



Jan – Jun, 2021

PBCS Monitoring Report in Fukuoka FIR

Presented by: Tomonaga Takashi



Network Performance Assessment Center (NPAC)
Japan Civil Aviation Bureau (JCAB)
Ministry of Land, Infrastructure, Transport and Tourism
Japan (MLIT)

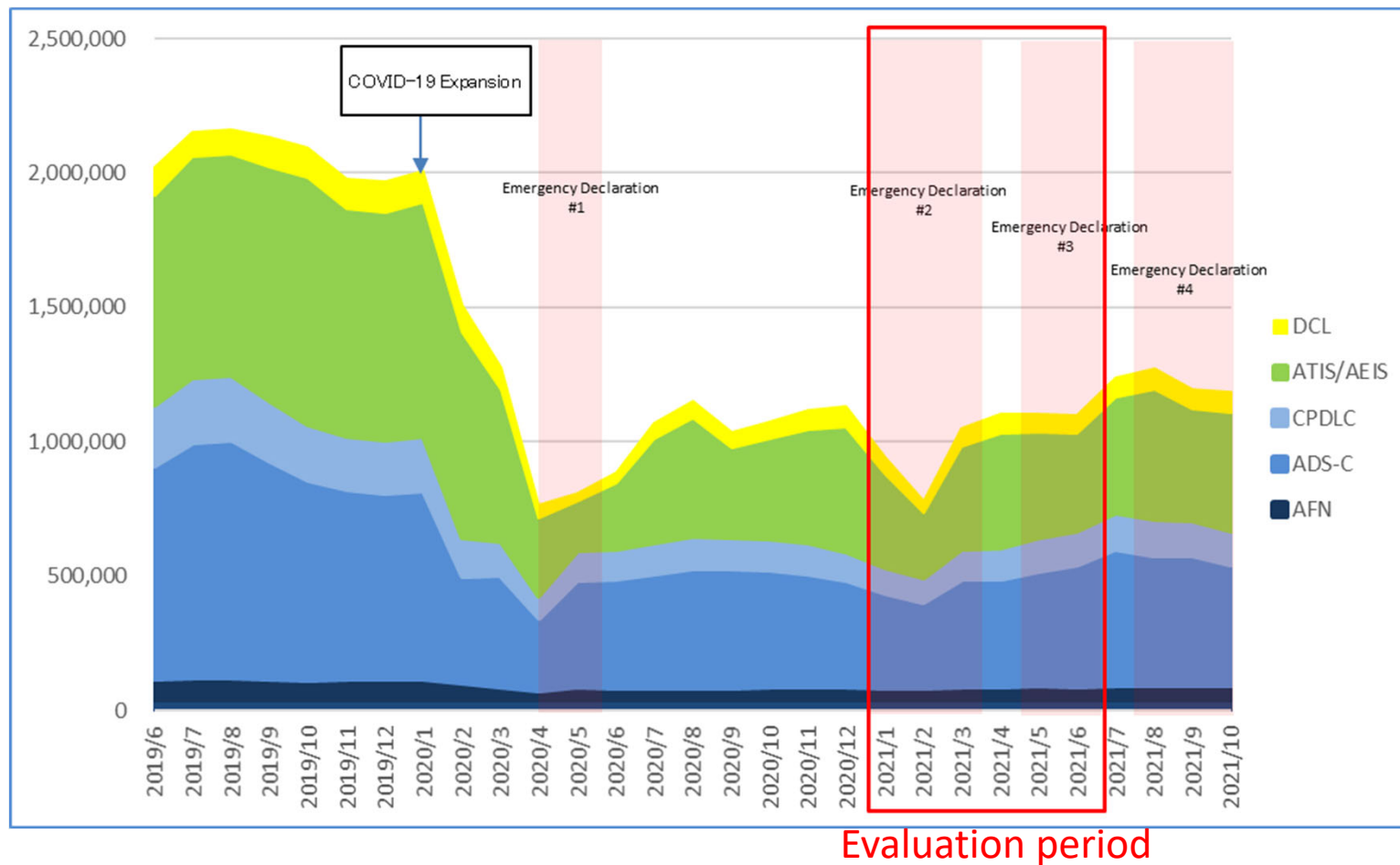
CRA JAPAN

Central Reporting Agency in Japan

IPACG47/FIT34
26 thru 27 Jan, 2022

Datalink Message volume in RJJJ

- This graph shows total monthly number of messages in RJJJ.
- The number of messages has decreased significantly due to the decrease of air traffic by the impact of COVID-19 in early 2020.



Evaluation period

- 1) This presentation reports the results of PBCS performance evaluation every 6 months (January to June 2021) at Fukuoka FIR.
- 2) This report includes the following items.
 - Availability
 - Continuity analysis result for each parameter

Availability

Availability (January – June 2021)

- The ARINC-Global outage is due to the ARINC system trouble on April 9.
- The cause of the performance deterioration of APK2 / XXP is the failure of the Inmarsat GES (Perth, Australia) on May 12.

CSP	Service	Location	Availability(%)	Number of Unplanned Outage	Number of Unplanned Outages > 10min	Accumulated Unplanned Outage Time (min)
SITA	Classic Aero/SBB	Global	100.00	0	0	0
	Classic Aero	APK1(Paumalu)	100.00	0	0	0
		APK2(Perth)	99.93	1	1	168
	Iridium	IGW1(Phoenix)	99.99	1	1	11
ARINC	Classic Aero/SBB	Global	99.97	1	1	63
	Classic Aero	XXA(Paumalu)	100.00	0	0	0
		XXQ(Perth)	100.00	0	0	0
		XXP(Perth)	99.97	1	1	62
	SBB	XXS(Paumalu)	100.00	0	0	0
	Iridium	IG1(Phoenix)	99.99	1	0	1
AVICOM	Classic Aero	Global	100.00	0	0	0

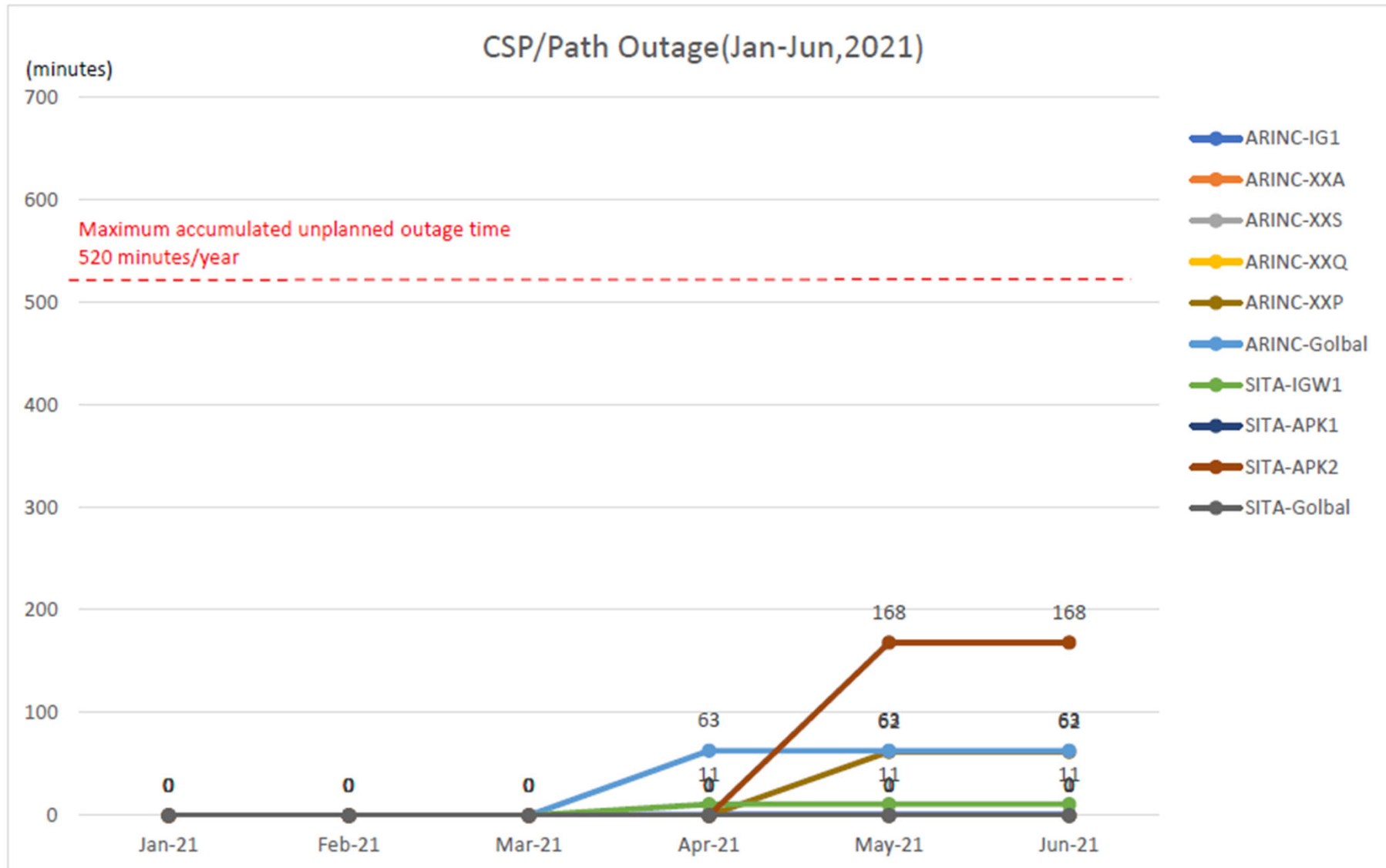
Legend:

