



 **Seminar – Data Link Elements & Role of Stakeholders**

ICAO – 2<sup>nd</sup> Satellite Data Link Operational Continuity Meeting (SOCM/2)

Steve Kong – for Inmarsat (UK)

8-10 February 2012



# Agenda

- Aero Safety Services Evolution
- Classic Aero on I-3/I-4
  - Roles
  - Networks & Architecture
  - I-4 Stakeholders & Performance
- SwiftBroadband Oceanic Safety Services
  - GOLD RCP Requirements
  - Reduced Separations
  - Architecture
  - Priority & Pre-emption
  - Products & Services
  - Benefits
- Study Work – Continental Airspace Satellite ATM

# Inmarsat Aero Evolution

## The Focus on Safety

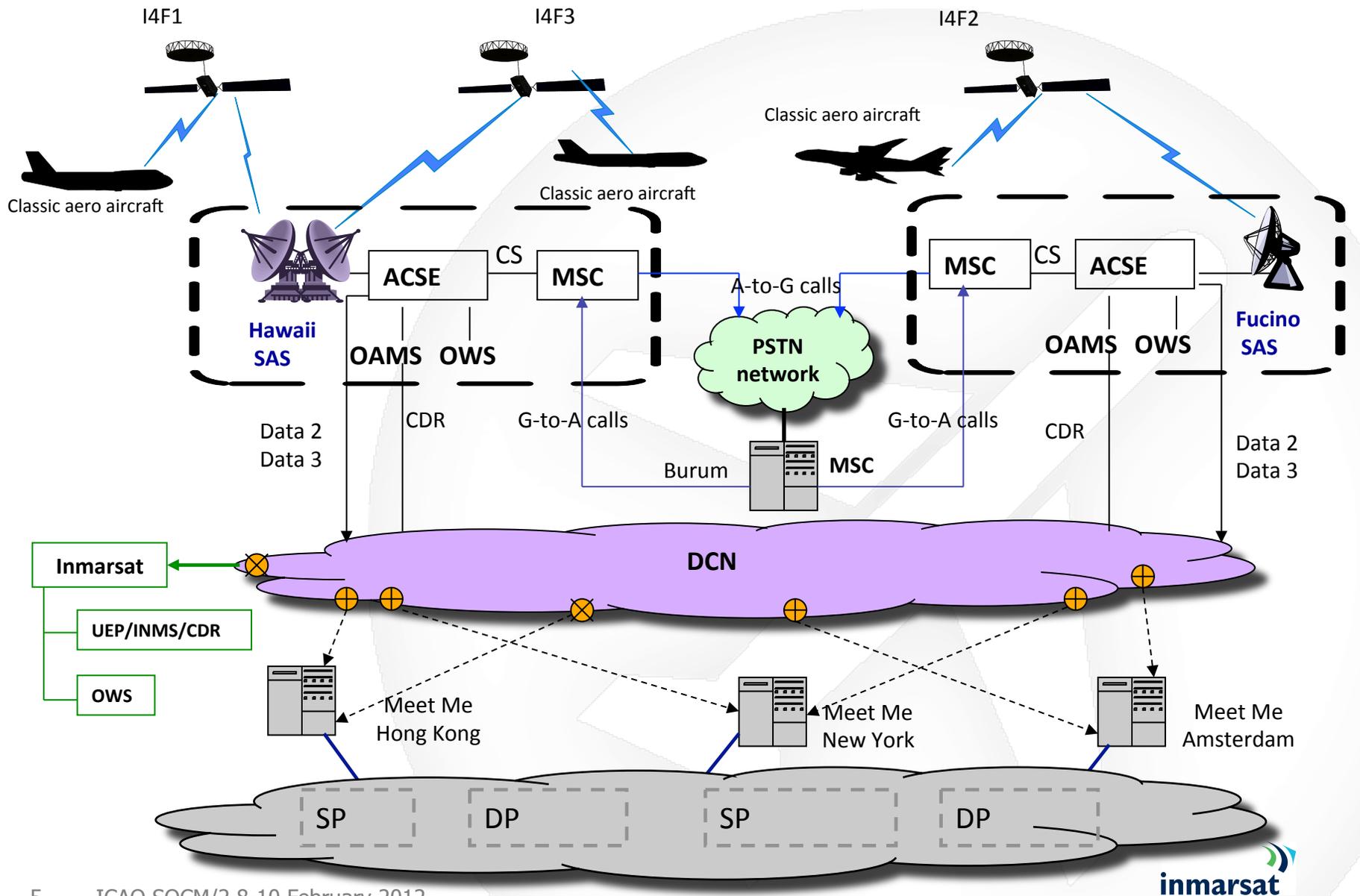
- Introduction: Aeronautical services circa 1990's
- Continued participation in industry
  - ICAO, RTCA, AEEC, PARC CWG
- Advanced satellite industry initiatives for Safety Services
  - EuroControl – NexSAT
  - ESA – Alphasat Extension & IRIS (Continental Airspace)
  - SESAR OPTIMI/SAT-OPTIMI
- The demands for more safety-critical comms
  - Weather applications (e.g. turbulence or volcanic ash)
  - Emergency events triggered data transmission

