

The background of the image is a blurred, high-angle view of an aircraft cockpit, showing various instruments, screens, and control panels. The text 'Avionics' is written in a large, blue, italicized sans-serif font. Below it, the word 'FOR' is in a smaller, blue, all-caps sans-serif font, flanked by two horizontal lines. Below that, the words 'NEXT GEN' are written in a large, blue, all-caps sans-serif font.

Avionics

— FOR —

NEXT GEN

www.AvionicsForNextGen.com

SATELLITE VOICE INTEGRATION



Mark Lebovitz
President



SATVOICE OVERVIEW

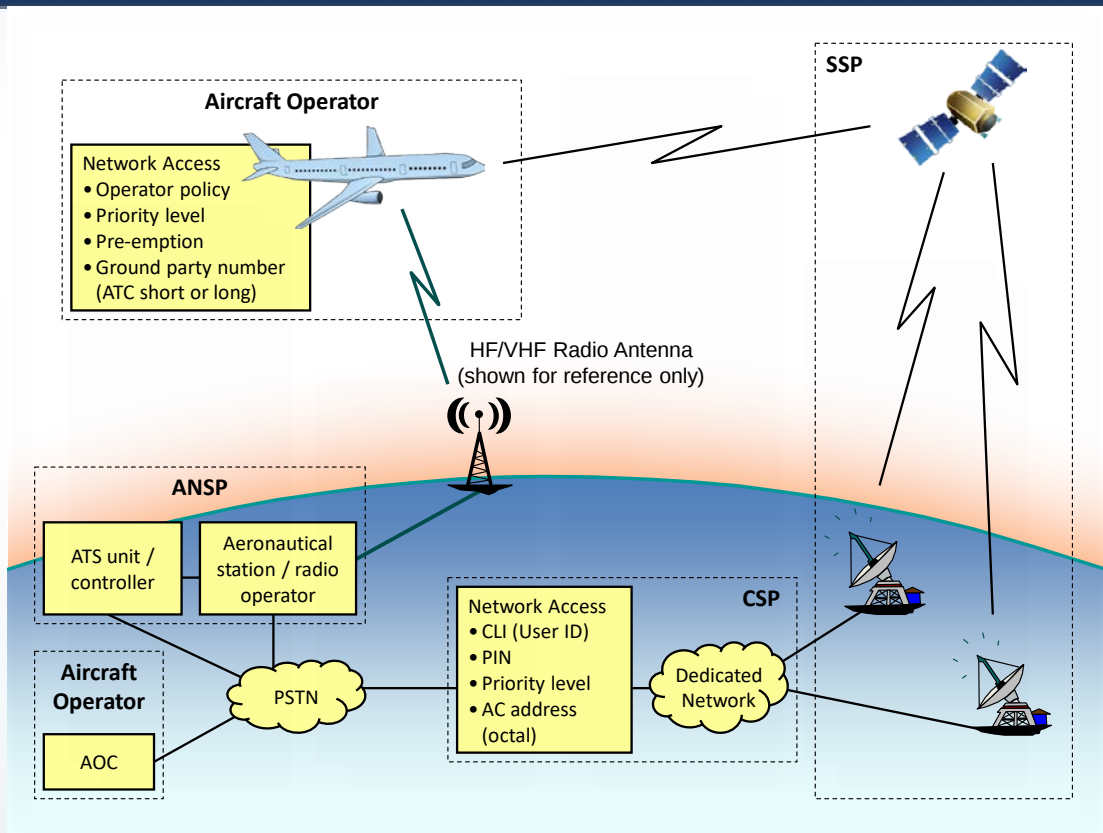
- **SATVOICE PROJECT SUMMARY**
- **SYSTEM OVERVIEW**
- **EQUIPAGE FILINGS**
- **ICAO MANUALS**
- **CERTIFICATION APPROVAL PATHS**
- **AVIONICS INTEGRATION**

SATVOICE STC PROJECT SUMMARY

- **Satellite Voice (SATVOICE) Communications**
 - Complements CPDLC, ADS-C, and HF voice by providing alternative Long Range Communication System (LRCS)
- STC Revision of FANS 1/A+ over SwiftBroadband (SBB) to add SATVOICE
- United Airlines, Boeing 767-300ER Series
- SATCOM software revision Level D, RTCA DO-178C
- Systems Safety Assessment (SSA) showed no single failure or combination of failures would not allow the continued safe flight and landing of aircraft
- SATVOICE guidance defined by FAA AC 20-150B



