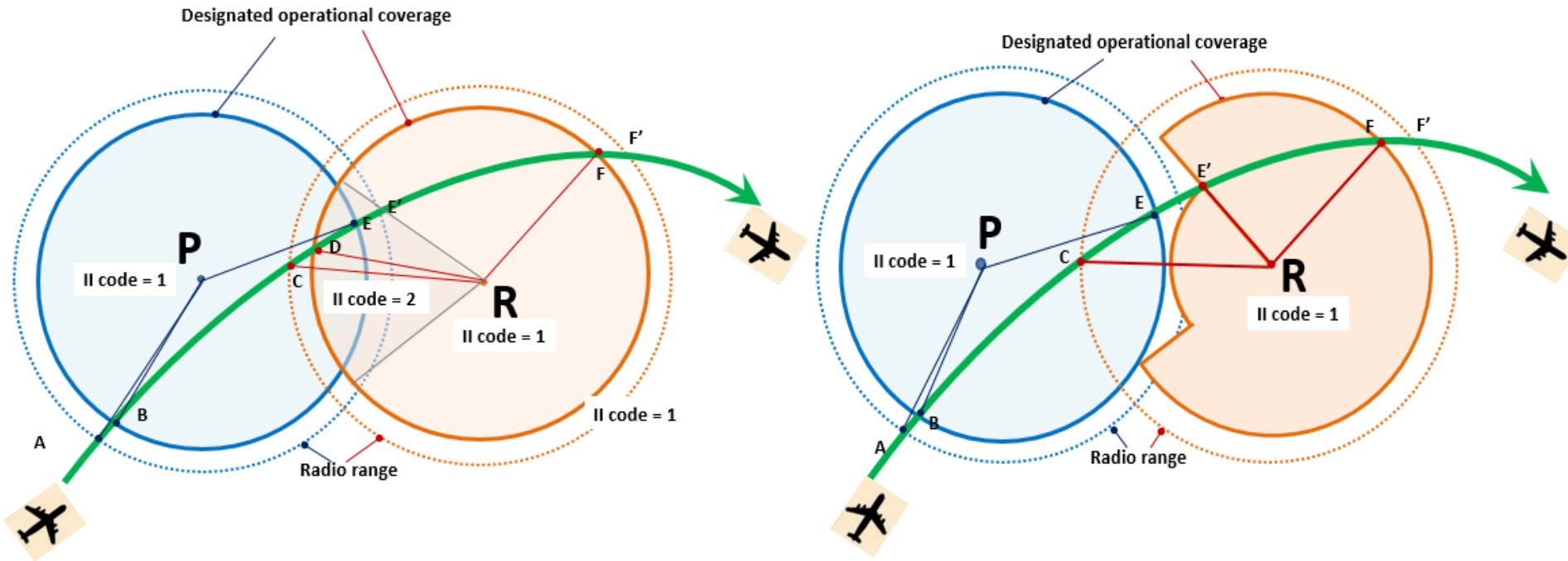
Process for II code acquisition and lock-out



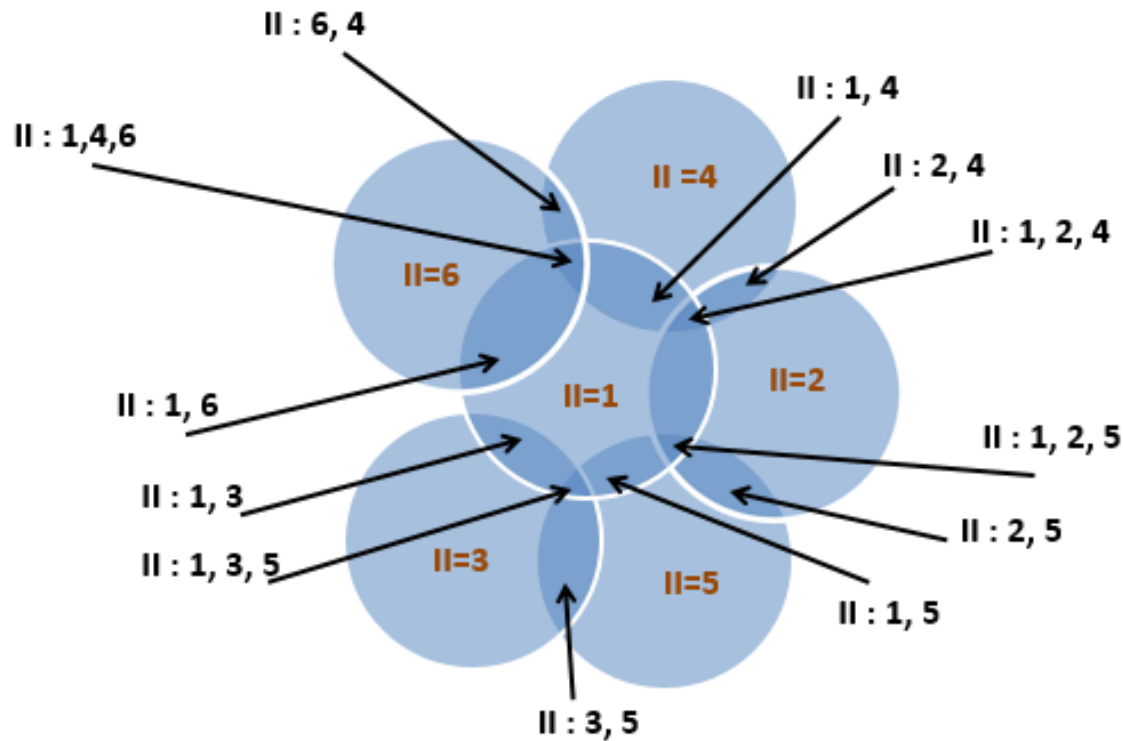
SSR Mode S interrogator clustering (interrogators with same II code)



Sectorized use of II codes



Practical examples of Interrogator Identifier code assignments



Background information

Refer to Annex 10 Volume 4

2.1.2.1.1 Recommendation.— Administrations should coordinate with appropriate national and international authorities those implementation aspects of the SSR system which will permit its optimum use.

2.1.2.1.2 The assignment of interrogator identifier (II) codes, where necessary in areas of overlapping coverage, across international boundaries of flight information regions, shall be the subject of regional air navigation agreements.

2.1.2.1.3 The assignment of surveillance identifier (SI) codes, where necessary in areas of overlapping coverage, shall be the subject of regional air navigation agreements.

Note.— The SI lockout facility cannot be used unless all Mode S transponders within coverage range are equipped for this purpose.

2.1.3.3.1 Requirements for mandatory carriage of SSR Mode S transponders shall be on the basis of regional air navigation agreements which shall specify the airspace and the airborne implementation timescales.

Background information

Annex 10 Volume 4

3.1.2.11.6 Lockout coordination. A Mode S interrogator shall not be operated using all-call lockout until coordination has been achieved with all other operating Mode S interrogators having any overlapping coverage volume in order to ensure that no interrogator can be denied the acquisition of Mode S-equipped aircraft.

Note.— This coordination may be via ground network or by the allocation of interrogator identifier (II) codes and will involve regional agreements where coverage overlaps international boundaries.

Etc.....

Background information

- Refer to Doc 9924 Aeronautical Surveillance Manual for more details related to:
 - SSR Mode S
 - ADS-B
 - ACAS
 - Multilateration (MLAT) etc...

Also for your convenience, we provided “Appendix J Chapter 8 of the Unedited version of second edition of Doc 9924 ” during the workshop.