# Inmarsat – I3/I4: Classic Aero “Roles”

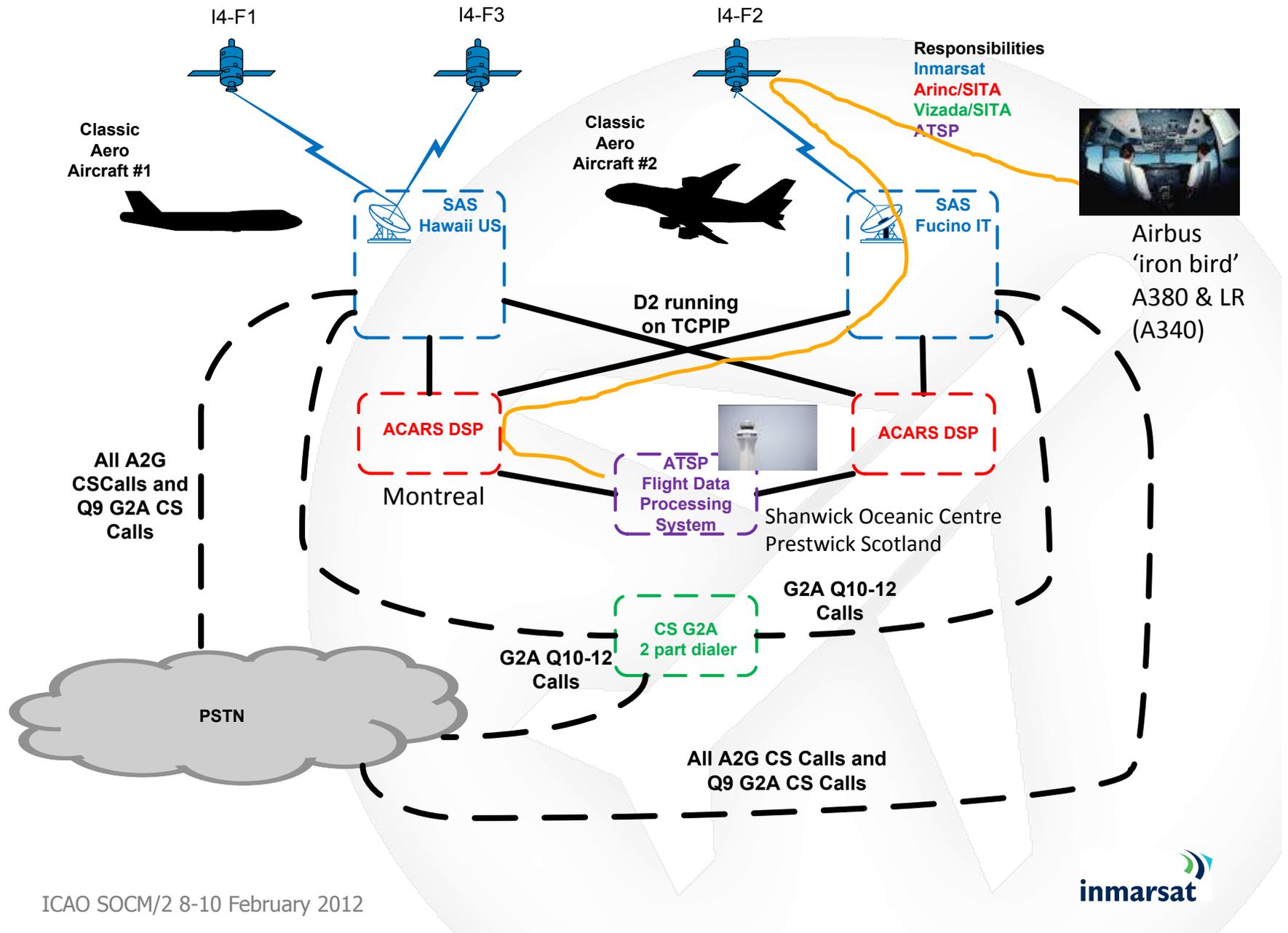
## Service Provision & Station Identifiers