	Meets Efficiency
	Under Efficiency but above Safety
	Under criteria

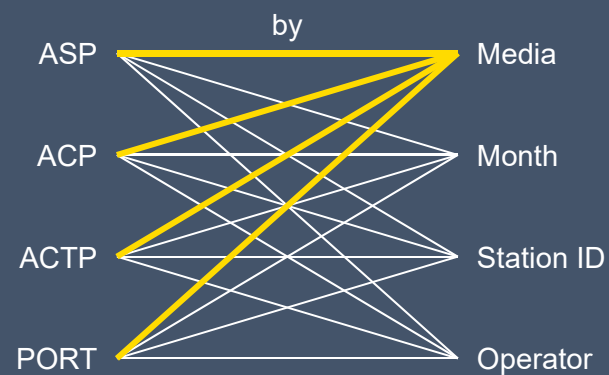
Unplanned Outages

Start Date	Start Time	Duration (min)	CSP	Service Involved	Location Involved	Reason	Comment (Operational Impact)
2021/4/9	6:44	63	ARINC	ARINC	Global	ARINC system trouble	No impact on flight HFvoice 10 aircrafts
2021/4/10	21:04	11	SITA	IRIDIUM	IGW1	Iridium experienced degraded service on Short Burst Data (SBD)	No impact on flight
2021/4/10	21:04	1	ARINC	IRIDIUM	IG1		
2021/5/12	22:00	168	SITA	I3	APK2	Unexpected Service Degradation due to Inmarsat Perth GES trouble	No impact on flight
2021/5/12	22:51	62	ARINC	I3	XXP		

Accumulated Unplanned Outage



Performance by Media Type



Performance by Media Type

- The case of communications using VHF for the uplink and satellite for the downlink does not meet criteria. (Because the case changes the media to SAT after trying to resend several times by VHF.)
- Both ASP and ACP meet the 95% criteria except above the case.

Media Type	RSP180			RCP240					
	Count of ADS-C	ASP		Count of CPDLC	ACTP		ACP		PORT
		95%	99.9%		95%	99.9%	95%	99.9%	
Aggregate	1,514,208	98.30%	99.64%	30,889	99.72%	99.79%	99.69%	99.83%	99.38%
SAT	1,155,280	98.08%	99.60%	27,858	99.72%	99.79%	99.69%	99.84%	99.39%
VHF	358,928	99.00%	99.79%	2,844	99.86%	99.96%	99.89%	99.93%	99.54%
SAT/VHF *1	---	---	---	118	99.15%	99.15%	97.46%	99.15%	96.61%
VHF/SAT *2	---	---	---	69	92.75%	94.20%	92.75%	94.20%	95.65%

* 1 SAT/VHF : Communication using satellite for uplink and VHF for downlink

* 2 VHF/SAT : Communication using VHF for uplink and satellite for downlink

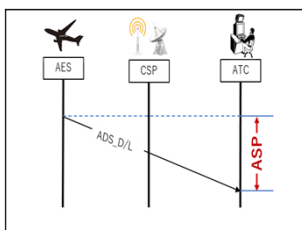
Legend:

	Meets criteria
	Under criteria but above 99.0%
	Under criteria

ASP by Media Type

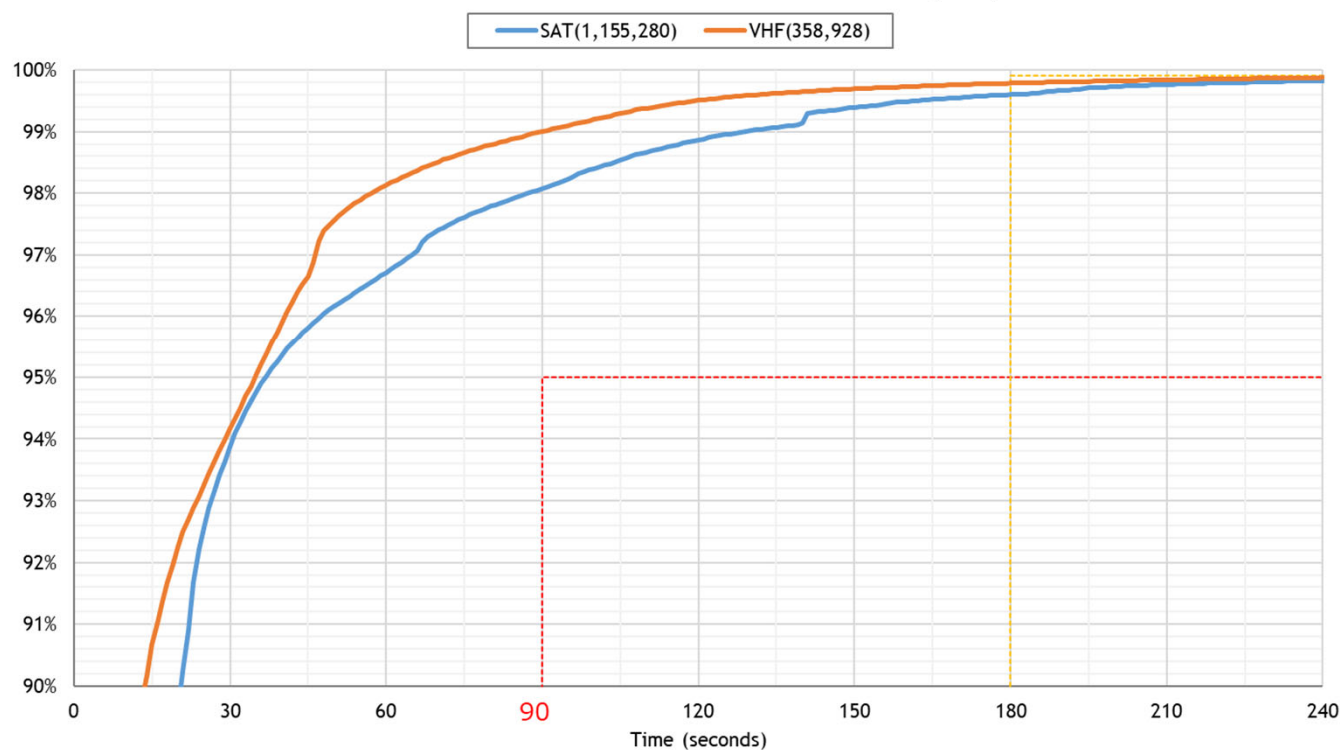
- Both satellite and VHF meet the 95% criteria.

