



**THE FORTY-SEVENTH MEETING OF THE
INFORMAL PACIFIC ATC CO-ORDINATING GROUP
(IPACG/47)**

**THE THIRTY-FOURTH MEETING OF THE
FANS INTEROPERABILITY TEAM (FIT/34)**

(Virtual, 25 & 26 January 2022)

Presented by: Federal Aviation Administration

Performance-based Communication and Surveillance (PBCS) Monitoring Report



**Federal Aviation
Administration**



Overview

- PBCS summary report for Oakland and Anchorage oceanic airspace
 - Aggregate and by media type
- Review of monthly non-compliance process for individual aircraft and recent results
- Analysis of performance issues observed by media delivery path
- Summary

PBCS monitoring – airspace report

January – June 2021

90,338
data link flights

Oakland

Media Type	ADS-C			CPDLC				
	Count of ADS-C Downlink Messages	ADS-C 95%	ADS-C 99.9%	Count of CPDLC Transactions	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%
Performance Criteria		RSP 180			RCP 240			
Aggregate	3,436,520	98.9%	99.7%	335,459	98.8%	99.4%	98.3%	98.8%
SAT	2,986,886	99.0%	99.7%	291,089	98.9%	99.5%	98.4%	98.9%
VHF	444,340	98.9%	99.6%	36,026	99.6%	99.7%	98.9%	99.1%
HF	5,262	66.7%	79.2%	200	36.0%	47.5%	41.0%	47.0%
SAT-VHF				4,000	93.9%	96.6%	94.4%	96.2%
VHF-SAT				2,954	92.7%	96.3%	92.2%	94.7%
SAT-HF				136	77.9%	83.1%	82.4%	86.0%
HF-SAT				966	96.7%	98.3%	97.1%	98.7%
VHF-HF				18	55.6%	61.1%	66.7%	66.7%
HF-VHF				70	74.3%	78.6%	85.7%	87.1%