		LESO	CSP	APAC	EMEA	AMER	AORE	AORW	POR	IOR
Inmarsat-3	EIK	Vizada	ARINC				XXE	XXE		XXE
	SANTA PAULA	Vizada	ARINC						XXC	
	AUSSAGUEL	Vizada	SITA				AOE2	AOW2		
	PERTH	Stratos	SITA						POR1	IOR2
Inmarsat-4	HAWAII	Vizada	ARINC	XXH		XXH				
		Stratos	SITA	APK1		AME1				
	FUCINO	Vizada	ARINC		XXF					
		Stratos	SITA		EUA1					

# Classic Over I4 System Architecture



# Classic/I4 End To End FANS data link ATSP/Airbus 7/5/09 & 24/6/09



# Classic Aero I-4 Performance

## FANS1/A over I-4 Classic Aero Project (FOICA)

### > PARC CWG Forum

- ICAO GOLD RCP240/RSP180 Framework

### > Candidates:

- Aircraft with Classic Aero Only
- Aircraft with Classic Aero & SBB
- Pacific (ZAN, ZAK, NZZO) & Atlantic (ZNY, EGGX, CYQX)

### > So far (5xCWG Sessions):

- Approximately 20 Airlines/250 aircraft (Airline/Cargo) + over 110 Bizjets

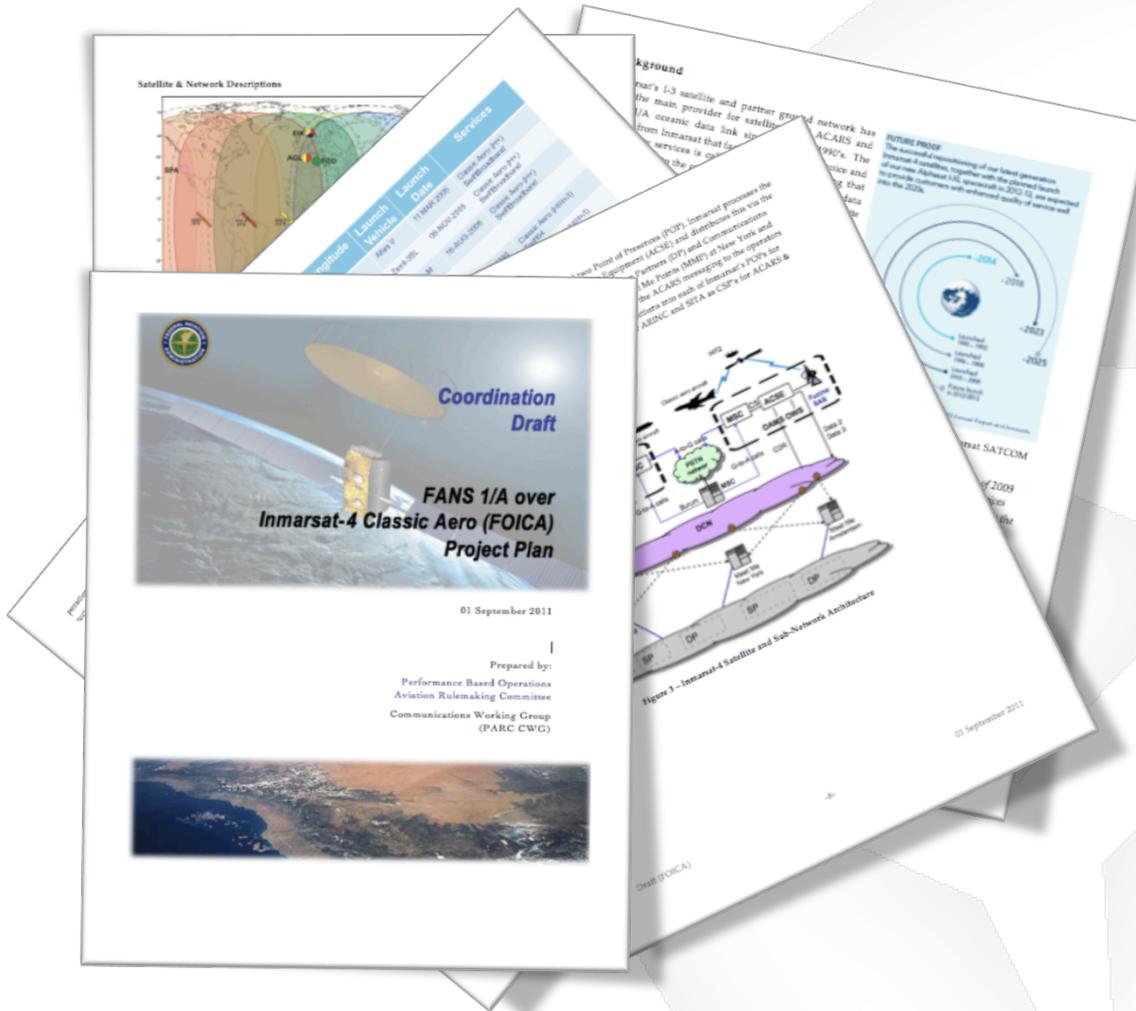
### > PARC CWG 26 Agreement:

