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Tracking, Search and rescue of civil aviation by using EGNOS and Galileo Satellites Navigation systems

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INTRODUCTION

The civil aviation is grow in worldwide and there are millions passengers using this way as a fast and save way to transport for several reasons, nevertheless the accidents happening because the human and technical faults or extreme weather events. maybe knows the position of airplane falling therefore the rescue teams will do their duty, in other hand the position of airplane falling maybe unknown and that will take many hours, days or weeks to find it and that will reduce chances of rescue of survivors like what happened in many airplanes accidents.

Procedure of Project

In this project will use Beacon System, (Main-beacon) device installed in platform and connected to European Geostationary Navigation overlay service (EGNOS) to indicate the position, altitude and time of airplane and will use the SAR already provided by Galileo Satellite Navigation to search and rescue the parts of civil aviation after accident by using navigation device (Sub-beacon) devices installed in airplane to send beacon signal, this service working when accident happened and send search signal to Galileo Satellite Navigation. The Beacon signal will transmit to Satellite of EGNOS then transmit this beacon signal to (Civil Aviation Tracking Centre) in Galileo Control Centre-GCC and collect all received data in it, to capable airways companies. If airplanes arrive to destination safely will known airplane path precisely. This system will work as (Air Traffic Control-ATC) to tracking the paths of airplanes as illustrated in (Figure 1).

Main Beacon device position



Figure 1: Main Beacon device position in centre mass of airplane



Figure 2: Sub Beacon devices positions

Main Beacon Device position and procedures

Main Beacon device installed in platform on surface provided with rechargeable battery (Figure 1), this device will transmit signal to European Geostationary Navigation overlay service (EGNOS) then transmit signal to (Civil aviation tracking center) to record airplane position, altitude and time to plot airplane path precisely by software found already in tracking center (Figure 3).

Main-Beacon device connected to Sub-beacon devices and Digital Storage Unit – DSU.