ASP measurement section



ASP:ADS Downlink transaction time

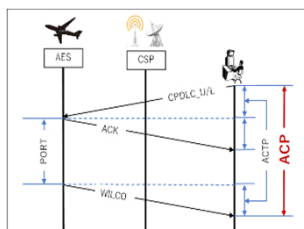
Fukuoka FIR - By Media Type - January to June 2021
ADS-C Actual Surveillance Performance (ASP)



ACP by Media Type

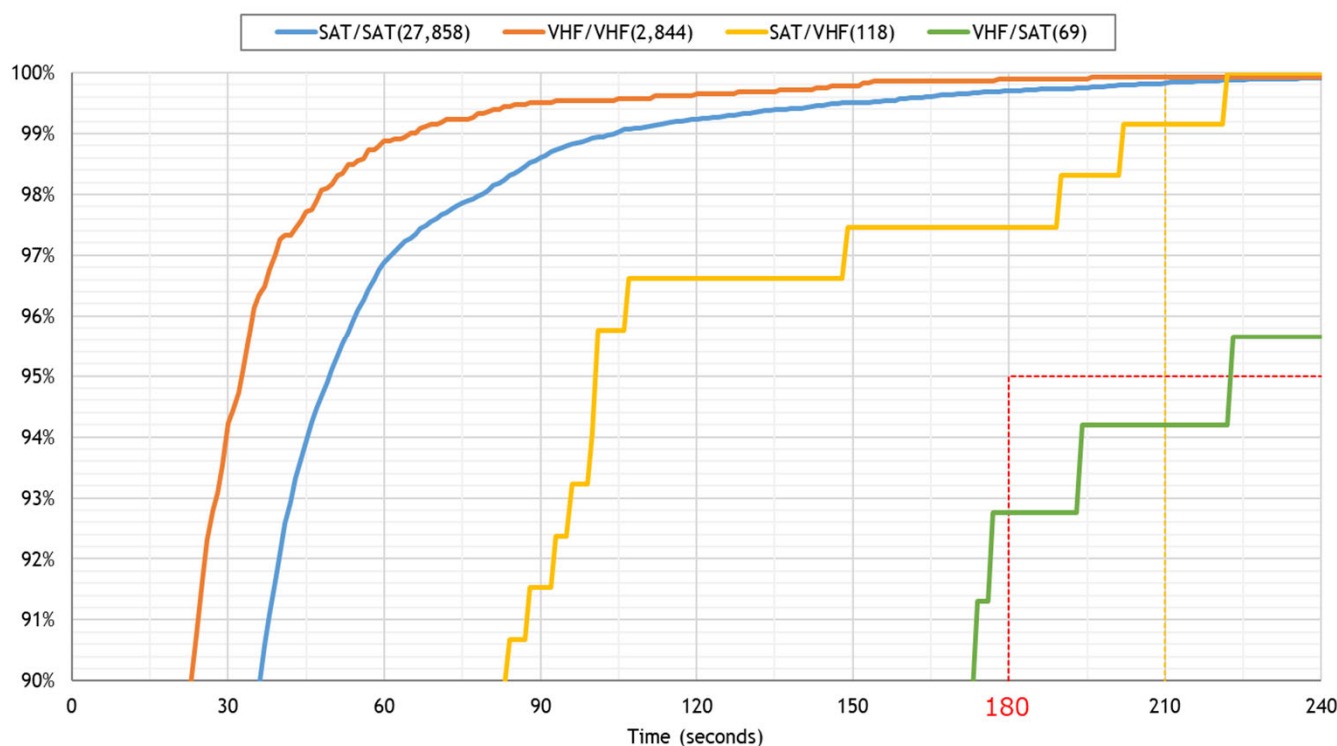
- The case of communications using VHF for the uplink and satellite for the downlink does not meet the criteria. (Because the case changes the media to SAT after trying to resend several times by VHF.)
- ACP meets the 95% criteria except above the case.

ACP measurement section



ACP : Total response time

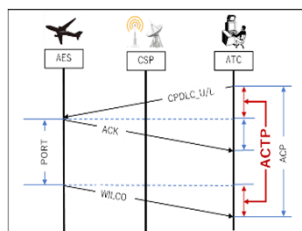
Fukuoka FIR - By Media Type - January to June 2021
CPDLC Actual Communication Performance (ACP)



ACTP by Media Type

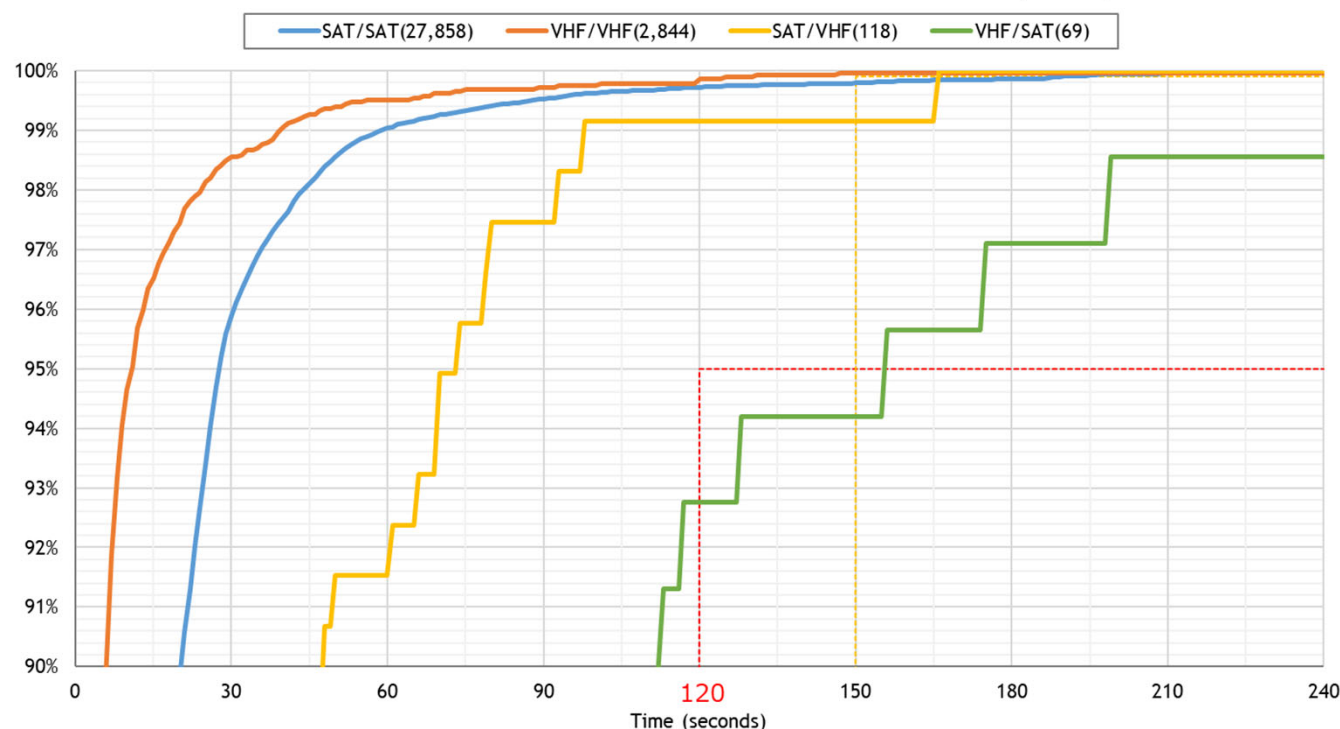
- The case of communications using VHF for the uplink and satellite for the downlink does not meet the criteria. (Because the case changes the media to SAT after trying to resend several times by VHF.)
- ACTP meets the 95% criteria except above the case.

ACTP measurement section



ACTP : Ground to air transmission time

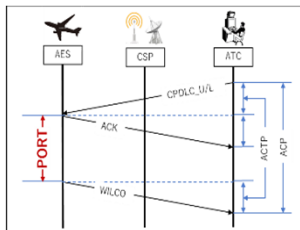
Fukuoka FIR - By Media Type - January to June 2021
CPDLC Actual Communication Technical Performance (ACTP)



