



Federal Aviation
Administration

Datalink Issues

Oakland Center

IPACG46/FIT33

October 14th – 15th, 2020



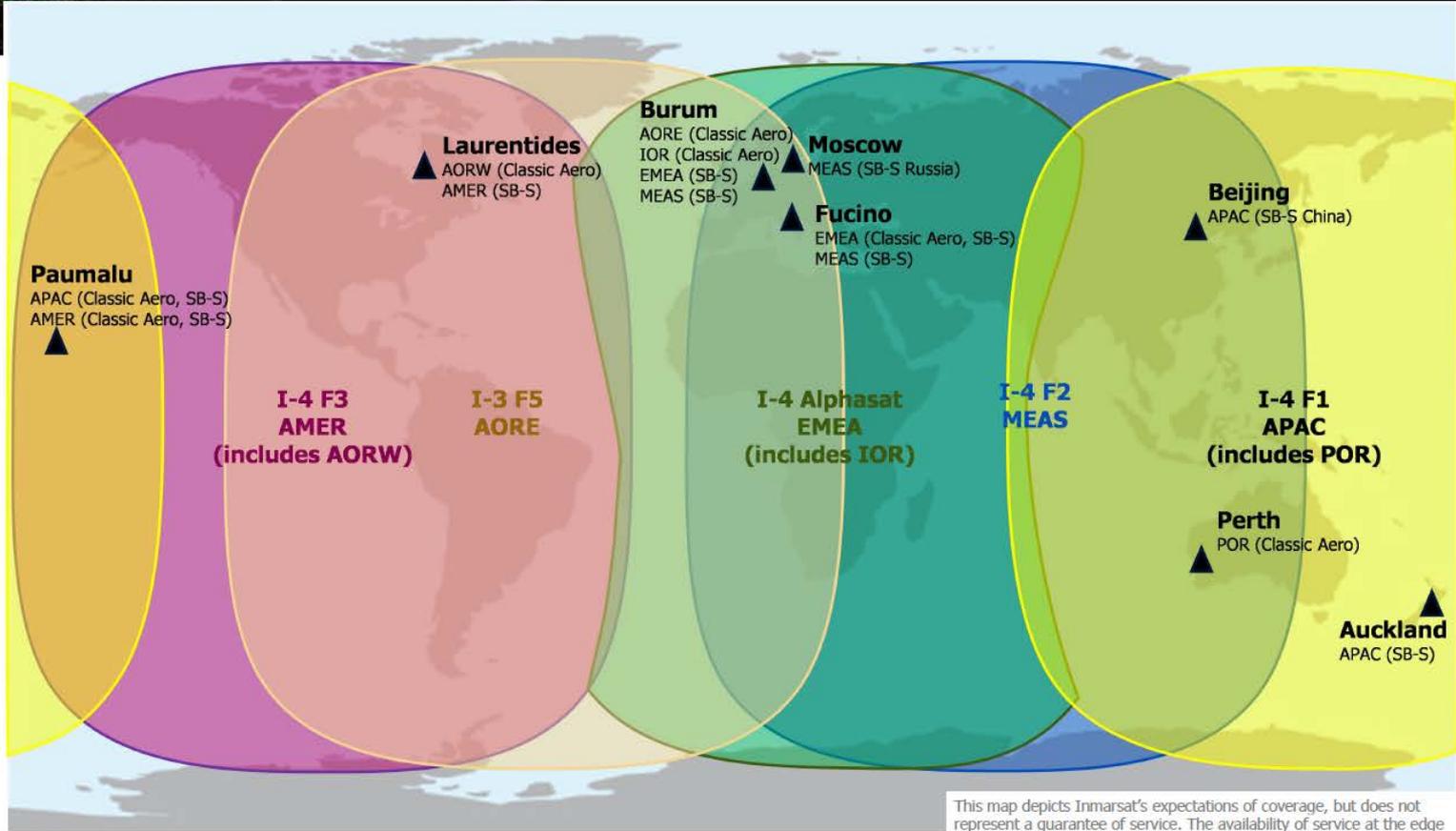
Overview

- Reported Outages
 - Accuracy and Timeliness of Notifications
 - Controller Impact
- Detected Outages
 - Controller Impact
- Upcoming ATOP changes to improve the handling of outages