PBCS monitoring – airspace report

January – June 2021

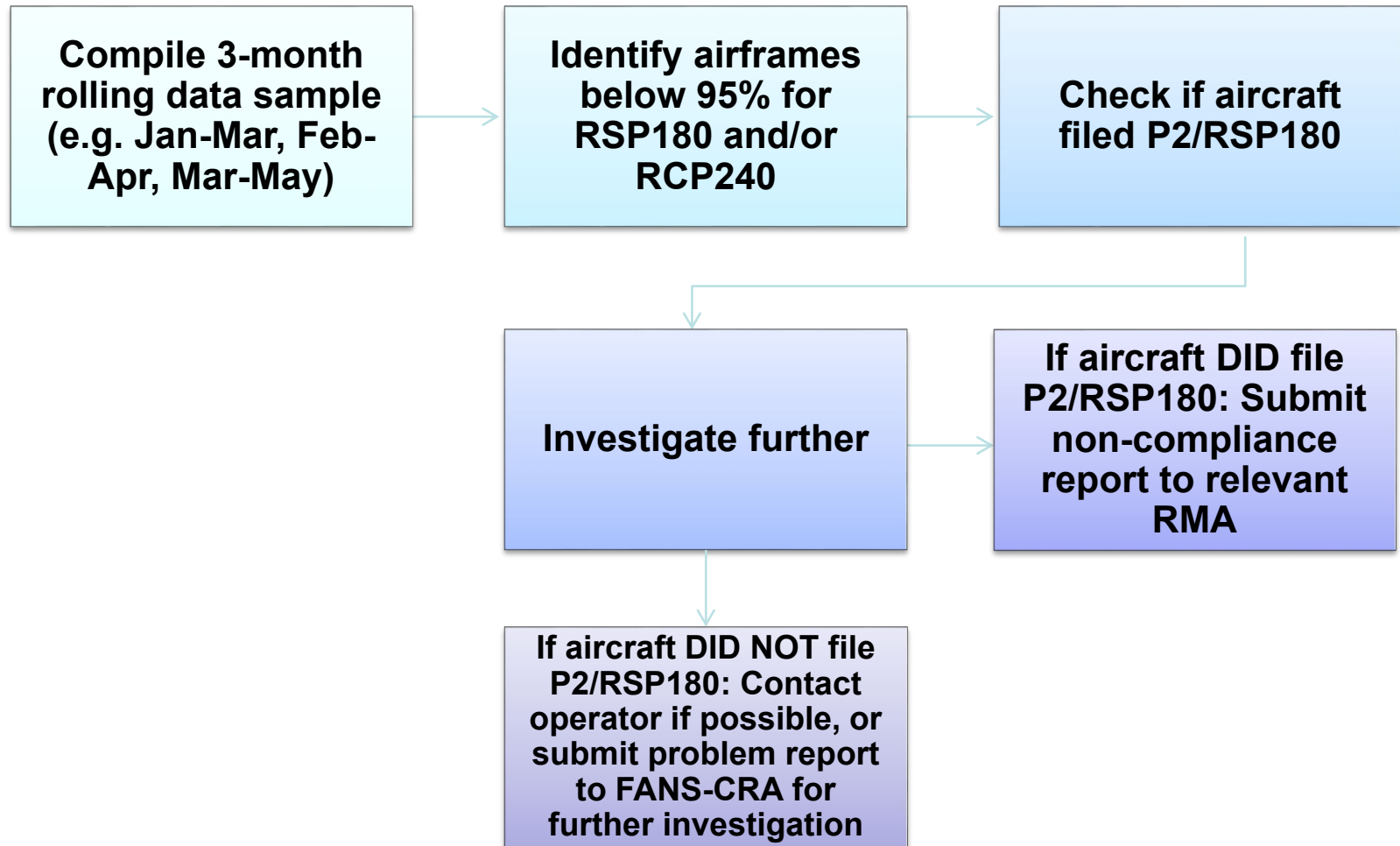
37,081
data link flights

Anchorage

Media Type	ADS-C			CPDLC				
	Count of ADS-C Downlink Messages	ADS-C 95%	ADS-C 99.9%	Count of CPDLC Transactions	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%
Performance Criteria		RSP 180			RCP 240			
Aggregate	1,196,520	98.9%	99.7%	74,627	98.5%	99.0%	98.8%	99.3%
SAT	804,019	98.6%	99.7%	55,149	98.4%	98.8%	98.7%	99.3%
VHF	389,118	99.8%	99.9%	17,142	99.9%	100.0%	99.9%	99.9%
HF	3,354	64.6%	76.9%	91	36.3%	45.1%	44.0%	49.5%
SAT-VHF				814	98.4%	99.3%	99.0%	99.5%
VHF-SAT				928	88.8%	97.0%	94.6%	95.8%
SAT-HF				60	75.0%	78.3%	78.3%	80.0%
HF-SAT				423	92.7%	94.6%	95.7%	97.2%
VHF-HF				9	66.7%	100.0%	100.0%	100.0%
HF-VHF				11	100.0%	100.0%	100.0%	100.0%



Monthly non-compliance monitoring



Sample non-compliance report form

PBCS ATSP Non-compliance Report Form							
Report Date:			7/27/2020				
Period of observed non-compliance:			January-March 2020				
Reporting Air Traffic Service Provider (ATSP):			FAA - Oakland				
Contact email address(es) at Reporting ATSP:			FAAPBCSmonitoring@faa.gov				
Reporting to Regional Monitoring Agency (RMA):			PARMO				
ICAO CODE:			XXX				
Airline Operator:			XXX Inc.				
State of Operator/Registry:			United States				
PBCS Data							
FIR	4-letter ICAO Aircraft Type	Registration	ADS-C downlink Message Counts	95% RSP 180 Benchmark	CPDLC Transaction Counts	95% RCP 240 benchmark	Issue code
				ASP		ACP	
				<=90 sec		<=180 sec	
KZAK	B772	Reg 1	410	93.41%	25	96.00%	(*1)(*3)
KZAK	B772	Reg 2	290	94.48%	21	95.24%	(*1)



PBCS monitoring – aircraft report

Oakland

Monitoring period	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021
Total aircraft observed using data link	2,378	2,329	2,384	2,411	2,487	2,565
Have 100 or more ADS-C downlink reports and/or CPDLC transactions	1,782	1,743	1,745	1,781	1,813	1,861
Observed below 95% for RSP180 and/or RCP240	40	30	33	47	50	52
Filed P2/RSP180	17	13	16	22	20	25
# Aircraft reported to PARMO	1	3	2	0	1	6



PBCS monitoring – aircraft report

Anchorage

Monitoring period	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021
Total aircraft observed using data link	1,322	1,281	1,305	1,355	1,376	1,434
Have 100 or more ADS-C downlink reports and/or CPDLC transactions	900	865	882	906	922	923
Observed below 95% for RSP180 and/or RCP240	14	11	6	10	6	9
Filed P2/RSP180	9	7	5	7	3	6
# Aircraft reported to PARMO	1	3	3	2	1	2