PORT by Media Type

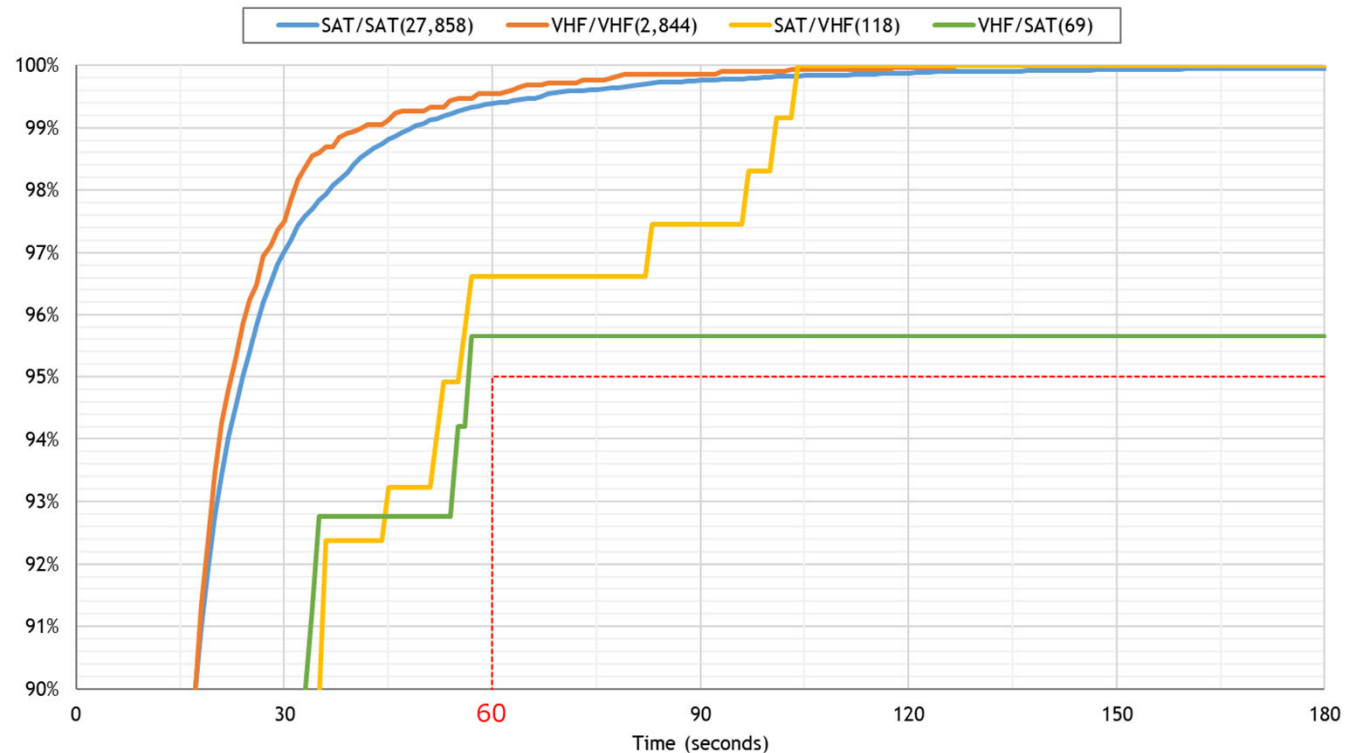
- Both satellite and VHF meet the 95% criteria.

PORT measurement section



PORT: pilot operational response time

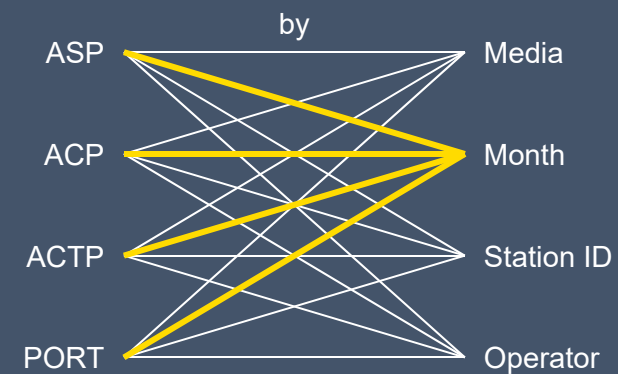
Fukuoka FIR - By Media Type - January to June 2021
CPDLC Pilot Operational Response Time (PORT)



(supplement)

PORT is the calculation time of the pilot's workload and does not include the transaction time between open spaces, but in this tabulation, the reception time on the aircraft is calculated based on the transmission time of DLCS and the ACK time from the aircraft. Therefore, communication using different media for transmission and reception includes the time required for media transition, resulting in lower performance than other communication.

Performance by Month



Performance by Month

- All months meet the 95% criteria and there are no major fluctuations.

Month	RSP180			RCP240					
	Count of ADS-C	ASP		Count of CPDLC	ACTP		ACP		PORT
		95%	99.9%		95%	99.9%	95%	99.9%	
Jan	227,771	98.30%	99.67%	3,970	99.77%	99.77%	99.77%	99.87%	99.60%
Feb	209,065	98.27%	99.68%	3,812	99.74%	99.79%	99.53%	99.74%	99.15%
Mar	258,300	98.31%	99.68%	5,219	99.77%	99.83%	99.75%	99.89%	98.95%
Apr	259,504	98.21%	99.60%	5,639	99.73%	99.88%	99.72%	99.80%	99.30%
May	274,489	98.29%	99.61%	6,071	99.75%	99.77%	99.69%	99.85%	99.40%
Jun	285,079	98.39%	99.65%	6,178	99.58%	99.72%	99.66%	99.82%	99.42%

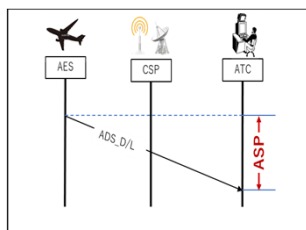
Legend:

	Meets criteria
	Under criteria but above 99.0%
	Under criteria

ASP by Month

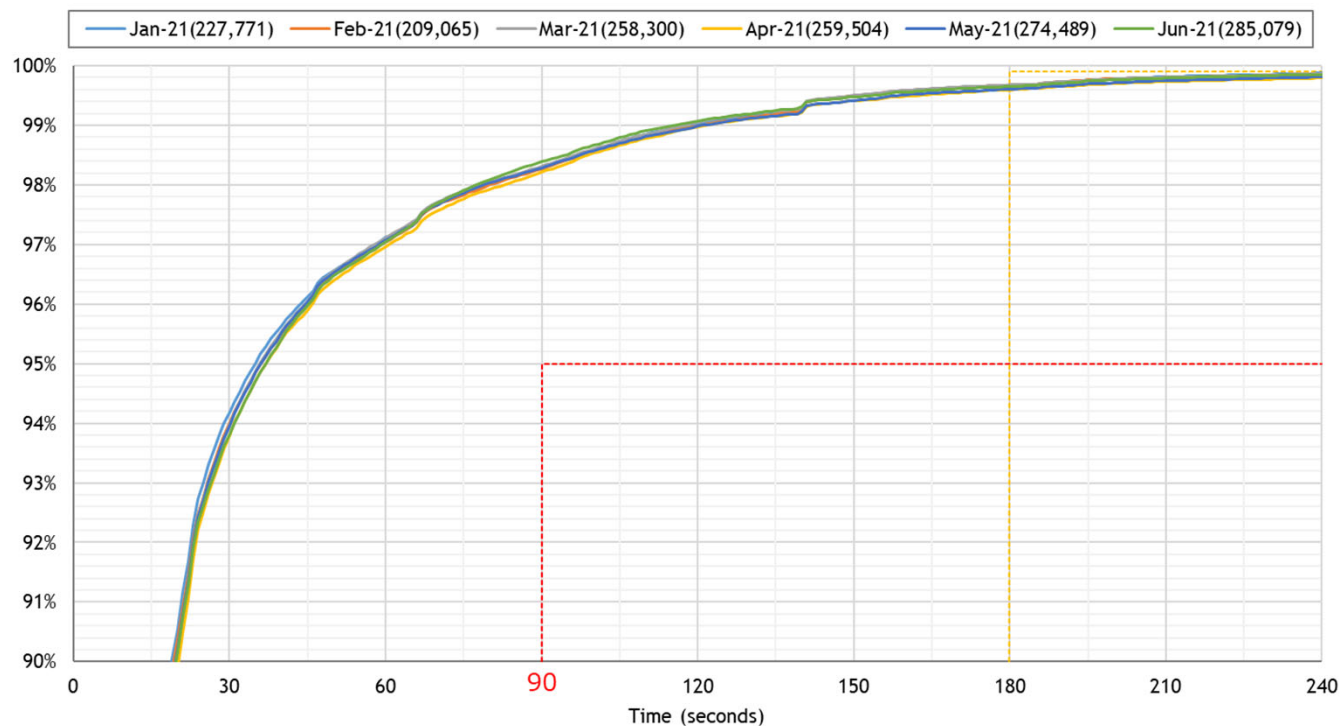
- All months meet the 95% criteria and there are no major fluctuations.