- Progress to Post-Implementation Monitoring
- Clarification Cover Letter: I-4 Classic Aero Evaluated Against RCP240



# FOICA Project Plan – Document Status

A BIG THANK YOU! – To PARC CWG Forum



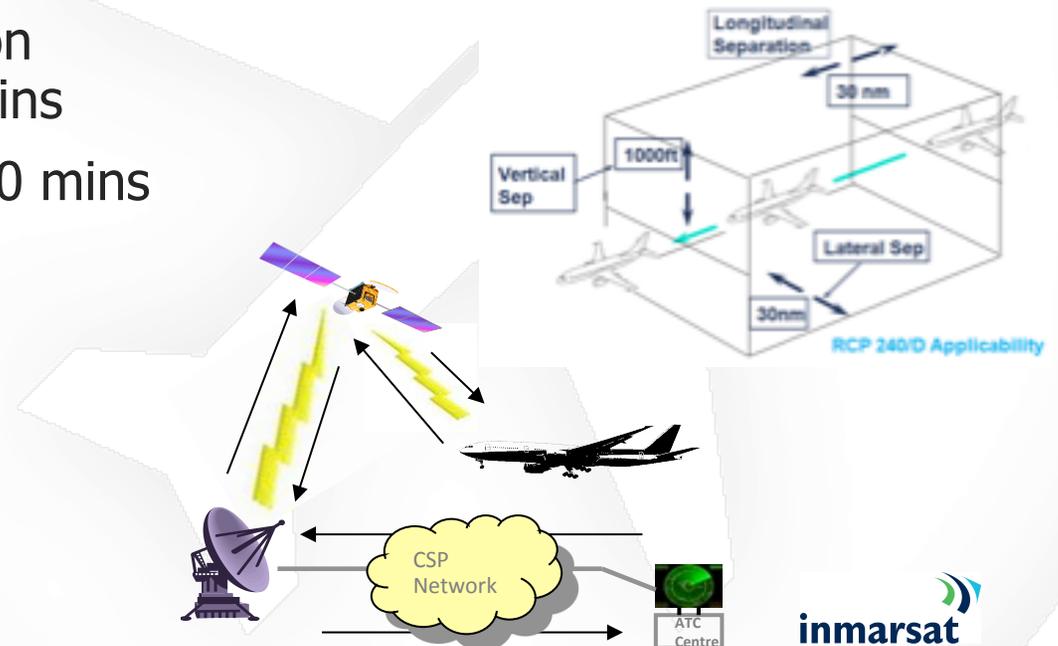
FAA, NAVCAN,  
UKNATS, AirwaysNZ  
ARINC & SITA  
Airbus, Boeing,  
Gulfstream  
Rockwell Collins,  
Thales & Honeywell  
I-4 Airline & Cargo  
Operators