Considerations for determining whether or not to put on the non-compliance report

- **Was the underperformance has been observed or reported in a previous monitoring period or in another flight information region (FIR)?**
- **How many messages were observed and from how many flights?**
- **Was the issue observed intermittently or were there multiple periods of consecutive delayed messages?**
- **Does the issue appear to have affected only one flight?**
- **Does the issue appear to have resolved within the monitoring period?**



Most commonly observed problems

Notes by numbers	Explanation	Recommendation(s)
(*1) Delayed reports around VHF/SAT transitions.	This note is used when ADS-C or CPDLC reports are observed with delays when there is mixed media usage in the sequence of reports before, at or after the delayed reports (ex.: VHF/VHF/SAT/VHF/SAT).	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #2).
(*2) Delayed reports via HF media.	This note is used when delayed ADS-C or CPDLC reports are observed to be delivered via HF data link (HFDL) or near reports delivered via HFDL. Check whether this appears to be a SATCOM failure with one flight or a period during the flight, or more continuous, intermittent use of HFDL. Potential issue with aircraft media priority settings.	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #1, #4, #9). - Review all Service Information Letters (SILs) and Software Bulletins (SBs) released from Satcom avionics manufacturers, particularly advice on Operator Requirement Table (ORT) set-up. - Operator should be aware that HFDL DOES NOT meet the RCP/RSP criterias for PBCS operations.
(*3) Delayed reports due to Inmarsat satellite to satellite transition (aircraft) or satellite problems (network).	This note is used when ADS-C or CPDLC reports are observed with delays and its noticed that there is a switch sequence between different or same Inmarsat satellite paths (Ex.: XXF/XXH/XXF/XXH). One known area where this occurs in the NAT is at 30W longitude. If multiple aircraft observed with same issue around same time, may be a network-related issue and ATSP may want to report to FANS-CRA/DLMA.	- Review all Service Information Letters (SILs) and Software Bulletins (SBs) released from Satcom avionics manufacturers, particularly advice on Operator Requirement Table (ORT) set-up. - Check with contracted Data Link Service Provider and Satellite Service Provider for possible coverage problems.
(*4) Delayed reports due to Iridium avionics (aircraft) or satellite problems (network).	This note is used when ADS-C or CPDLC reports are observed with delays via Iridium satellite paths (IG1, IGW1). If multiple aircraft observed with same issue around same time, may be a network-related issue and ATSP may want to report to FANS-CRA/DLMA.	- Check for SATCOM radio/unit problems.

Performance by media delivery path – observed below 95%

FAA-Oakland Reporting on ADS-C Actual Surveillance Performance (ASP)					
Period: Jan 01, 2021 to Jun 31, 2021 (6 months)					
				95% RSP 180 Benchmark	99.9% RSP 180 Benchmark
			Message Counts	RSP ≤90 sec	RSP ≤180 sec
Color key:					
Meets criteria					
99.0%-99.9%					
Under criteria					
Path ID					
OTH	VHF		5,440	89.43%	95.11%
H02	HF		3,115	68.64%	81.54%
OTHV	VHF		2,447	94.32%	97.92%
STS7	VHF		1,857	90.85%	94.72%
H01	HF		1,092	67.40%	78.57%
SAN9	VHF		889	93.14%	96.51%
STS8	VHF		786	88.80%	93.38%
CRQ	VHF		768	92.06%	95.83%
H16	HF		741	60.73%	73.01%
XXN	SAT		711	89.31%	95.08%
SBA1	VHF		629	93.48%	99.84%
UIL8	VHF		291	91.75%	98.63%
EUG8	VHF		212	92.92%	100.00%
H09	HF		116	76.72%	87.93%