SATVOICE SYSTEM OVERVIEW



Courtesy: ICAO Satellite Voice Operations Manual (SVOM), Doc 10038

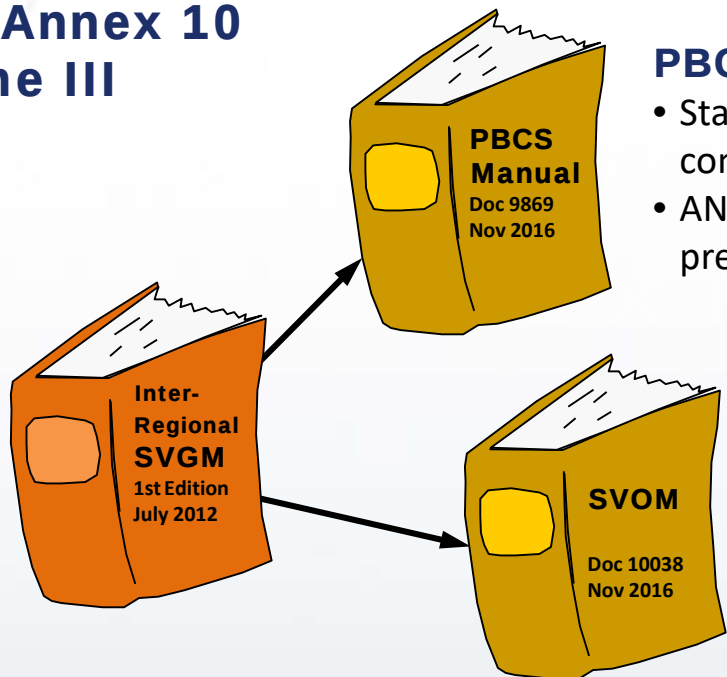
SATVOICE EQUIPAGE FILING

	New York			Oakland			Anchorage		
	Dec-15	Jun-16	Sep-17	Dec-15	Jun-16	Sep-17	Dec-15	Jun-16	Sep-17
Total Flights	21,266	19,424	14,844	23,358	22,900	23,087	5,537	6,505	7,447
% Flights Filing "M" Code in Field 10A	47%	53%	63%	69%	69%	75%	95%	94%	93%
% Flights Filing "M" Code in Field 10A that also filed CODE/ in Field 18	34%	47%	58%	51%	73%	32%	68%	72%	34%

Courtesy: FAA

ICAO MANUALS

ICAO Annex 10 Volume III



PBCS

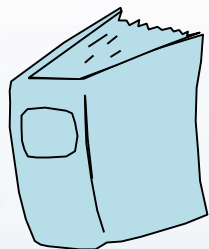
- State prescribed **RCP/RSP** for relevant communication/surveillance capabilities
- ANSP/Operator show system complies with prescribed RCP/RSP

SATVOICE

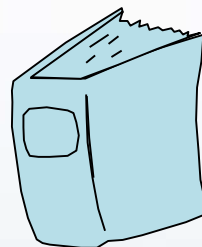
- ANSP/Operator preparation/readiness
- Controller/radio operator/pilot procedures

SATVOICE APPROVAL PATHS

- AC 20-150B, Airworthiness Approval of SATVOICE ATS Communication
- DO-210D, DO-215A, DO-262B, DO-270
- TSO-C159c, Next Generation Satellite Systems (NGSS); TSO-C132, Geosynchronous Orbit Aeronautical Mobile Satellite Services
- 14 CFRs, i.e. §25.1309
- FAA AIP Aeronautical Information Publication
- Extended Overwater Operations, Single LRCS, OpSpec B045
- Policy Letter 106 Rev5, MMEL requirements for HF communication (InFO 15008)
- 14 CFRs, i.e. §121.99(d), §121.122(c), §135.165, §125.203, §121.351, Appendix P



AIRWORTHINESS



OPERATIONS

SATVOICE INTEGRATION

- **Advisory Circular AC 20-150B**
- **CVR Interface**
- **Interface to Existing Flightdeck Audio System**
- **Call Priority, Preemption and Precedence (PPP)**
- **Aural/Visual Annunciation**
- **Continuous Visual Indication of Call in Progress**
- **Call “CAMP ON” Function**
- **Calling Line Identification (CLID)**