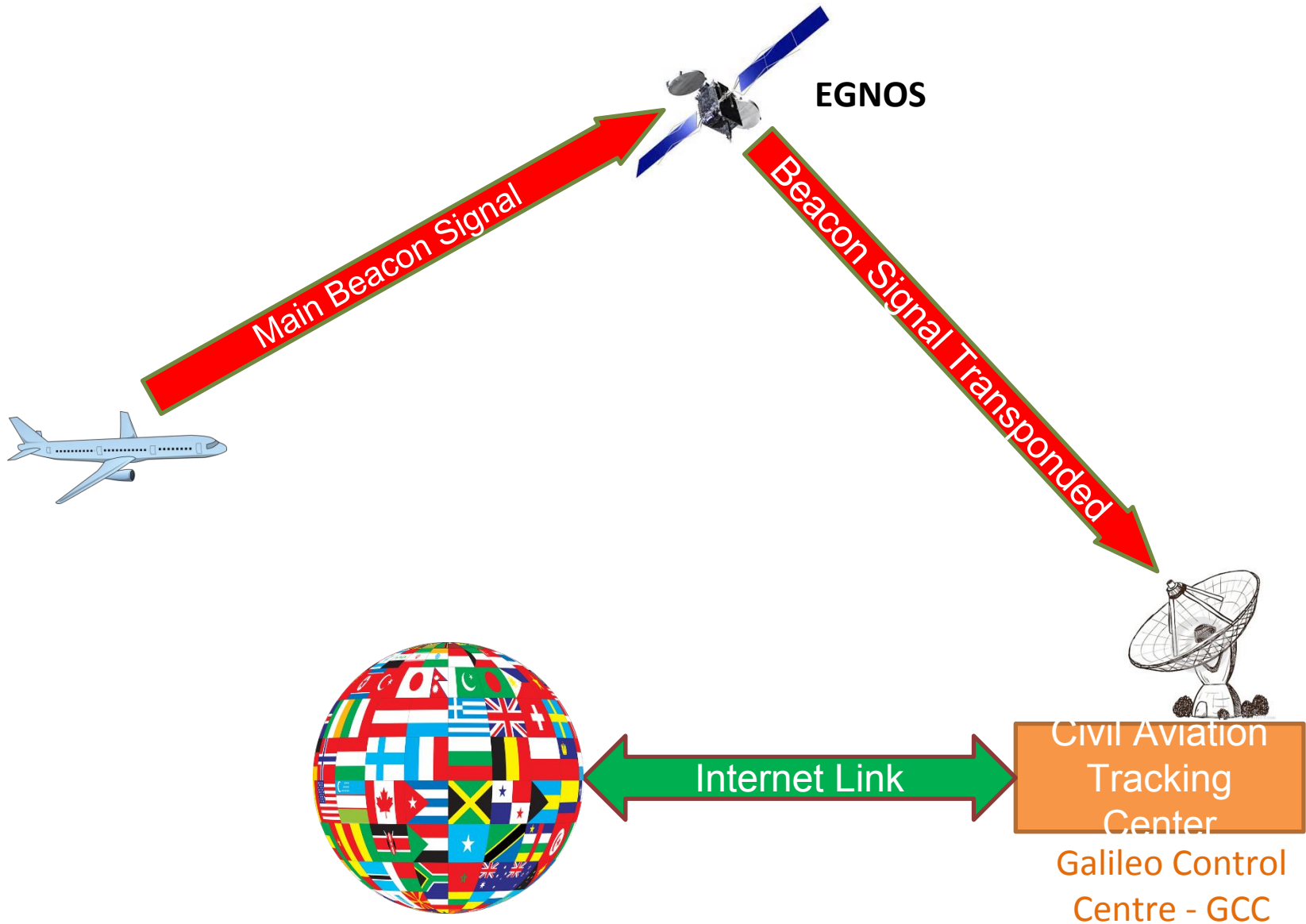


Figure 3 : Illustrate the idea

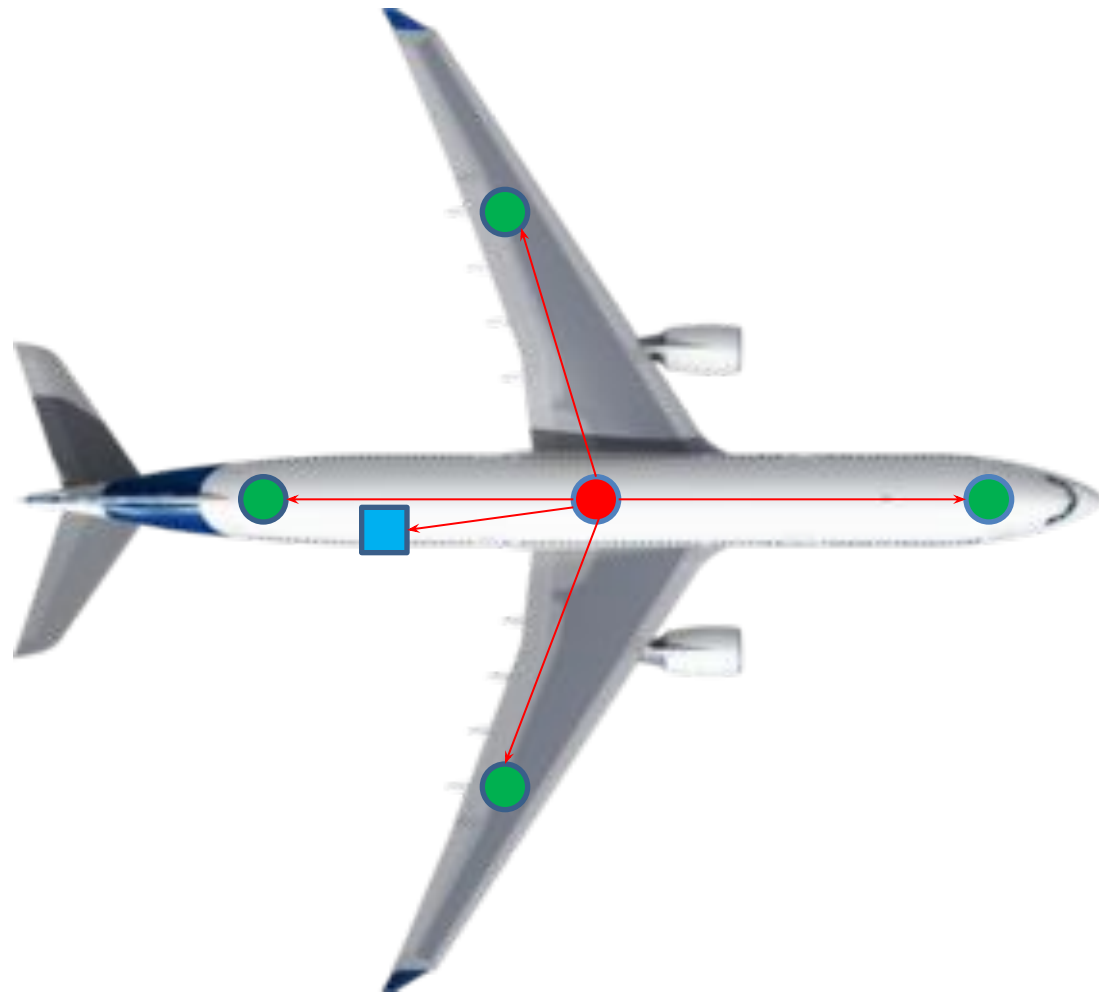


Figure 4: Beacon systems and Digital Storage unit connections

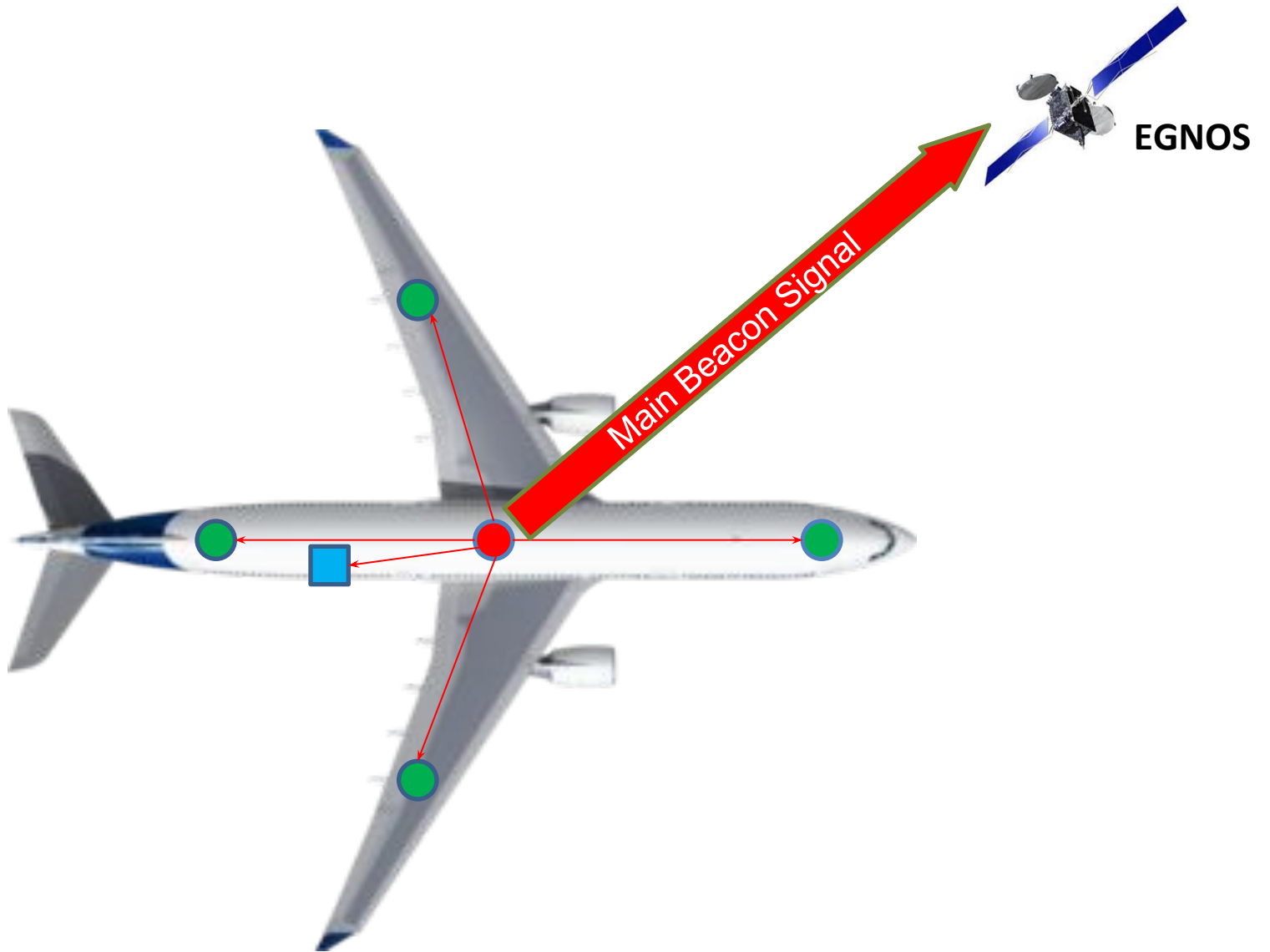


Figure 5: Main Beacon working and procedures