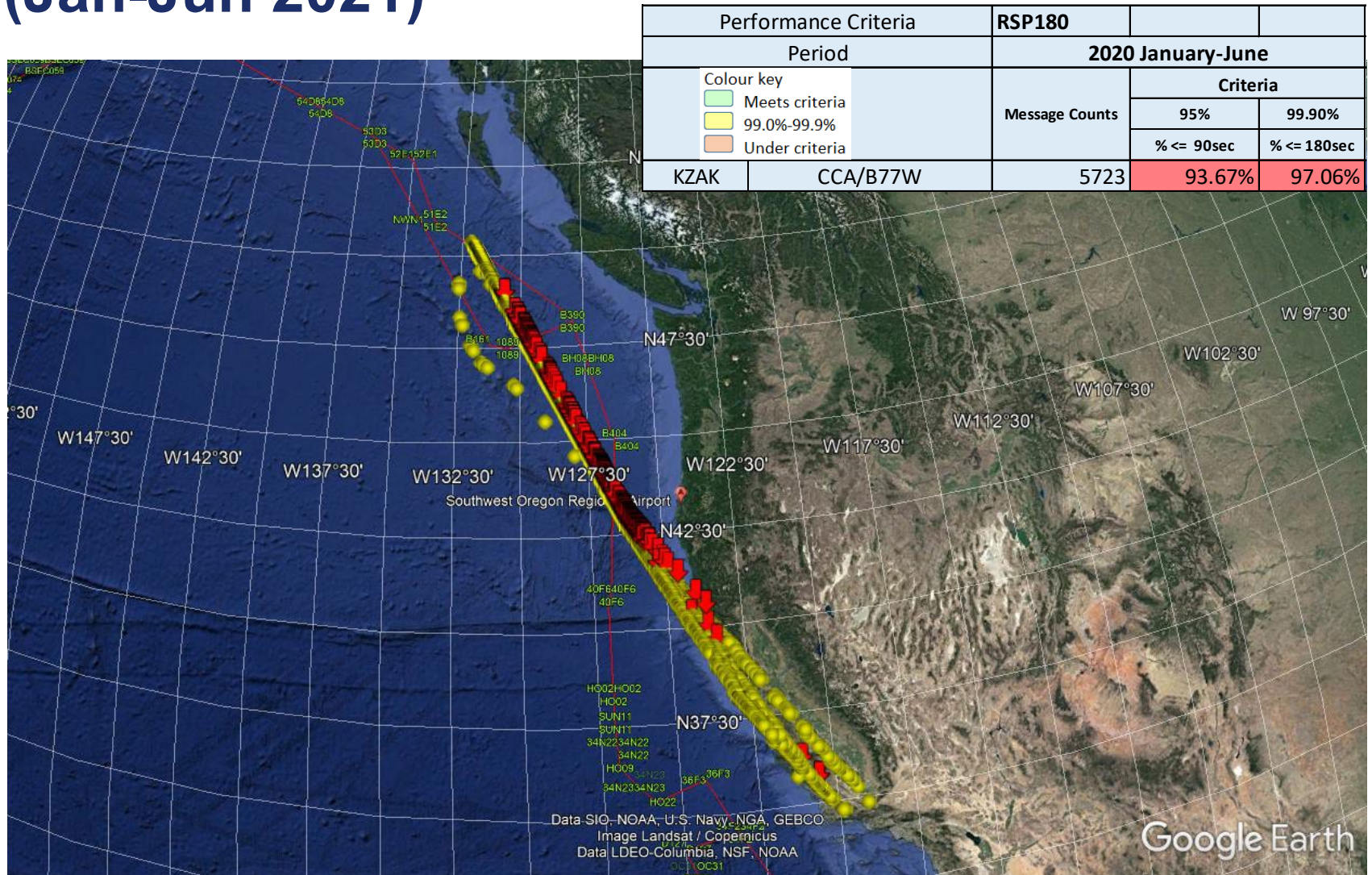


Drill down by aircraft type and operator for OTH/OTHV

Aircraft Type	Operator	Total ADS-C via OTH	Total > 90 sec	% of all ADS-C via OTH	% of all ADS-C via OTH and > 90 sec	Aircraft Type	Operator	Total ADS-C via OTH	Total > 90 sec	% of all ADS-C via OTH	% of all ADS-C via OTH and > 90 sec
B77L	CSN	802	102	10%	14%	B789	CXA	366	4	5%	1%
	KAL	276	58	3%	8%		UAL	227	18	3%	3%
	CAO	267	24	3%	3%		AAL	226	7	3%	1%
	FDX	196	33	2%	5%		CSN	183	1	2%	0%
	CKK	160	36	2%	5%		KAL	168	5	2%	1%
	SOO	9		0%	0%		CCA	83		1%	0%
	CKS	1		0%	0%		ANA	30	1	0%	0%
B77W	CCA	692	125	9%	17%		AMX	16		0%	0%
	KAL	507	144	6%	20%		ACA	7		0%	0%
	UAL	123	37	2%	5%	B738	ASA	821	50	10%	7%
	AAL	38	11	0%	2%						
	CES	12	3	0%	0%						
	CPA	12	2	0%	0%						
	ANA	7	3	0%	0%						
	PAL	6	3	0%	0%						
	SIA	2		0%	0%						
	ACA	1		0%	0%						
	UAE	1	1	0%	0%						