ASP measurement section



ASP:ADS Downlink transaction time

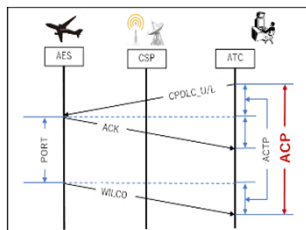
Fukuoka FIR - By Month - January to June 2021
ADS-C Actual Surveillance Performance (ASP)



ACP by Month

- All months meet the 95% criteria and there are no major fluctuations.

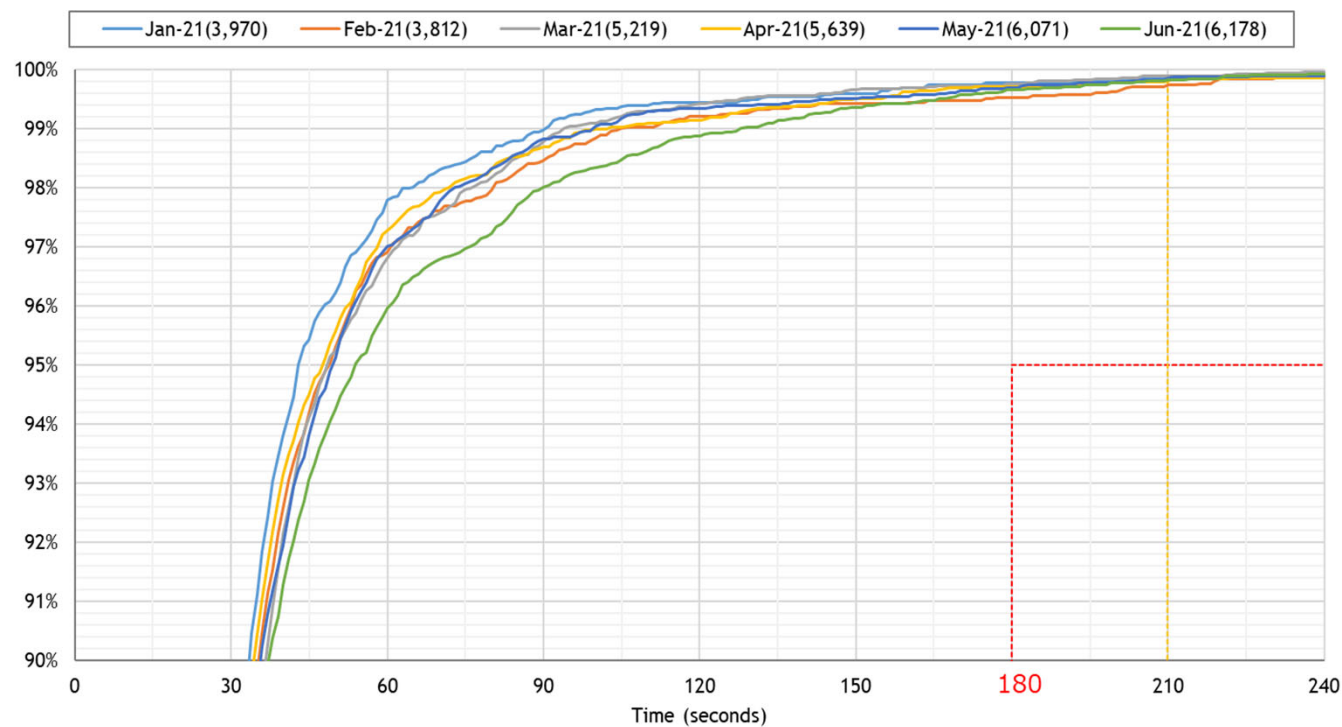
ACP measurement section



ACP : Total response time

Fukuoka FIR - By Month - January to June 2021

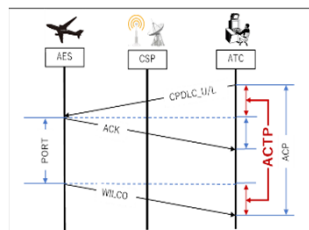
CPDLC Actual Communication Performance (ACP)



ACTP by Month

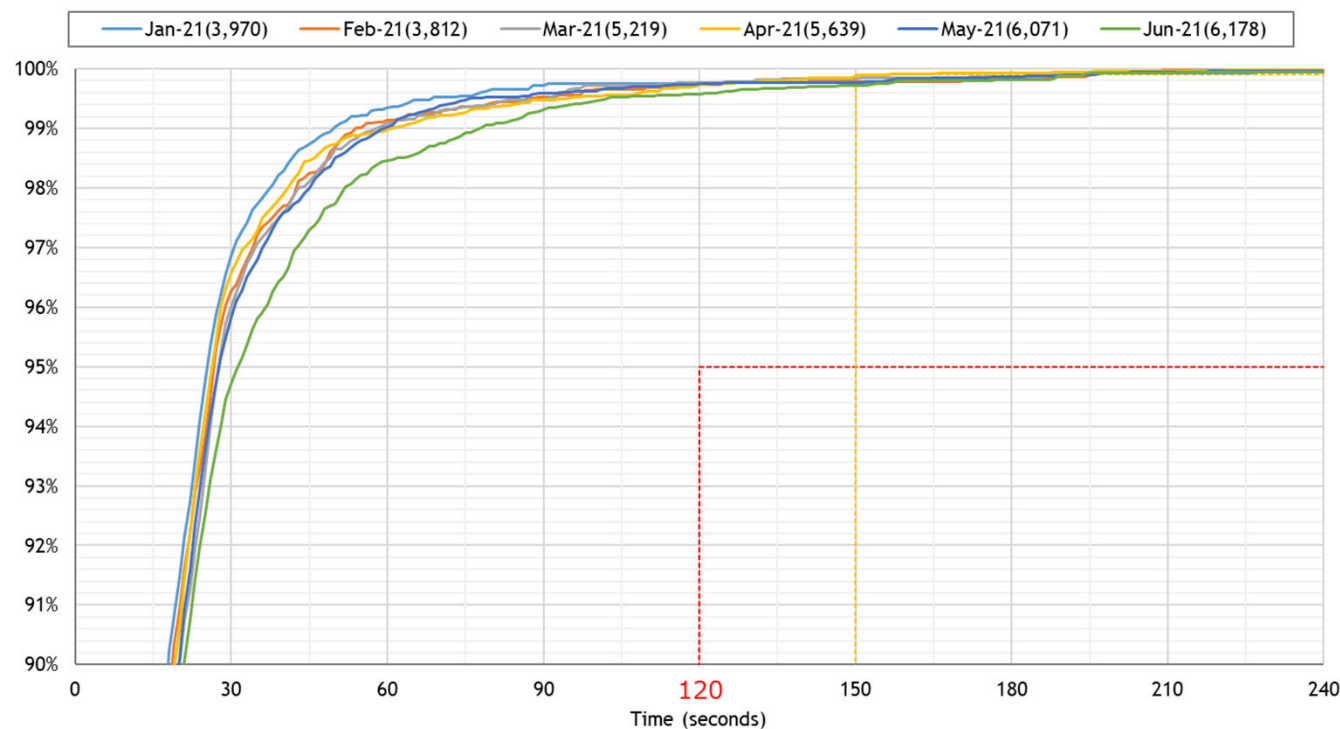
- All months meet the 95% criteria and there are no major fluctuations.

ACTP measurement section



ACTP : Ground to air transmission time

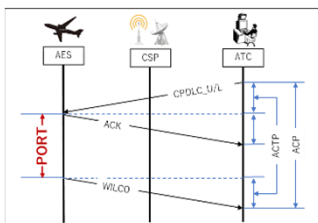
Fukuoka FIR - By Month - January to June 2021
CPDLC Actual Communication Technical Performance (ACTP)