Satellite Service Provider (SSP)	Satellite	Service	Ground Station Location	ARINC ACARS Identifiers	SITA ACARS Identifiers
Iridium	All	Short Burst Data	Primary: Tempe, Arizona, US Secondary: None	<u>IG1 - 2</u>	<u>IGW1 - 8</u>
Inmarsat	AORE (3F5 at 54°W)	Classic Aero	Burum, Netherlands	<u>XXN - 15</u>	<u>AOE6 - 14</u>
		Swift Broadband-Safety	N/A	N/A	N/A
	EMEA (AF1 at 25°E)	Classic Aero over I-4	Primary: Fucino, Italy Secondary: Burum, Netherlands	XXF	EUA1
		Classic Aero over I-4 (virtual I-3 IOR)	Burum, Netherlands	XXI	EUA2
		Swift Broadband-Safety	Primary: Burum, Netherlands Secondary: Fucino, Italy	XXB	EUA9
	APAC (4F1 at 143.5°E)	Classic Aero over I-4	Primary: Paumalu, Hawaii, US Secondary: Auckland, New Zealand	<u>XXA - 4</u>	<u>APK1 - 1</u>
		Classic Aero over I-4 (virtual I-3 POR)	Perth, Australia	<u>XXP - 7</u>	<u>APK2 - 10</u>
		Swift Broadband-Safety	Primary: Paumalu, Hawaii, US Secondary: Auckland, New Zealand	<u>XXS -16</u>	APK9
	AMER (4F3 at 98°W)	Classic Aero over I-4	Primary: Paumalu, Hawaii, US Secondary: Auckland, New Zealand	<u>XXH - 3</u>	<u>AME1 - 5</u>
		Classic Aero over I-4 (virtual I-3 AORW)	Laurentides, Canada	<u>XXW - 6</u>	<u>AME2 - 9</u>
Swift Broadband-Safety		Primary: Paumalu, Hawaii, US Secondary: Laurentides, Canada	<u>XXU - 11</u>	AMR9	
MEAS (4F2 at 64°E)	Swift Broadband-Safety	Primary: Burum, Netherlands Secondary: Fucino, Italy	XXM	MEA9	
MTSAT			Kobe and Hitachiota, Japan	N/A	<u>MTS1 – 13(Feb-6)</u>

Operational Coverage Map



This map depicts Inmarsat's expectations of coverage, but does not represent a guarantee of service. The availability of service at the edge of coverage areas fluctuates depending on various conditions.



Reported Outages



Reported Outages

No Observed Impact

CSP Notification details						Impact details							
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Path ID	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	No MAS Received
7-Feb-20	01:42	9.00	Inmarsat Voice and Data Services	AMER	SITA	AME1	13	0	11	0	3	0	0
						AME2	3	0	2	0	0	0	0
19-Apr-20	15:26	60.00	Inmarsat Voice and Data Services/No End Time Provided	AMER(AME1 & AME2)	SITA	AME1	46	0	7	0	7	0	0
						AME2	5	0	1	0	5	0	0
19-Apr-20	15:32	129.00	Classic Aero over I4 and SB Safety Data and ACARS	I-4 AMER	ARINC	XXH	48	0	6	0	15	1	0
						XXW	55	0	4	0	7	1	0
15-May-20	01:13	84.00	Classic Aero over I3	POR	ARINC	XXP	29	0	4	0	19	0	0

- ~1.5 hours after the reported Feb 7th outage, an unreported outage/degradation was detected in the same region
- For the reported April 19th outage, no end time was provided. One hour was used as the duration estimate to check the data for delayed messages and MAS Failures.
- No impact was observed in Anchorage



Reported Outages

Low/Moderate Impact

CSP Notification details						Impact details							
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Path ID	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	No MAS Received
18-Mar-20	15:52	55.00	Inmarsat	Pamalau, Hawaii	ARINC	XXA	3	1	3	1	0	32	0

- 117 Outage Related Sector Queue messages were observed
- Delays were observed over APK2 were observed during this time period, however no notification was received from SITA regarding an outage over APK2
- The first outage notification was received 8 minutes after the conclusion of the outage
- No impact was observed in Anchorage



Reported Outages

Moderate/Significant Impact - KZAK

CSP Notification details						Impact details										
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Detected/ Reported	Path ID	Start Time	End Time	Duration (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures
22-Jan-20	02:00	282.00	Inmarsat	APAC and POR	ARINC	Reported	XXA	02:00:00	06:42:00	282.00	26	1	7	1	9	227
						Reported	XXP	02:00:00	06:42:00	282.00	472	87	34	15	217	227
						Detected	XXP	04:42:35	05:06:32	24.00	41	11	14	5	22	18