Locations of ADS-C messages – CCA B77W (Jan-Jun 2021)



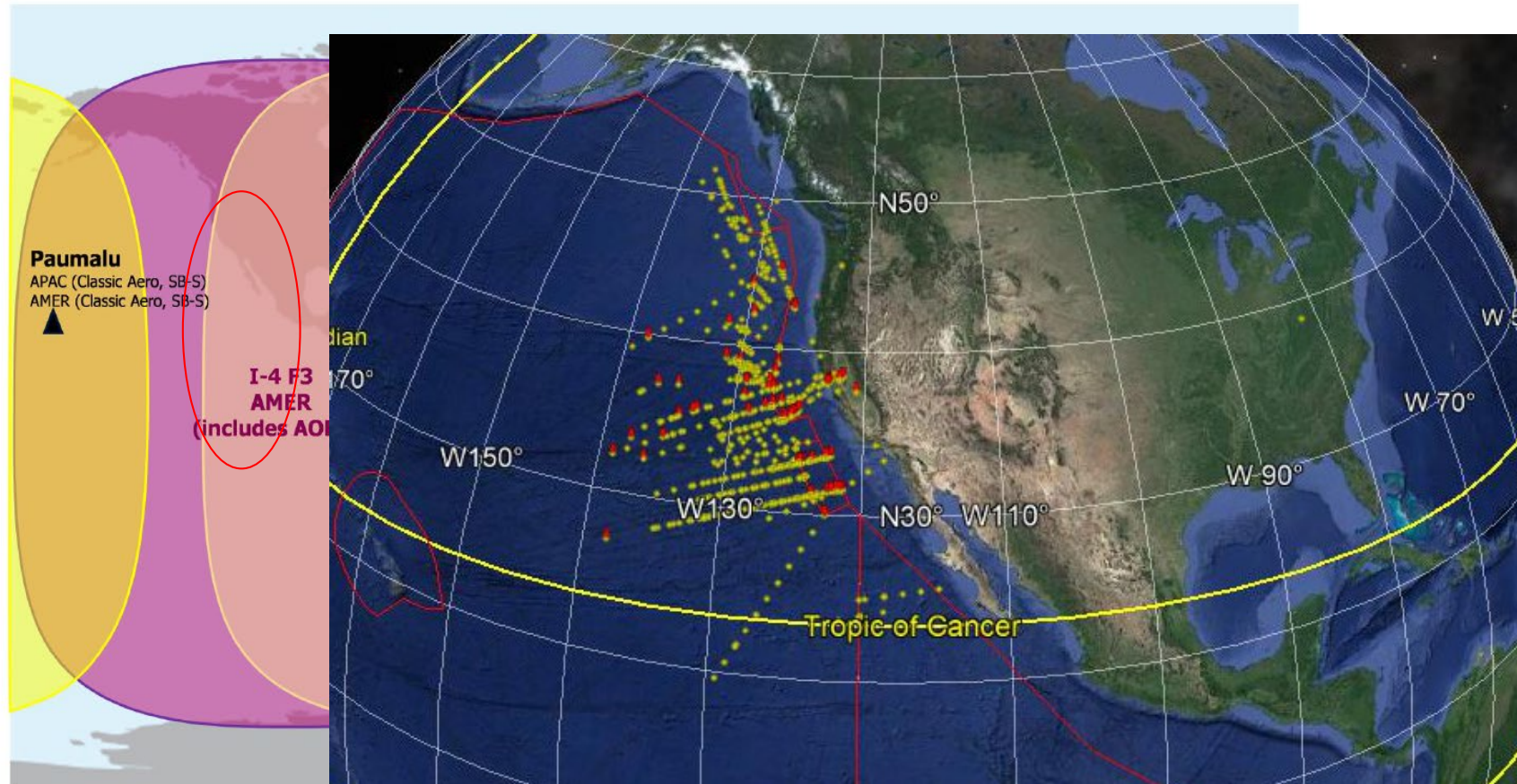
Analysis conclusions

- **The underperformance observed for ADS-C messages delivered via OTH/OTHV appears to be due to their distance from oceanic routes that parallel the coast**
 - Certain routes keep aircraft in proximity to the VHF/SAT transition point longer and the aircraft keeps trying to use VHF
- **When drilling down to aircraft/operator, it appears certain fleets have more of a problem**
- **When plotting the routes for aircraft with high and low failure rates over OTH/OTHV, it is observed that aircraft flying on the routes where they are in proximity to OTH/OTHV longer are observed with a higher percentage of delays, versus those that fly on routes where they more quickly transition to SATCOM**



Locations of ADS-C positions delivered via XXN

Inmarsat Operational Coverage Map (Classic Aero and SB-Safety)



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AVIATION

Drill down by aircraft and operator

Aircraft Type	Operator	Total ADS-C via XXN	Total > 90 sec	% of all ADS-C via XXN	% of all ADS-C via XXN and > 90 sec
B77W	EVA	155	3	22%	4%
B788	AAL	141	3	20%	4%
B772	AAL	80	13	11%	16%
	UAL	12	2	2%	3%
B763	UAL	71	20	10%	25%
	UNK	1		0%	0%
B744	GTI	42		6%	0%
	AAR	10	2	1%	3%
	PAC	9	2	1%	3%
C5M	RCH	34	11	5%	14%
	MIL	11	2	2%	3%
	UNK	4	2	1%	3%
K35R	MIL	33	4	5%	5%
	RCH	7	2	1%	3%
GL5T	PVT	20		3%	0%
B737	MIL	18		3%	0%
GLEX	PVT	16	4	2%	5%
B748	KAL	7		1%	0%
	PAC	5		1%	0%
C17	RCH	10	2	1%	3%
	MIL	2		0%	0%
CL35	XOJ	11	1	2%	1%
B764	UAL	9	5	1%	6%
GLF4	PVT	4		1%	0%
B789	AMX	3	2	0%	3%
	AAL	1		0%	0%
GLF6	PVT	1		0%	0%

- **Maximising access to the Classic Aero Ground Earth Station (GES) services:**
- **In the Inmarsat SATCOM system, there are a multitude of transmission paths available via the different ground stations and satellites.**
 - If one path fails, the aircraft may be able to switch to an alternate path provided the Operator Requirement Table (ORT) in the SATCOM terminal is correctly configured.