PORT by Month

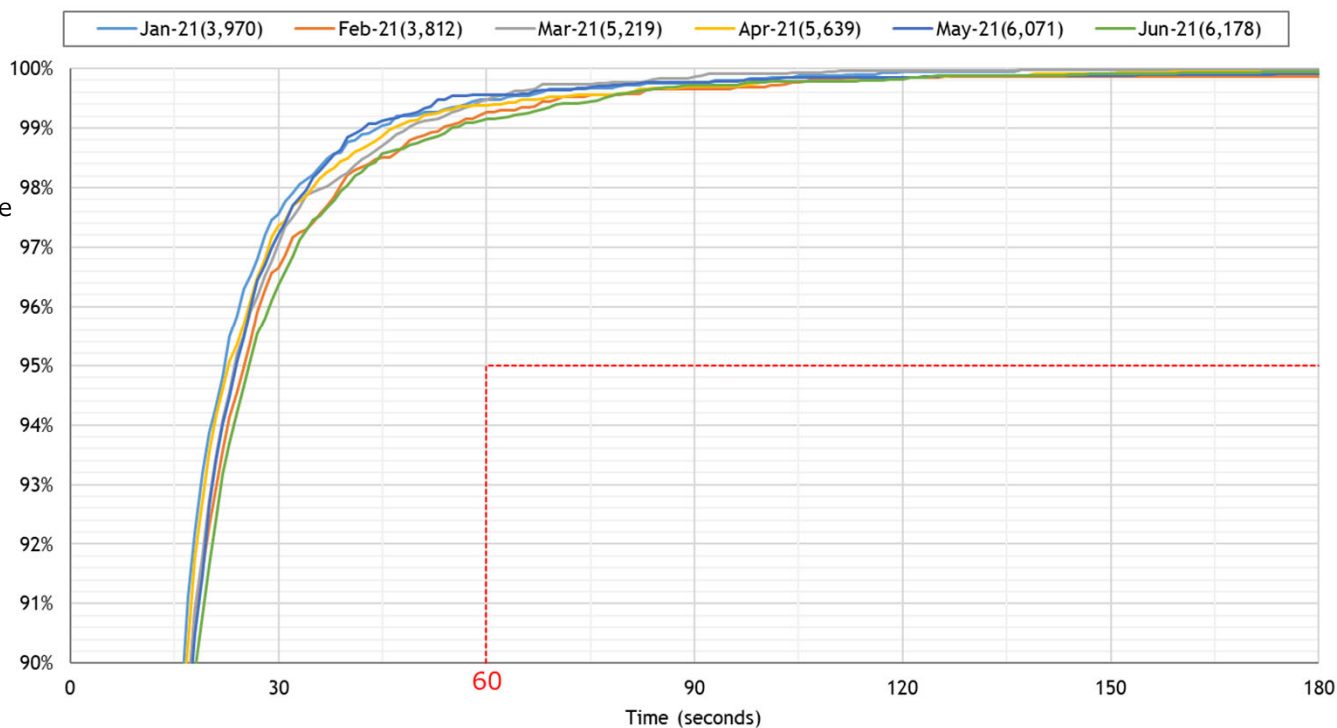
- All months meet the 95% criteria and there are no major fluctuations.

PORT measurement section

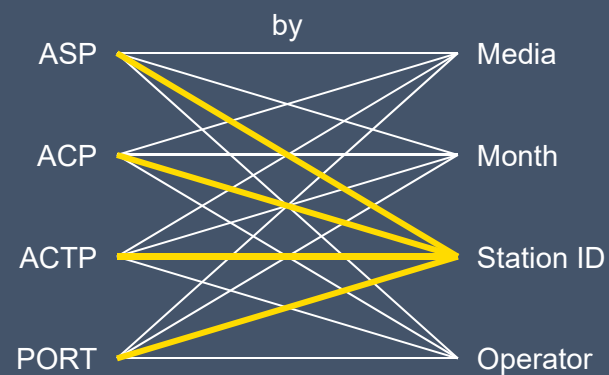


PORT: pilot operational response time

Fukuoka FIR - By Month - January to June 2021
CPDLC Pilot Operational Response Time (PORT)



Performance by Station ID



Performance by Station ID

- All GES meet the 95% criteria.
- XXS is excluded from the evaluation because the count of ADS-C is 100 or less in half a year.

CSP	Service	Station ID	RSP180			RCP240					
			Count of ADS-C	ASP		Count of CPDLC	ACTP		ACP		PORT
				95%	99.9%		95%	99.9%	95%	99.9%	
SITA	Classic Aero	APK1(Paumalu)	505,811	98.05%	99.63%	12,377	99.84%	99.89%	99.83%	99.94%	99.55%
		APK2(Perth)	46,045	98.29%	99.57%	1,320	99.85%	99.85%	99.70%	99.85%	99.24%
	SBB	APK9(Paumalu)	0	0.00%	0.00%	0	0.00%	0.00%	0.00%	0.00%	0.00%
	Iridium	IGW1(Phoenix)	12,612	96.29%	99.38%	211	98.58%	99.05%	98.10%	99.05%	98.58%
ARINC	Classic Aero	XXA(Paumalu)	399,855	98.42%	99.70%	9,461	99.71%	99.77%	99.74%	99.87%	99.69%
		XXP(Perth)	109,584	98.14%	99.51%	2,692	99.78%	99.81%	99.67%	99.85%	98.89%
		XXQ(Perth)	0	0.00%	0.00%	0	0.00%	0.00%	0.00%	0.00%	0.00%
	SBB	XXS(Paumalu)	24	100.00%	100.00%	0	0.00%	0.00%	0.00%	0.00%	0.00%
	Iridium	IG1(Phoenix)	81,331	96.64%	99.14%	1,915	98.96%	99.27%	98.69%	99.06%	97.60%

*No-colored where under 100 data points.

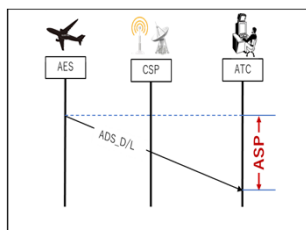
Legend:

	Meets criteria
	Under criteria but above 99.0%
	Under criteria

ASP by Station ID

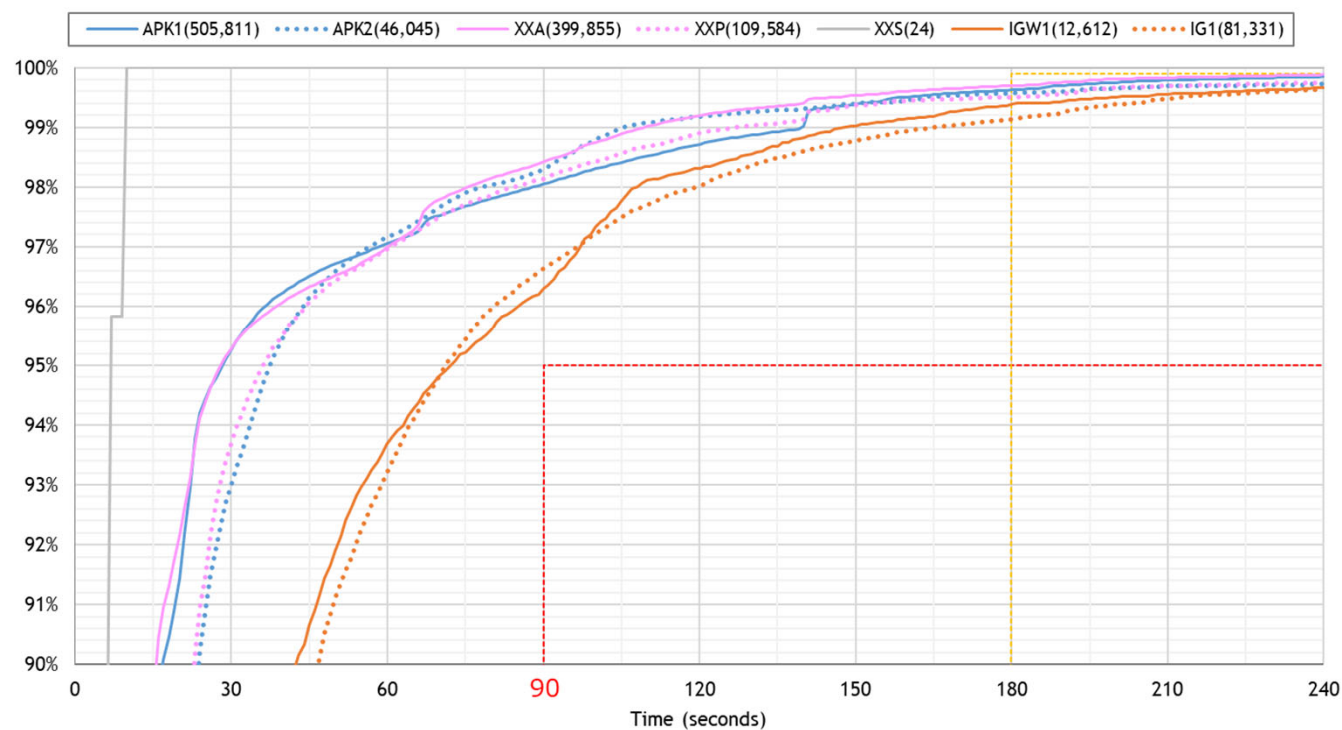
- All GES meet the 95% criteria.