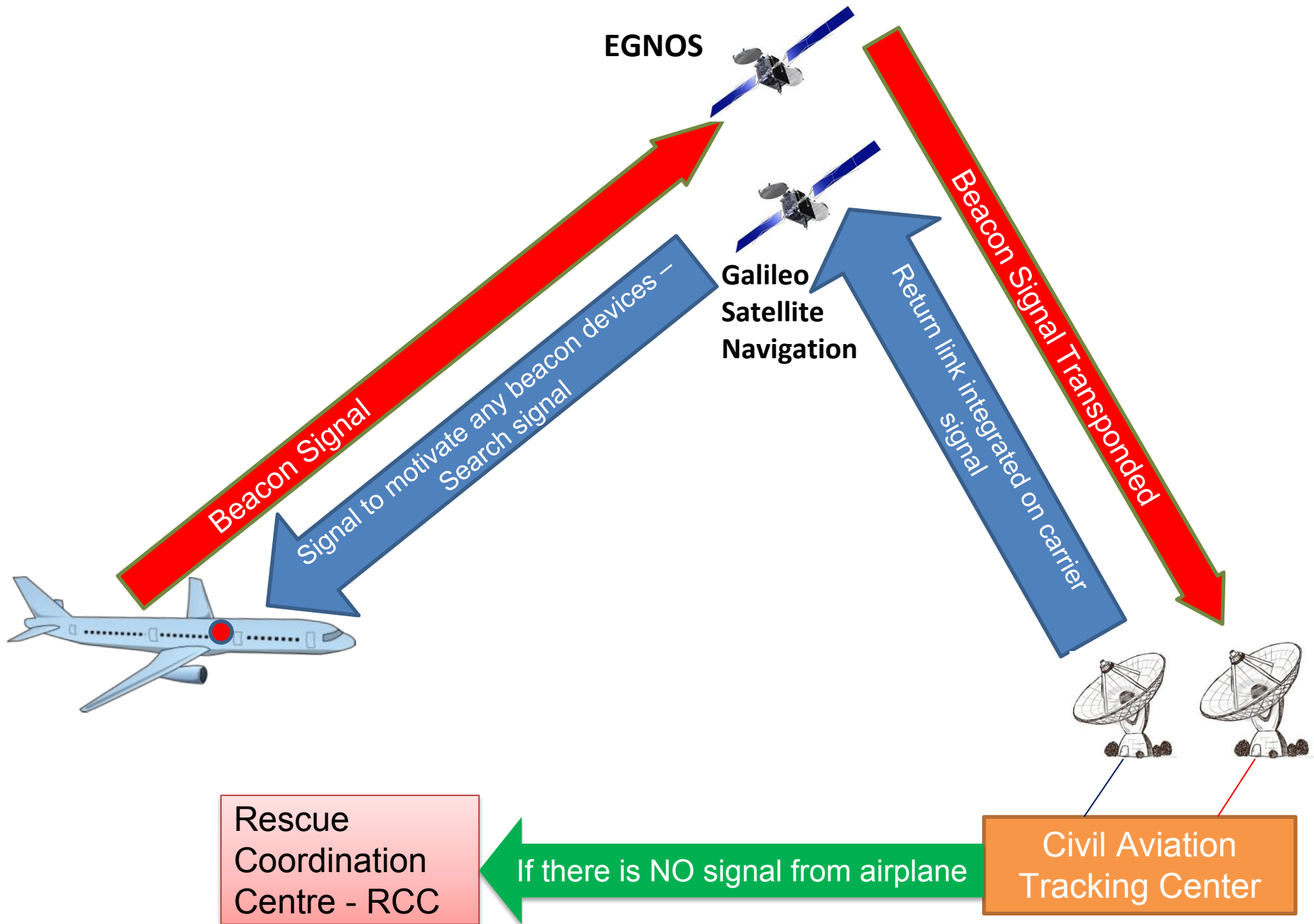


Figure 6: Main beacon device procedures

Galileo Control Centre - GCC

Sub Beacon devices positions and procedures

SUB BEACON DEVICES POSITION and PROCEDURES

Sub-beacon devices distribute on airplane body (Figure 2).

All these devices have rechargeable batteries to work autonomously if necessary. Sub-beacon transmit search signal autonomously to Galileo Satellites Navigation then transmit search uplink signal to Galileo Satellite Navigation then transmit search downlink signal by satellite to (Civil aviation tracking center) (Figure 7), if any accident happen the beacon device will still working before crash the airplane on earth or in sea that will give capable to know falling position precisely.