Report, Results, Recommendation to  
be submitted Summer 2012 @ PARC  
CWG 27 for final approval

# Reduced Oceanic ATM Separation

## Summary of RCP240/D Requirements

- Communications path time budget: 120s 95%, 150s 99.9%
  - Should be easy to exceed with SBB acting as preferred communications path for ATS data
- Availability (for operational efficiency): 0.9999  
(Max accumulated unplanned outage time < 52 min/yr)
  - Introducing redundant routes through the use of SwiftBroadband as a parallel communication system to Aero Classic improves the overall communications system availability
- Maximum time for notification of unplanned outage: < 5 mins
- Maximum allowed outage: 10 mins

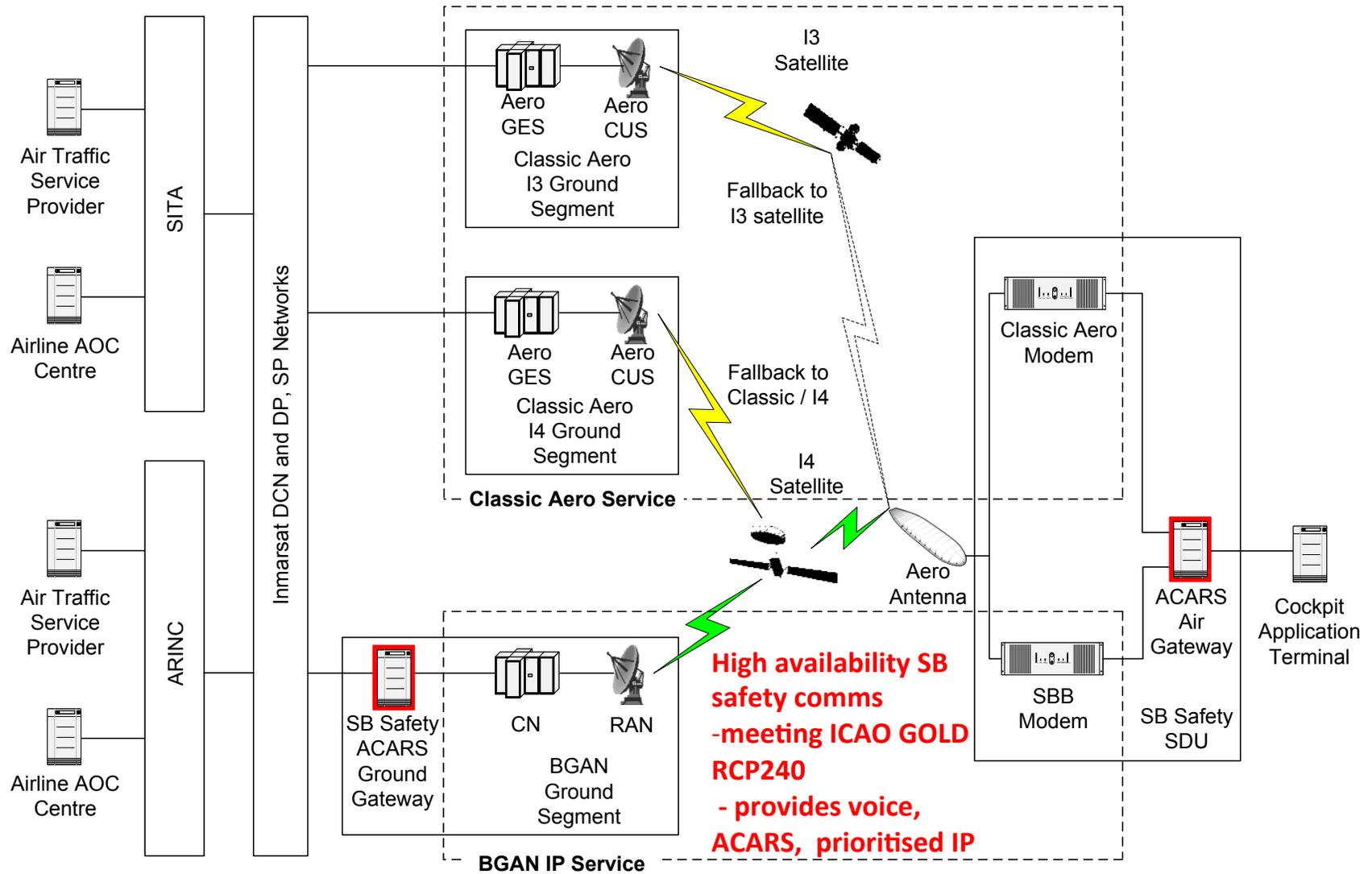


# SwiftBroadband Oceanic Safety Service

- > SwiftBroadband will be preferred communications path, supported by Classic Aero on I4 and on I3
- > Introducing redundant routes through the use of SwiftBroadband as a parallel communication network to Classic Aero aims to provide:
  - Four 9's communications system availability
  - ATS data transaction times meeting RCP240



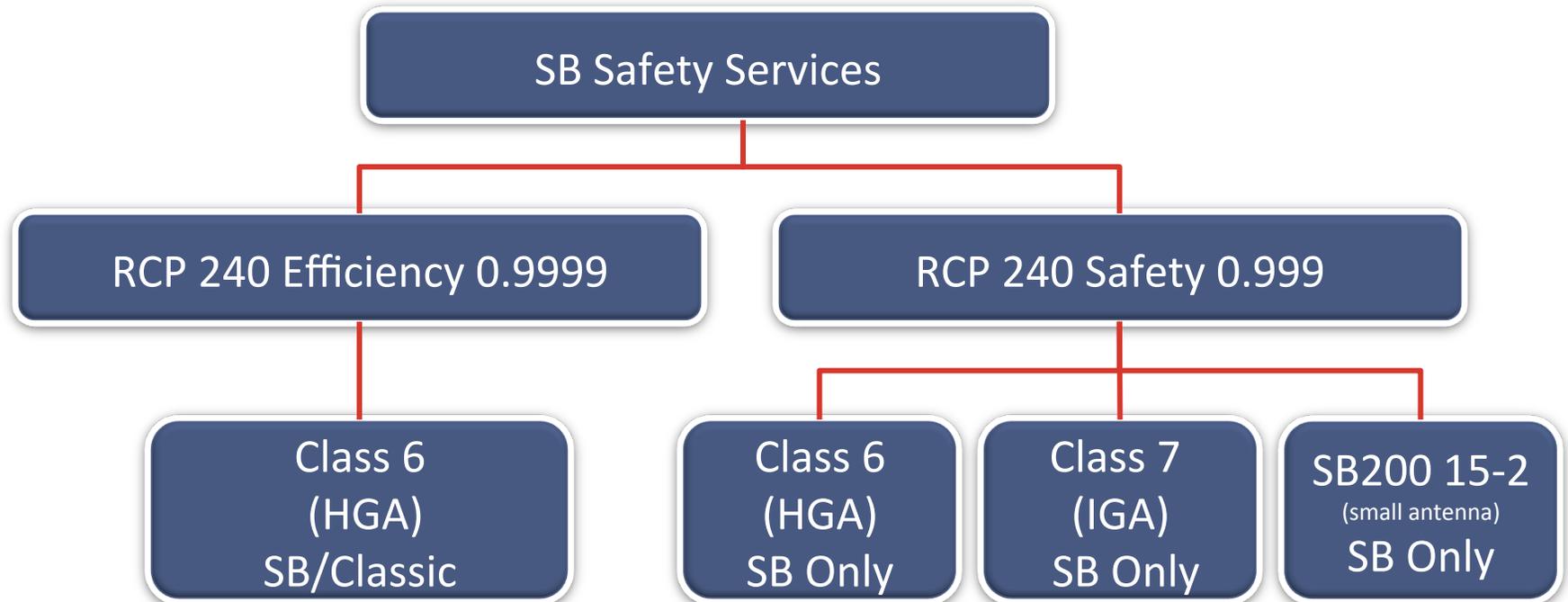
# SwiftBroadband Oceanic Safety Architecture