ASP measurement section



ASP:ADS Downlink transaction time

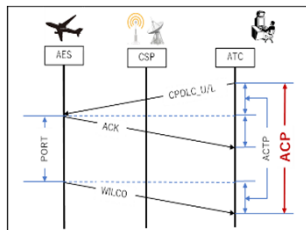
Fukuoka FIR - By Station Identifier - January to June 2021
ADS-C Actual Surveillance Performance (ASP)



ACP by Station ID

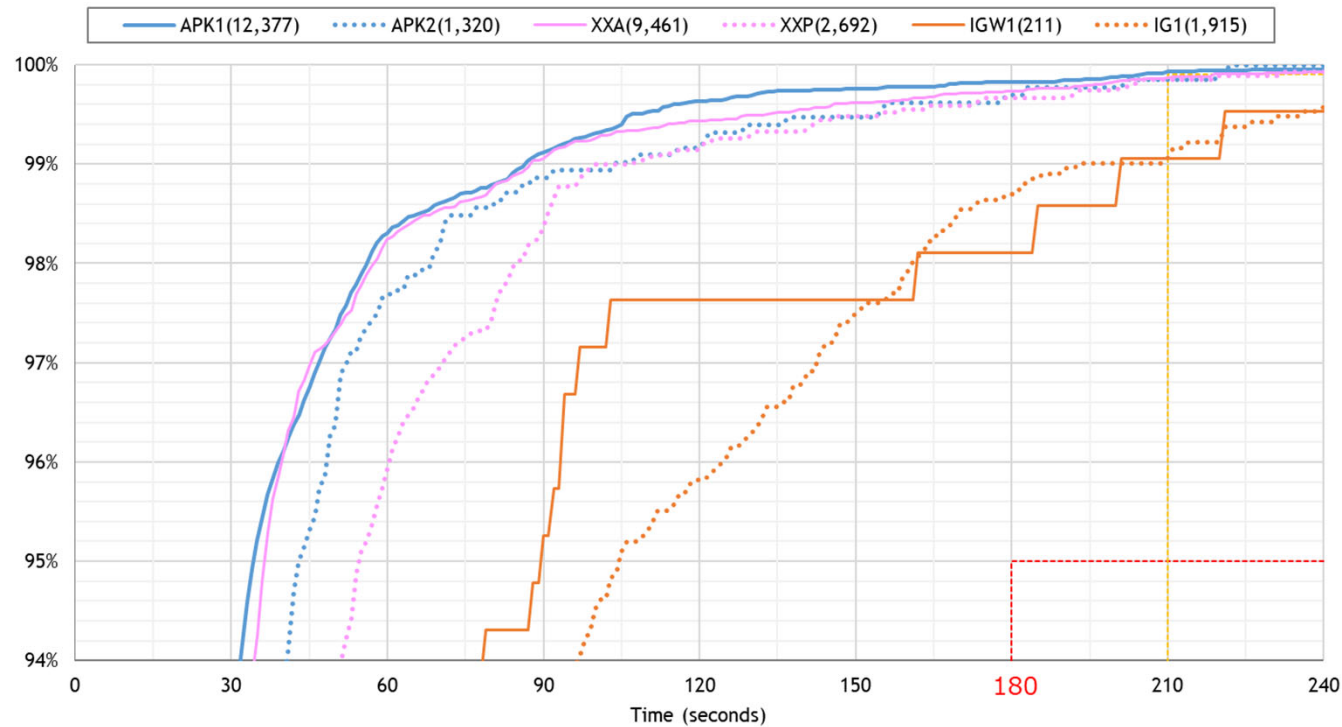
- All GES meet the 95% criteria.

ACP measurement section



ACP : Total response time

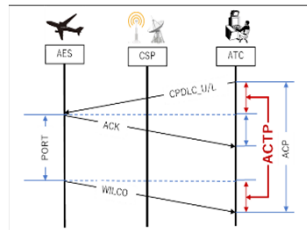
Fukuoka FIR - By Station Identifier - January to June 2021
CPDLC Actual Communication Performance (ACP)



ACTP by Station ID

- All GES meet the 95% criteria.

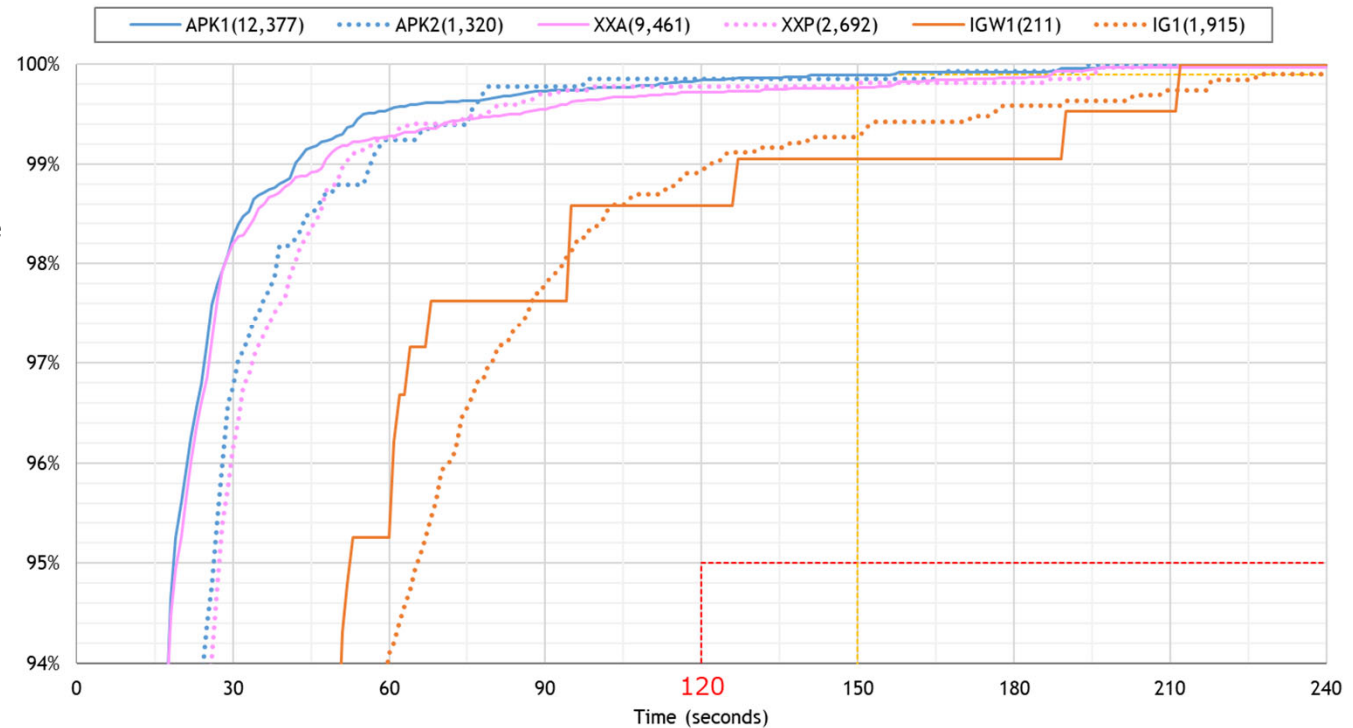
ACTP measurement section



ACTP : Ground to air transmission time

Fukuoka FIR - By Station Identifier - January to June 2021

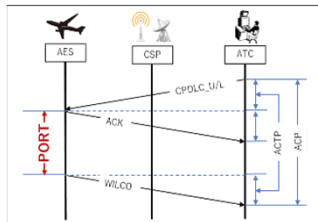
CPDLC Actual Communication Technical Performance (ACTP)