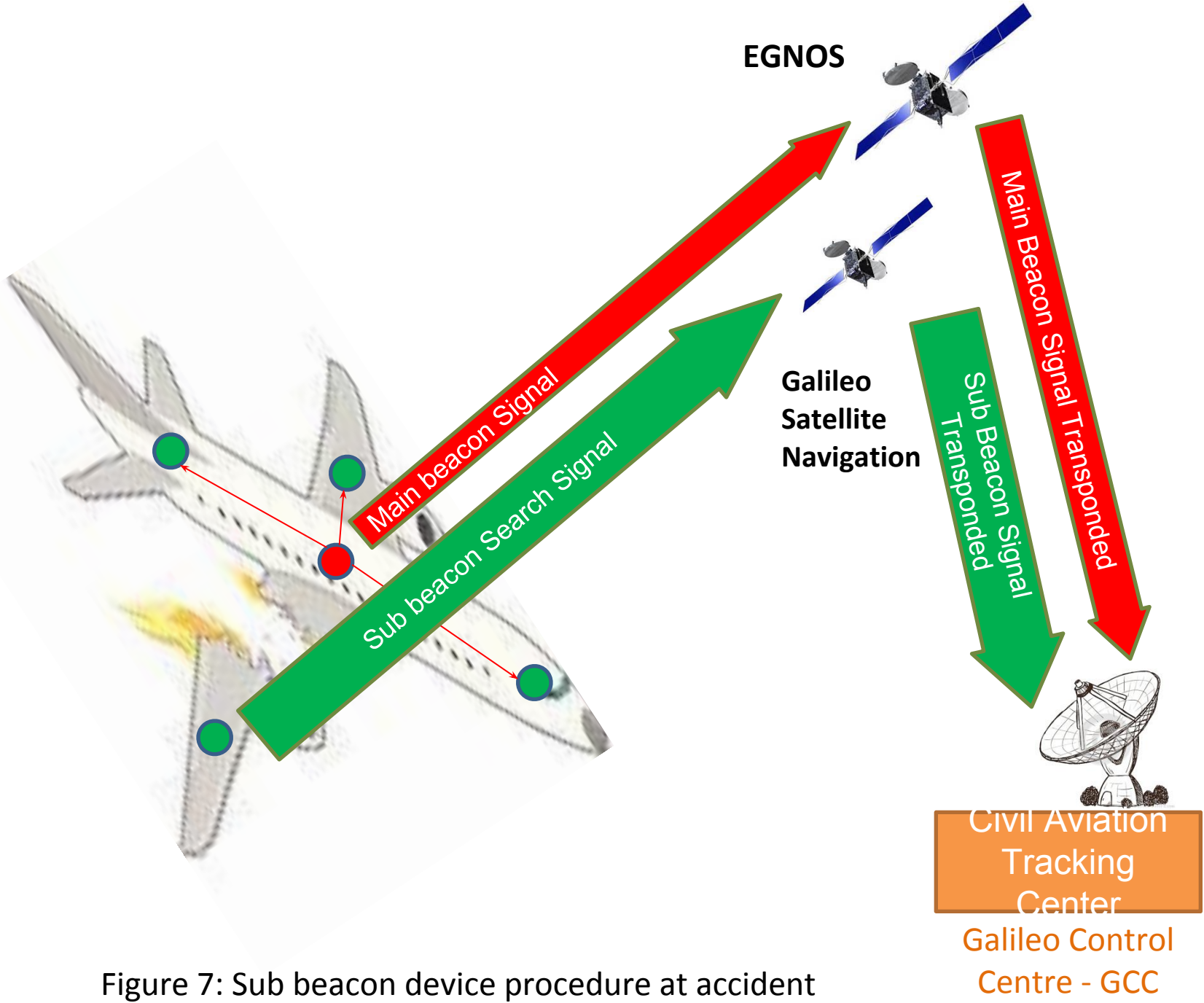


Figure 7: Sub beacon device procedure at accident

Black Boxes Connections and the Procedures with Hazard, Digital Storage Unit and Beacon System

Black boxes data collection

Some times after airplane crashed cannot get data and information of black boxes because hard crashing with terrain, explosion or sink in deep sea water, to collect data of black boxes suggest following:

1- Black boxes connection with Digital Storage Unit – DSU

Connect the black box with Digital Storage Unit have (rechargeable battery, transmitter and antenna) and take all data and information directly from output port to store again in DSU.

Digital Storage Unit connected to hazards system in airplane if abnormal situation or any dangerous happened then hazard devices working with (EGNOS)