# SB Oceanic Safety: Priority and Pre-emption

- Key provision of Priority, Pre-emption and Precedence (RAN 3.8)
- Priority levels given to:
  - ATS, AOC, AAC data
  - Priority levels for voice
- SwiftBroadband will be configured to provide communications channel availability for ATS safety
  - Priority over cabin users of SwiftBroadband
  - Priority over other BGAN users
  - Other users with lower priority can be preempted
- Data bearers are configurable to be 'always-on' and thus available at all times for data message delivery

# SB Oceanic Safety Services - Products



➤ All support the following sub-services:

- ACARS Data and IP Data
- 2-channels of voice (one CS, one digital voice)
- Down to 5 degrees elevation

➤ Using one 200 kHz RF channel in the AES (e.g: one SIM)

# What benefits does SwiftBroadband bring to ATM?

- SBB offers reduced operating costs over 'Classic' Aero data link
  - At least 30% reduction in SAT ACARS operating costs expected
- Key provision of Priority, Pre-emption and Precedence
  - Priority levels given to: ATS, AOC, AAC data; voice
  - PPP ensures comms availability for ATS safety
  - Priority over cabin users of SwiftBroadband
  - Priority over other BGAN users
  - Other users with lower priority can be pre-empted
- SBB brings improved performance over classic Aero
  - Target to meet requirements of RCP240
- SBB enables new dynamic capability to FDR applications
  - Triggered streaming of FDR (*per BEA recommendation following AF447 enquiry*)



# SwiftBroadband Safety Services – Long Term Studies Continental Airspace – Satellite ATM

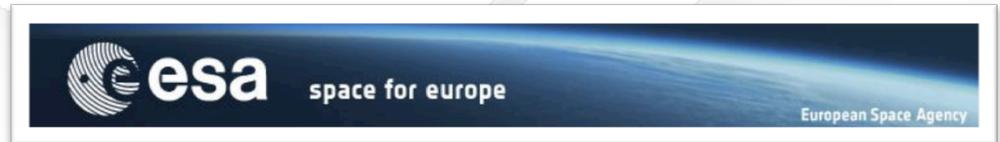


# SESAR and ESA 'Iris' programme



## > Single European Sky ATM Research (SESAR)

- Multi-€bn program, funded by Commission, Industry and Eurocontrol, and involving all major European stakeholders
- To address fact that current VHF voice system cannot support Air Traffic Management (ATM) in the future high density airspace
- SESAR Master Plan identifies need to validate satellite component
- 2020+ timeframe



## > ESA 'Iris' Programme

- Inmarsat is participating in ESA Iris studies (design [B1 phase] and operations ['HERMES']) that evaluate the SwiftBroadband enhancements necessary to achieve the performance required in Continental Airspace:
  - More stringent latency and reliability requirements
  - Regular banking and turning
  - Small, low-cost avionics and antenna systems suitable for short-haul and general aviation

# To Conclude

- Inmarsat is committed to the long term support of safety services
- SwiftBroadband-Safety for Oceanic use; development is underway targeting compliance with GOLD RCP requirements
- Expect FANS 1/A over SwiftBroadband Project Initiation late 2012 @ PARC CWG 28
- The longer term requirements for adaptation of SwiftBroadband for continental airspace Air Traffic Management are being studied

*Inmarsat is keen to 'open the door' for new safety service & flight deck applications*



## Thank you – Questions?

> Steve Kong

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# Acronyms

- > **ACSE** – Access, Control and Signalling Equipment
- > **BSS** – Business Support System
- > **CDR** – Call Data Records
- > **CI/I4** – Classic Aero services delivered over the Inmarsat 4 satellite and ground infrastructure
- > **CS** – Circuit Switched
- > **CSI** - Commercial Service Introduction
- > **DCN** – Data Communication Network
- > **DP** – Distribution Partner
- > **ESAS**- Electronic Service Activation System
- > **INMS** – Inmarsat Network Monitoring System
- > **MASPS** – Minimum Aviation System Performance Standards
- > **MOPS** - Minimum Operations Performance Standards
- > **MSC** – Mobile Switching Centre
- > **OAMS** – Off-Air Monitoring System
- > **OWS** – Operator Work Station
- > **PS** – Packet Switched
- > **PSTN** – Public Switched Telecommunication Network
- > **SAS** – Satellite Access Station
- > **SP** – Service Provider
- > **RAN** – Radio Access Network
- > **UEP** – User Enquiry Process