PORT by Station ID

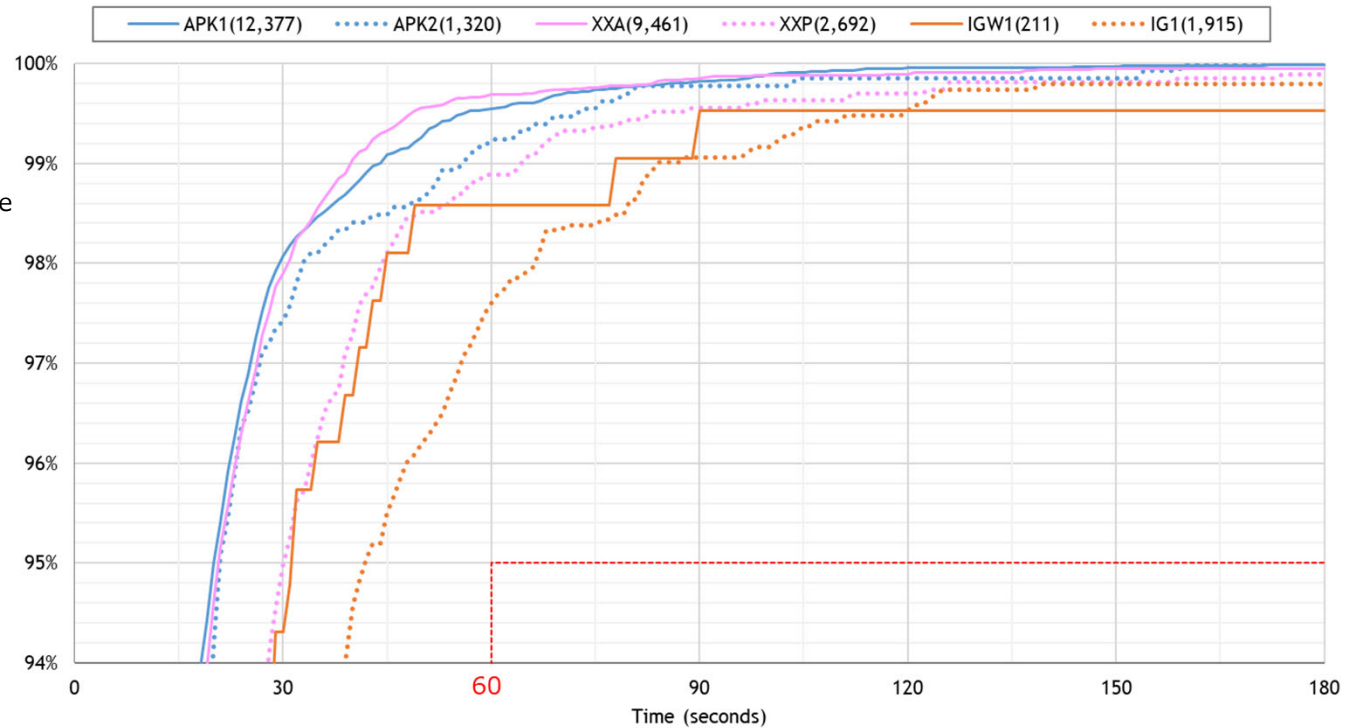
- All GES meet the 95% criteria.

PORT measurement section



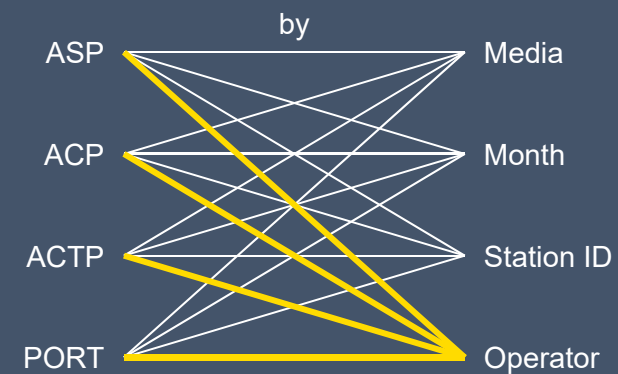
PORT: pilot operational response time

Fukuoka FIR - By Station Identifier - January to June 2021
CPDLC Pilot Operational Response Time (PORT)



Performance by Operator

Table only, Percentile graph not contained



Performance by Operator

- In this term, 54 operators had more than 100 messages in ADS-C.
 - ◆ ASP95% criteria*¹ is met by all operators.
- In this term, 30 operators had more than 100 messages in CPDLC.
 - ◆ ACP95% criteria*² is met by all operators.

	RSP180		RCP240				
	ASP		ACTP		ACP		PORT
	95%	99.9%	95%	99.9%	95%	99.9%	95%
Meets Criteria	54	12	30	12	30	18	30
Under criteria but above 99.0%		39		17		11	
Under criteria	0	3	0	1	0	1	0

※1 ASP95% criteria: The ASP value of 95% of the entire ADS-C downlink must be within 90 seconds.

※2 ACP95% criteria: The ACP value of 95% of the entire CPDLC communication with response request must be within 180 seconds.

Summary of Performance by Operator/AC-Type

- In this term, there are 142 pair of operators / aircraft that received more than 100 downlink messages of ADS-C.
 - ◆ 3 pairs did not meet the 95% ASP criteria *1.
- In this term, there are 60 pair of operators / aircraft that received more than 100 downlink messages of CPDLC.
 - ◆ ACP95% requirement*2 was met by all pair.

	RSP180		RCP240				
	ASP		ACTP		ACP		PORT
	95%	99.9%	95%	99.9%	95%	99.9%	95%
Meets Criteria	139	50	60	30	60	42	58
Under criteria but above 99.0%		81		29		15	
Under criteria	3	11	0	1	0	3	2

※1 ASP95% Performance Requirements: The ASP value of 95% of the entire ADS-C downlink must be within 90 seconds.

※2 ACP95% Performance Requirements: The ACP value of 95% of the entire CPDLC communication with response request must be within 180 seconds.

Summary of Performance by Operator/AC-Type

- In this term, three pair (B737 / KAL, B763 / ANA, B77W / GIA) did not meet the ASP95% criteria.
 - ◆ Regarding B763 / ANA, it has been reported in the past that B763 is susceptible to media transitions in the South Pacific A590, and it seems that the performance has deteriorated for the same reason.
 - ◆ B737 / KAL and B77W / GIA are not evaluated because there is no P code(Shortened control interval is not applicable) in the flight plan.

Aircraft Type	OP Code	RSP180				RCP240						
		Count of ADS-C	% of Total ADS-C	ASP		Count of CPDLC	% of Total CPDLC	ACTP		ACP		PORT
				95%	99.9%			95%	99.9%	95%	99.9%	
A333	GIA	329	0.02%	96.96%	98.78%	7	0.02%	100.00%	100.00%	100.00%	100.00%	100.00%
B737	KAL	117	0.01%	94.87%	97.44%	1	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%
B738	UAL	7,980	0.53%	95.85%	99.25%	128	0.41%	99.22%	100.00%	97.66%	97.66%	94.53%
B744	CKS	26,197	1.73%	96.21%	98.94%	386	1.25%	98.45%	99.22%	98.19%	98.70%	96.63%
B763	ANA	7,868	0.52%	94.90%	98.32%	154	0.50%	99.35%	99.35%	99.35%	99.35%	98.05%
B763	GTI	322	0.02%	95.03%	98.45%	12	0.04%	100.00%	100.00%	100.00%	100.00%	91.67%
B763	JAL	5,800	0.38%	96.84%	98.62%	97	0.31%	98.97%	98.97%	96.91%	97.94%	96.91%
B77L	CKS	6,926	0.46%	97.24%	98.97%	107	0.35%	99.07%	99.07%	100.00%	100.00%	99.07%
B77L	FDX	62,907	4.15%	96.19%	98.94%	1,064	3.44%	99.62%	99.62%	99.62%	99.91%	99.06%
B77W	CPA	2,511	0.17%	96.97%	98.92%	74	0.24%	95.95%	97.30%	97.30%	98.65%	97.30%
B77W	GIA	1,424	0.09%	93.61%	97.05%	29	0.09%	100.00%	100.00%	100.00%	100.00%	100.00%
C17	RCH	4,378	0.29%	99.50%	99.68%	101	0.33%	100.00%	100.00%	98.02%	98.02%	94.06%
K35R	RCH	705	0.05%	95.74%	97.02%	9	0.03%	100.00%	100.00%	100.00%	100.00%	100.00%

*No-colored where under 100 data points.

Legend:

	Meets criteria
	Under criteria but above 99.0%
	Under criteria

Summary

Summary of the report

- 1) Availability was good with no long-term failures of satellites and CSPs.
- 2) Continuity does not meet the criteria for some communications, including media transitions that use VHF for uplinks and satellites for downlinks.

Any Questions?

Thank you!



Technical Management
Center



Network Performance
Assessment Center



Air Traffic Management
Center