Black boxes connection with Digital Storage Unit – DSU

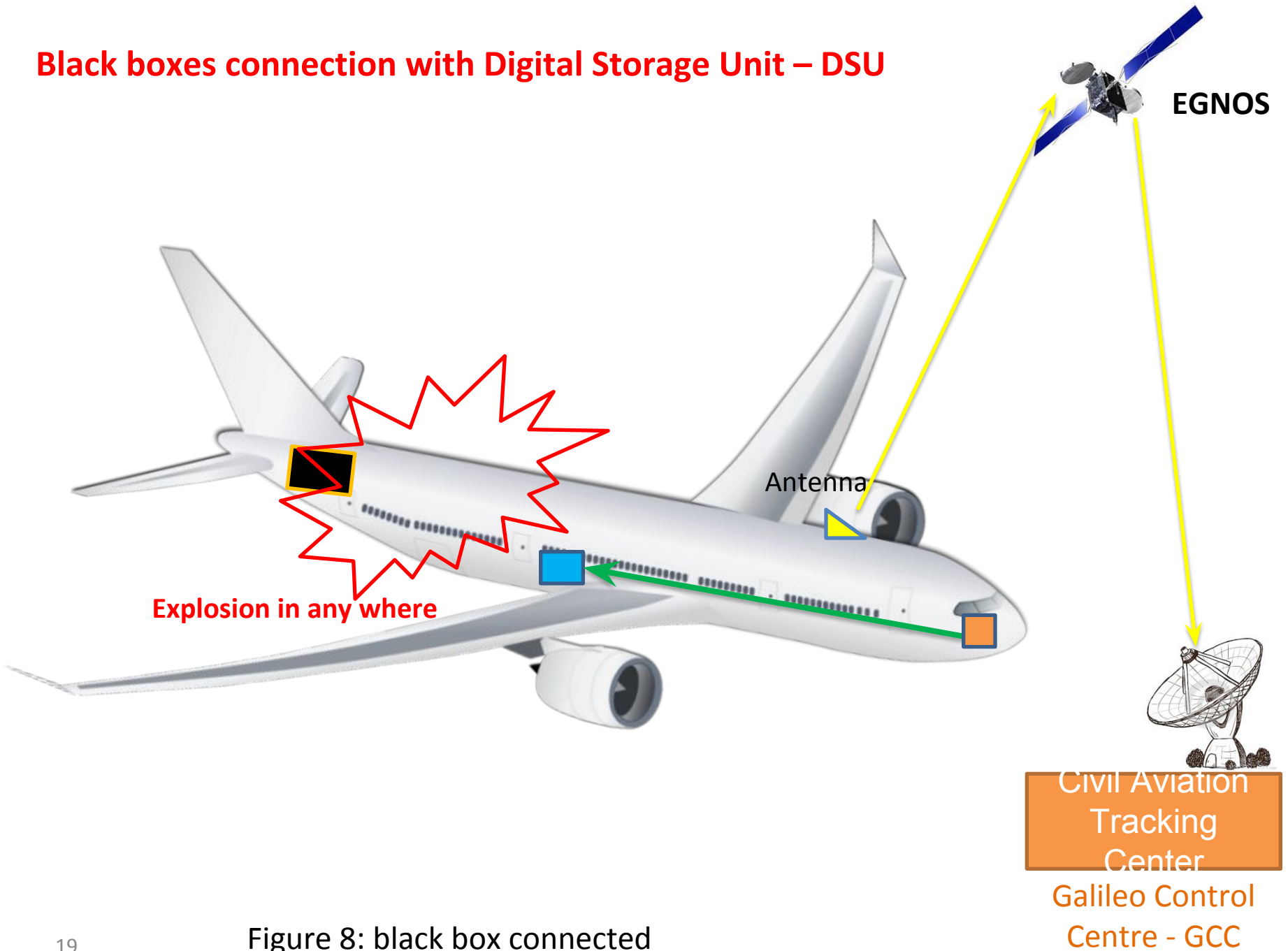


Figure 8: black box connected

2- Digital Storage Unit - DSU connection with beacon system

If any suddenly dangerous happened like explosion in airplane or separate any part of airplane then cut off control signal coming from airplane beacon system to Digital Storage Unit-DSU so the last device will broadcast the stored data and all new information get it continually to EGNOS to transmit to civil aviation tracking center dependent to Galileo Control Center- GCC to save (Figure 9).