CSP Notification details						Impact details										
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Detected/ Reported	Path ID	Start Time	End Time	Duration (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures
22-Jan-20	No CSP Reports/Degradation					Detected	AME1	00:33:30	00:52:45	20.00	41	16	21	14	6	25
22-Jan-20	No CSP Reports/Degradation					Detected	APK2	02:44:04	03:40:07	57.00	33	21	9	6	19	35

- Delayed messages were observed intermittently during the duration of the outage
- Mas Failures for uplinks were the most significant impact of the outage
- The Outage notification was received ~two hours after the conclusion of the outage

Reported Outages

Moderate/Significant Impact - PAZN

CSP Notification details						Impact details										
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures
22-Jan-20	02:00	282.00	Inmarsat	APAC and POR	ARINC	Reported	XXA	02:00:00	06:42:00	282	15	0	4	0	5	166
						Reported	XXP	02:00:00	06:42:00	282	193	21	23	8	84	166
No CSP Reports/Degradation						Detected	APK2	00:33:35	00:53:18	20.00	23	11	8	7	1	1
No CSP Reports/Degradation								03:01:31	03:40:37	40.00	20	8	8	4	0	4

- Delayed messages were observed intermittently during the duration of the outage
- Mas Failures for uplinks were the most significant impact of the outage
- The Outage notification was received ~two hours after the conclusion of the outage

Reported Outages

Moderate/Significant Impact

➤ KZAK

CSP Notification details						Impact details											
Start Date	Start Time (UTC)	Dur (min)	Service Impacted	Satellite Region Impacted	Source	Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	Outage Related Sector Queue Messages
6-Feb-20	23:05	50.00	Iridium	Global	SITA	Detected	IGW1	21:58:42	22:19:48	22.00	43	25	13	13	17	17	92
						Detected	IGW1	23:26:33	23:58:58	33.00	21	12	10	5	31	32	291
						Reported	IGW1	23:05:00	23:55:00	50.00	17	12	9	5	22	97	529
6-Feb-20	23:43	12.00	Iridium	Global	ARINC	Detected	IG1	21:59:23	22:21:29	23.00	114	71	33	29	31	17	95
						Detected	IG1	22:58:43	00:18:10	80.00	184	114	36	31	87	103	591
						Reported	IG1	23:43:00	23:55:00	12.00	49	33	22	16	38	0	529

- Delayed messages and MAS Failures were observed prior to the reported start of the outage
- Mas Failures for uplinks were a significant impact of this outage
- The Outage notification was received 20 minutes after the conclusion of the outage but 3 hours after the start of the detected outage
- Low/Moderate impact was observed in Anchorage, specifically for flights operating over IGW1



Reported Outages Moderate/Significant Impact

➤ KZAK

CSP Notification details						Impact details											
Start Date	Start Time (UTC)	Dur (min)	Service Impacted	Satellite Region Impacted	Source	Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	Outage Related SQ Msgs
11-Feb-20	18:06	37.00	Iridium	Global	SITA	Detected	IGW1	18:45:14	19:03:25	19.00	10	8	3	2	9	0	59
						Reported	IGW1	18:06:00	18:43:00	37.00	4	4	1	1	1	55	248
11-Feb-20	No CSP Reports/Degradation					Detected	IG1	18:03:58	19:00:33	57.00	79	47	19	17	32	55	330

- The outage notification was received within 5 minutes of the conclusion of the outage
- An outage notification was only received from SITA, however, impact was also observed over the ARINC Iridium path id – IG1
- Low/Moderate impact was observed in Anchorage with 14 MAS Failures received during this time period