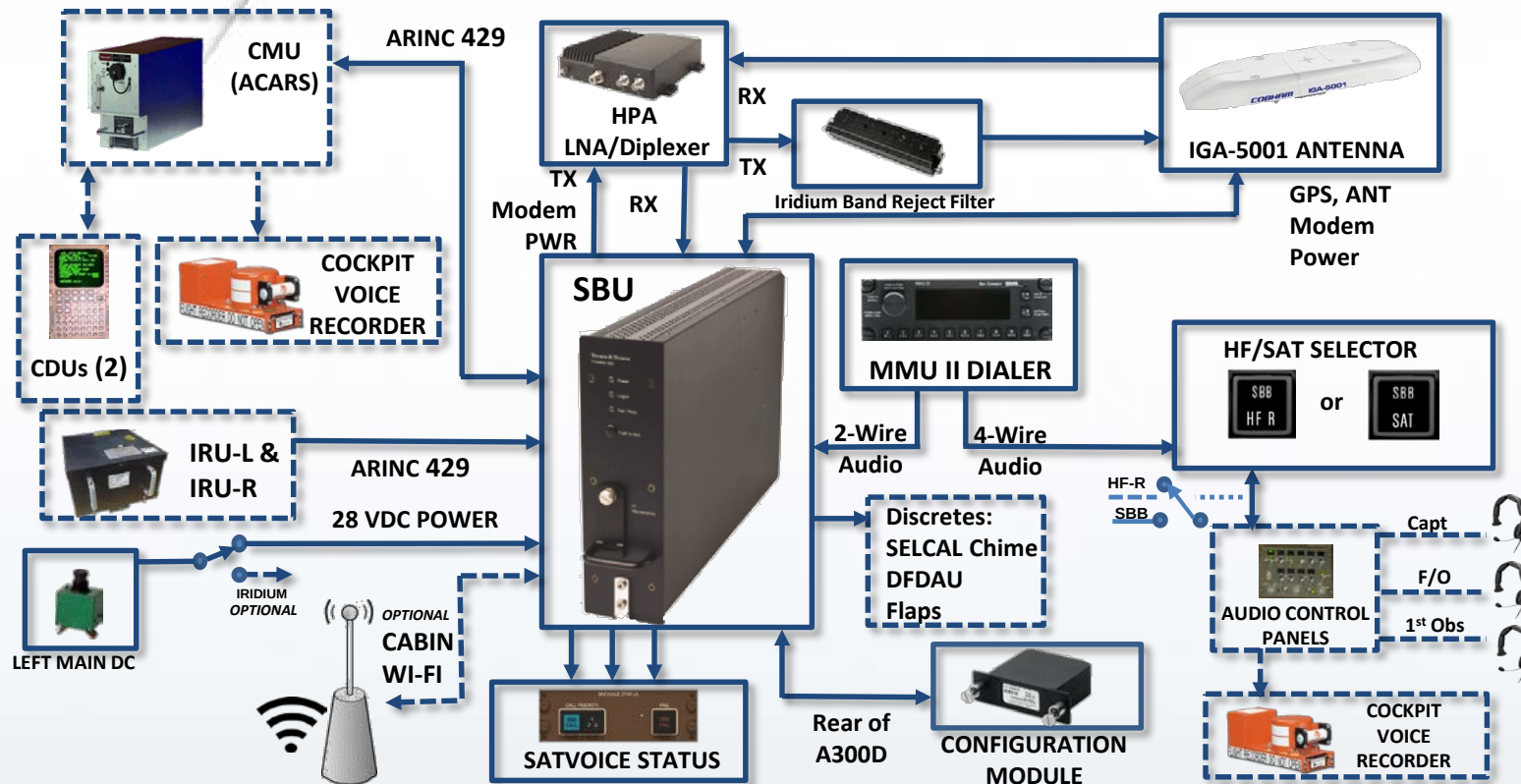
SATVOICE OPERATIONAL

- **Secure Calling - Two Stage (Third Party) Calling with PIN**
- **ICAO Flight Plan - operating communications equipment onboard**
 - **SATVOICE filing information in items 10 and 18**
 - **CSP/SSP ensure aircraft SATVOICE number is the aircraft address represented in octal code**
- **SATVOICE services are supplemental of HF communication**
- **Some ANSPs may limit the use SATVOICE only for certain types of communications (e.g. distress and urgency situations)**
- **Use SATVOICE short codes for ARTCCs and RADIO**