Digital Storage Unit - DSU connection with beacon system

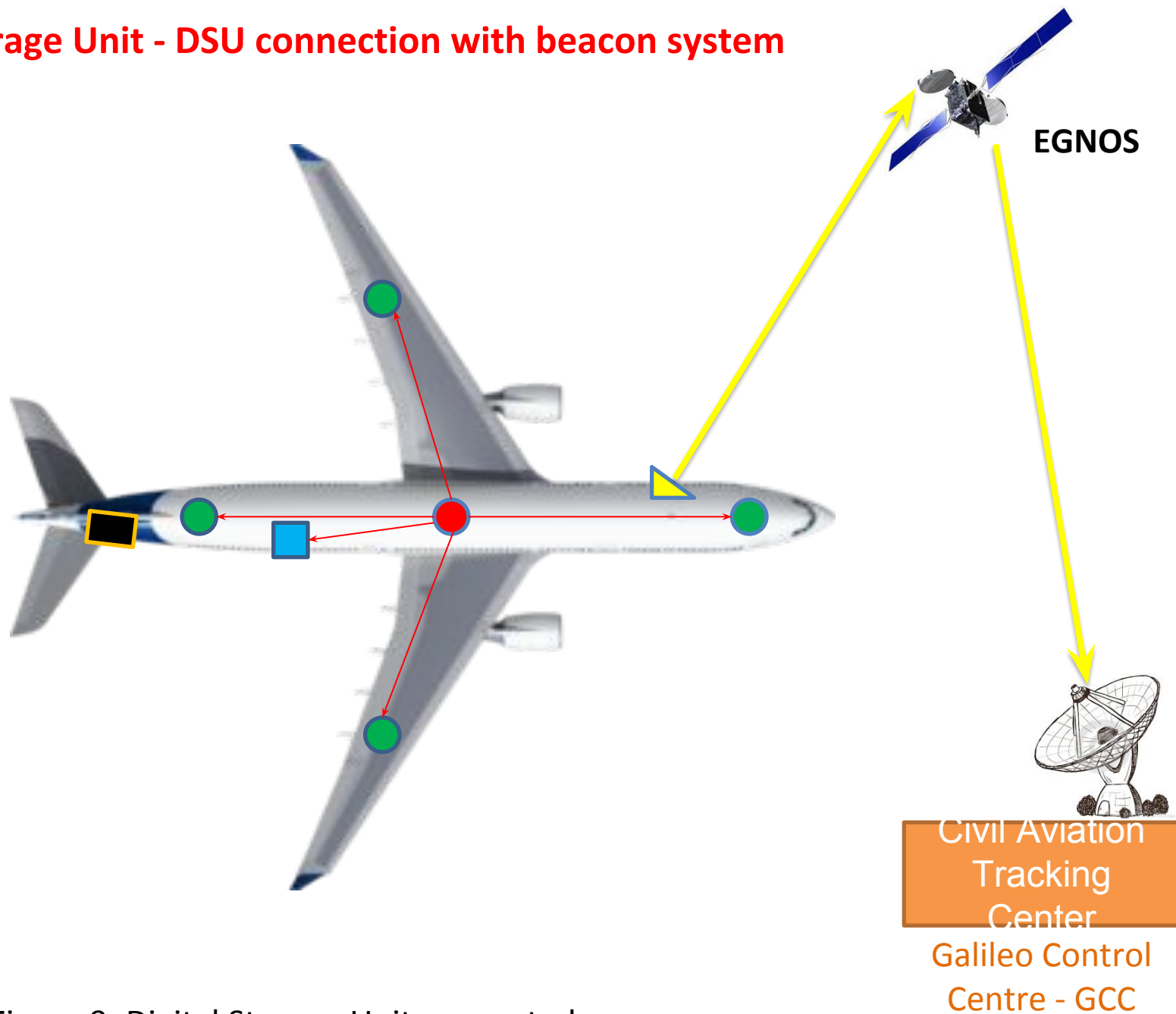


Figure 9: Digital Storage Unit connected

Thank you