Reported Outages Significant Impact

CSP Notification details						Impact details											
Start Date	Start Time (UTC)	Dur (min)	Service Impacted	Satellite Region Impacted	Source	Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	Outage Related SQ Msgs
7-Feb-20	01:42	9.00	Inmarsat	AMER	SITA	Reported	AME1	01:42:00	01:51:00	9.00	13	0	11	0	3	0	2
						Reported	AME2	01:42:00	01:51:00	9.00	3	0	2	0	0	0	2
7-Feb-20	No CSP Reports/Degradation					Detected	AME1	03:26:21	03:53:59	28.00	23	11	7	5	11	0	9
						Detected	AME1	05:08:37	05:30:06	22.00	25	15	8	8	12	2	29
						Detected	XXH	05:10:51	05:31:49	21.00	29	15	8	6	18	2	28
						Detected	XXH	06:26:37	06:43:20	17.00	12	7	6	5	8	0	2
						Detected	AME1	06:52:21	08:00:28	69.00	92	50	17	15	89	9	126
7-Feb-20	08:30	288.00	Inmarsat	AMER	SITA	Detected	AME1	08:13:21	09:39:51	87.00	116	62	29	21	91	47	292
						Detected	AME2	08:42:10	08:54:26	13.00	28	8	16	6	10	18	87
						Detected	AME1	09:54:40	10:54:58	61.00	14	10	6	4	8	90	402
						Reported	AME1	08:30:00	13:18:00	288.00	121	55	25	16	72	216	999
7-Feb-20	No CSP Reports/Degradation					Detected	XXH	08:06:07	09:39:14	94.00	74	39	15	10	57	47	298
7-Feb-20	10:17	186.00	Classic Aero over I4	AMER	ARINC	Detected	XXH	09:57:12	10:23:39	27.00	18	14	7	5	16	42	216
						Reported	XXH	10:17:00	13:23:00	186.00	8	3	6	1	9	132	571
						Reported	XXW	10:17:00	13:23:00	186.00	669	3	55	3	145	132	571

- Impact was observed outside of the time period of the outage notification
- No impact was observed in Anchorage



Reported Outages

Significant Impact - KZAK

CSP Notification details						Impact details												
Start Date	Start Time (UTC)	Dur (min)	Service Impacted	Satellite Region Impacted	Source	Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	No MAS Received	Outage Related SQ Msgs
20-Feb-20	14:40	50.00	Inmarsat ARINC Server Issue	Oceanic Regions	SITA	Detected	APK1	14:23:52	14:37:46	14.00	67	53	35	35	7	0	111	199
						Detected	AME1	14:24:09	14:38:01	14.00	39	31	21	21	1	0	111	210
						Detected	IGW1	14:25:09	14:37:55	13.00	10	7	5	5	0	0	106	204
						Detected	APK2	14:25:16	14:37:16	13.00	13	10	8	7	0	0	106	185
						Detected	APK1	14:51:16	15:27:05	36.00	174	157	43	40	12	10	308	791
						Detected	IGW1	14:51:51	15:26:48	35.00	25	21	5	5	1	9	308	786
						Detected	APK2	14:51:59	15:26:50	35.00	21	18	5	5	1	8	308	786
						Detected	AME2	14:52:35	15:26:12	34.00	22	20	6	6	0	0	308	761
						Detected	AME1	14:52:57	15:27:09	35.00	83	73	20	20	5	0	307	786
						Reported	IGW1	14:40:00	15:30:00	50.00	33	21	5	5	2	11	308	1056
						Reported	APK1	14:40:00	15:30:00	50.00	248	157	43	40	53	11	308	1056
						Reported	APK2	14:40:00	15:30:00	50.00	34	18	9	5	12	11	308	1056
						Reported	AME1	14:40:00	15:30:00	50.00	123	73	22	20	18	11	308	1056
Reported	AME2	14:40:00	15:30:00	50.00	33	20	6	6	0	11	308	1056						

- The outage started ~20 minutes prior to the reported time in the notification
- KZWK declared ATC Alert during this outage