PRIORITY LEVELS

<i>Priority level</i>	<i>Application category</i>	<i>SATVOICE call examples</i>
1 / EMG / Q15 Emergency Safety of Flight	Distress and urgency For use by flight crew, when appropriate	Rapid descent, Urgent weather deviation
2 / HGH / Q12 Operational High Safety of Flight	Flight safety Typically assigned to calls between aircraft and ANSPs	Altitude request
3 / LOW / Q10 Operational Low Safety of Flight	Regularity of flight, meteorological, administrative Typically assigned to calls between aircraft operators and their aircraft	Air traffic information service, redispatch, maintenance
4 / PUB / Q9 Nonoperational Nonsafety	Public correspondence	Public phone calls

AVIATOR 300D BLOCK DIAGRAM



SATVOICE STATUS Panel



Option with HF Switching



INDICATOR/CONTROL	ENERGIZED
Satellite Incoming Call or Active Call	
Indicates Incoming Call Priority Level	
Indicates Internal Failure of SATCOM System LRU	
Selects system interfaced to the HF R position on the Audio Select Panels	



The new SATCOM networks (Inmarsat SBB, Iridium Certus and Thuraya) are IP based

- It allows flexibility and combinations of different services (shared loading over IP)
- Compatibility with modern telecoms infrastructures



Which comes with new challenges

- Security (hacking)
- Segregation (sharing pipes)
- Compatibility with existing avionics
- New interfaces needed
- New Standards needed



Backup Slides



SATVOICE STATUS Panel

SBB CALL Visual Alert, ground-to-air ATS

- Priority 1, 2 or 3
- AC 20-150B ¶8.1 and §25.1322 for Satcom integrations not connected to EICAS

SBB FAIL per CPDLC guidance

- AC 20-140C ¶7.2.2
- Indication to the flight crew of aircraft data link system failure, including connection failures

Panel and placement, AC 20-150B

- Flightcrew alerting consistent with the particular flight deck philosophy
- Provides indication to the flightcrew in the event of detectable abnormal call terminations or connection failures



SATVOICE Equipage Filing – Sep 2017

Field 10A “M” codes Filed	New York		Oakland		Anchorage	
	Count of flights	% with CODE/ in Field 18	Count of flights	% with CODE/ in Field 18	Count of flights	% with CODE/ in Field 18
M1 only	6,623	62%	11,262	40%	5007	39%
M2 only	1	100%				
M3 only	1,356	31%	2,958	17%	837	16%
M1, M2, M3	3	33%	2	0%	1	0%
M1, M2	1,146	65%	2,300	18%	609	10%
M1, M3	208	48%	729	20%	443	40%
M2, M3						
No “M” codes	5,507		5,836		550	

Courtesy: FAA

SATVOICE Equipage Filing – June 2016

Field 10A “M” codes Filed	New York		Oakland		Anchorage	
	Count of flights	% with CODE/ in Field 18	Count of flights	% with CODE/ in Field 18	Count of flights	% with CODE/ in Field 18
M1 only	8,288	45%	10,244	70%	4,390	68%
M2 only	1	0%	2	100%	-	-
M3 only	677	58%	2,509	75%	644	82%
M1, M2, M3	2	0%	2	50%	3	100%
M1, M2	1,088	49%	2,102	81%	798	90%
M1, M3	193	74%	878	90%	282	69%
M2, M3	4	100%	-	-	-	-
No “M” codes	9,171	54%	7,163	31%	388	41%