- **Proper configuration of the ORT table is therefore vital for maximizing availability of SATCOM services.**
- **Below are some links to the SATCOM manufacturers' information portals:**
 - Cobham: <https://sync.cobham.com/satcom/>
 - Honeywell: <https://myaerospace.com/>
 - Thales: <https://www.thalesgroup.com/en/customer-online>
 - Rockwell Collins: <https://www.shopcollins.com>

Summary

- **The ASP in Oakland and Anchorage observed to meet the RSP180 95% and 99.9% values at the aggregate level and also for the messages delivered via SAT and VHF**
 - Not met for HF
- **The ACTP in Oakland and Anchorage observed to meet the RCP240 95% and 99.9% values at the aggregate level and also for the messages delivered via SAT and VHF**
 - Not met for HF or any mixed media except 95% met for HF-SAT mixed media
- **The ACP in Oakland and Anchorage observed to meet the RCP240 95% values at the aggregate level and also for the messages delivered via SAT and VHF**
 - 99.9% value met for VHF in Anchorage
- **More VHF data link usage in Anchorage, with better VHF performance but lower SAT performance observed**



Summary (cont)

- **The monthly non-compliance reporting process is in progress for FAA oceanic airspace – some resource constraints**
- **After further investigation there are a negligible number of aircraft with performance issues found to be significant enough to report**
 - Some repeat offenders are being observed making it unclear if reports are getting to the State and/or Operator
 - Most common problems are delays in VHF/SAT transition areas, HF data link, Inmarsat satellite to satellite transition (aircraft) or satellite problems (network), and Iridium avionics (aircraft) or satellite problems (network)
- **Observed issues by media delivery path generally traced to specific aircraft/avionics**
- **Because there is little VHF coverage in the Oakland airspace, VHF/SAT transition issues tend to be masked and overlooked due to the aggregate nature of the PBCS monitoring.**
 - There is more VHF coverage in Anchorage so more likely to see these issues in the data.

Questions