Courtesy: FAA

Flight Plan Example

(FPL-ACA101-IS

-B773/H-SHXWM1M3/S

-EGLL1400

-N0450F310L9UL9STU285036/M082F310UL9LIMRI

52N020W52N030W50N040W49N050W

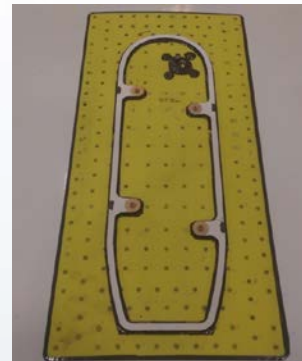
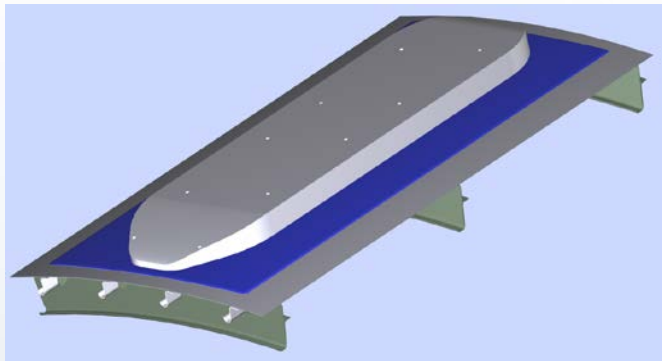
-CYQX0455CYYR

-EET/EISN0026EGGX0111CZQX0228

REG/CFIUVSEL/FQHS**CODE/C0173E**)

Intermediate Gain Antenna

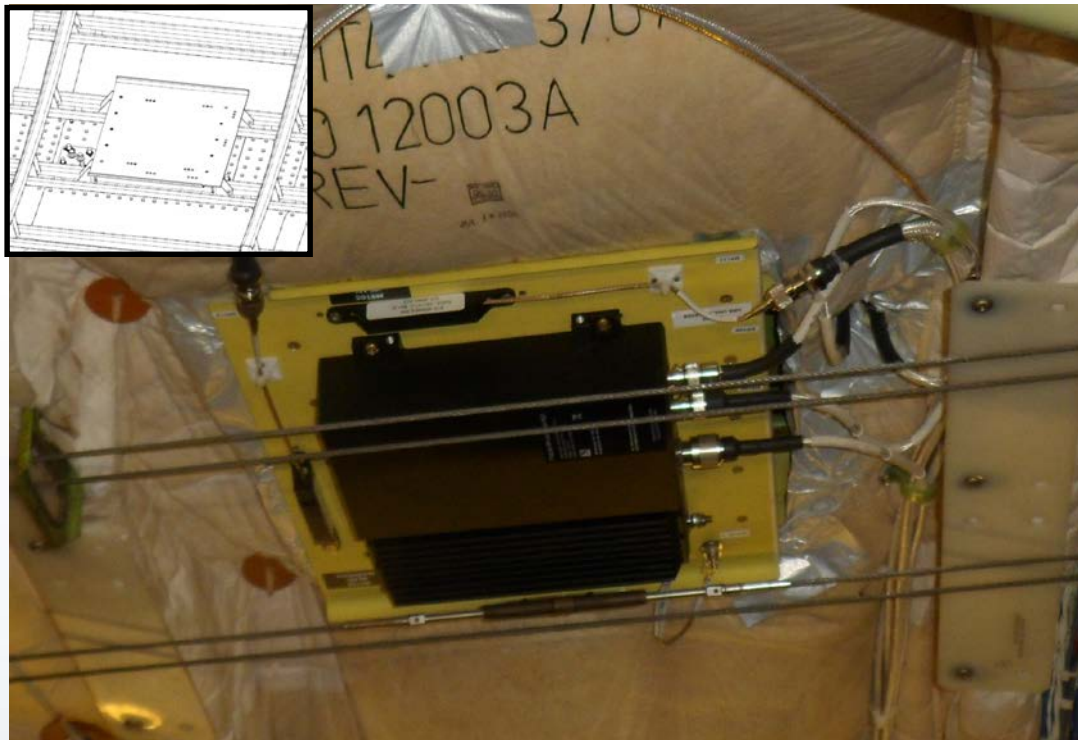
- Cobham IGA-5001 Intermediate Gain Antenna
- Antenna P/N 802-10-0010
- Width: 175 mm (6.89"); Height: 49 mm (1.93"); Length: 581 mm (22.87")
- Weight: 3.5 kg (7.7 lbs)
- Installed at STA 489 Top
- Antenna Inspection: 37,500 cycles from installation; 12,000 cycles repeat



SBU Installation



Diplexer/LNA Installation



Iridium Band Reject Filter Installation - Optional