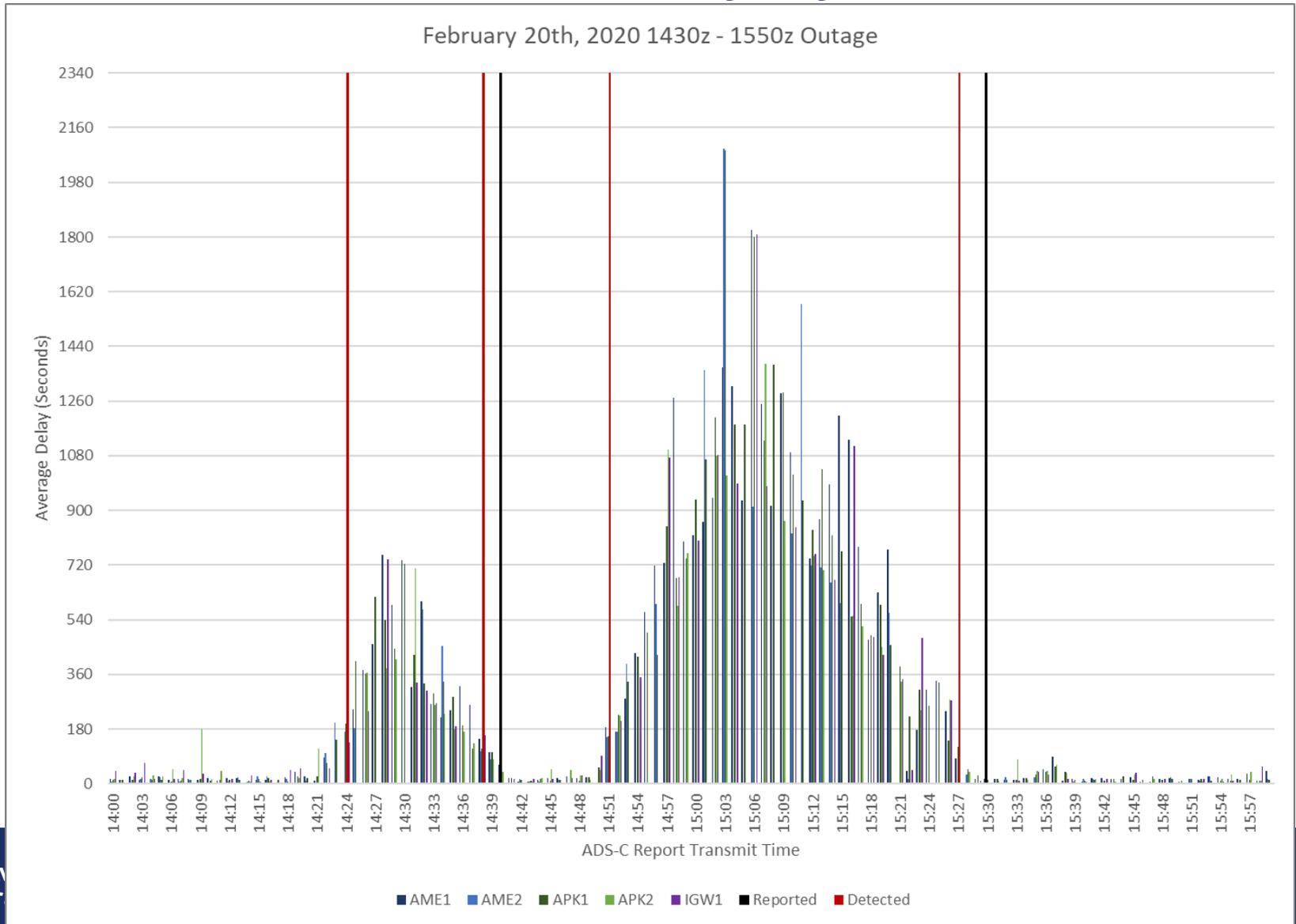
Reported Outages

Significant Impact - PAZN

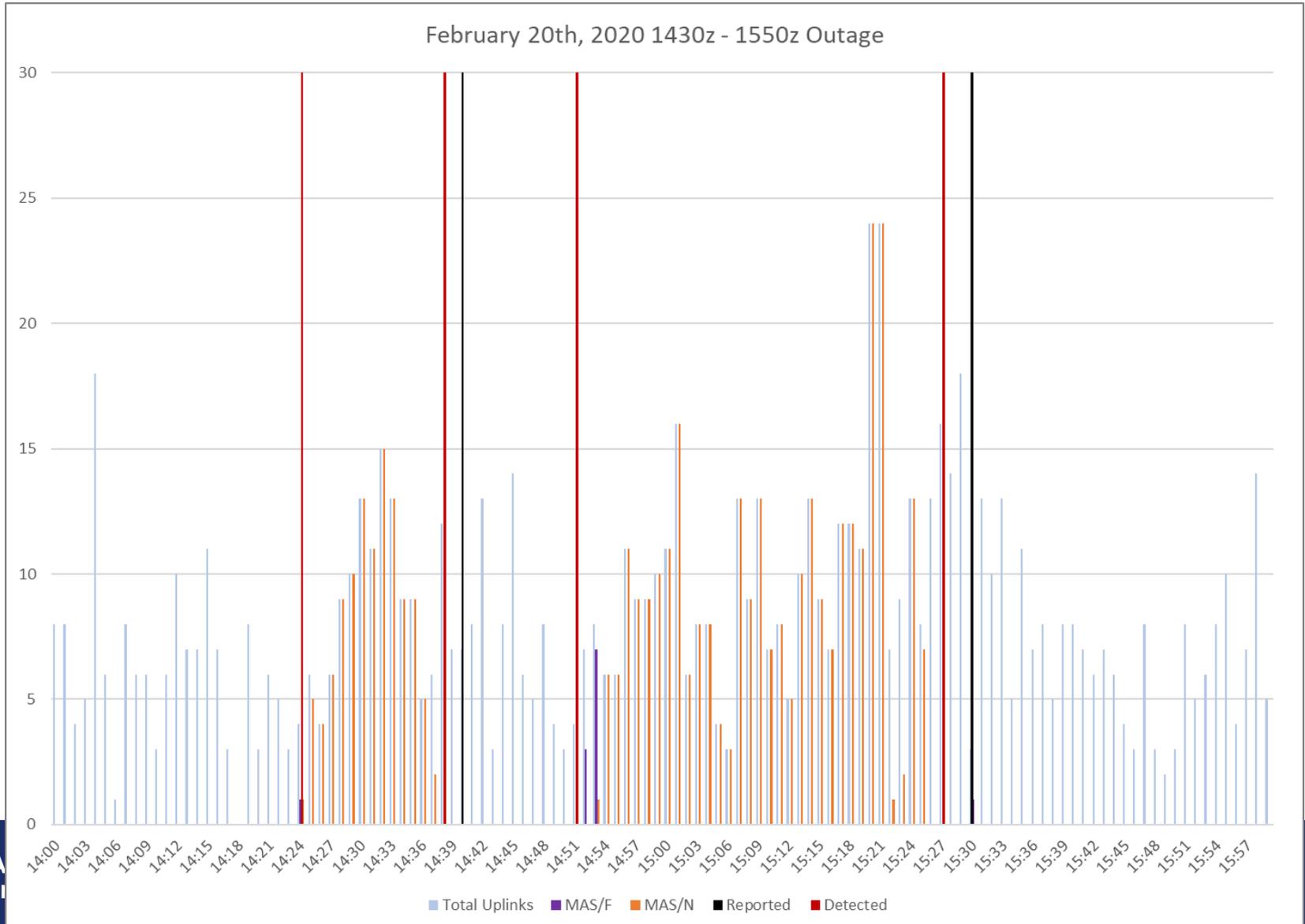
CSP Notification details						Impact details											
Start Date	Start Time (UTC)	Duration (min)	Service Impacted	Satellite Region Impacted	Source	Detected/Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	MAS failures	No MAS Received	Outage Related Sector Queue Messages
20-Feb-20	14:40	50.00	Inmarsat Voice and Data Services - ARINC Server Issue	Oceanic Regions	SITA	Detected	APK1	14:24:07	14:37:26	14.00	10	8	6	6	0	0	51
						Detected	APK1	14:52:55	15:27:04	35.00	41	36	10	10	0	16	189
						Reported	IGW1	14:40:00	15:30:00	50.00	7	4	1	1	3	78	255
						Reported	APK1	14:40:00	15:30:00	50.00	60	36	10	10	3	78	255
						Reported	APK2	14:40:00	15:30:00	50.00	12	8	2	2	3	78	255
						Reported	AME1	14:40:00	15:30:00	50.00	1	0	1	0	3	78	255



Reported Outages ADS-C Latency by GES



Reported Outages Uplink Delivery and MAS Response



Unreported Outages



Unreported Outages

Low/Moderate Impact

CSP Notification details		Impact details											
Start Date		Detected Reported	Path ID	Start Time	End Time	Duration (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	MAS failures	Outage Related Sector Queue Messages
31-Jan-20	No CSP Reports/Degradation	Detected	XXW	19:57:06	20:09:48	13.00	25	8	13	6	7	3	25
1-Jul-20	No CSP Reports/Degradation	Detected	XXP	15:10:08	15:35:32	26.00	11	7	3	2	4	3	9

- Opened up PR ZOA-2020-002 for the July 1st XXP outage/degradation

Unreported Outages Moderate/Significant Impact

CSP Notification details		Impact details											
Start Date		Detected Reported	Path ID	Start Time	End Time	Dur (min)	Total reports	Delay > 180 sec	Total flights	Impacted flights	Total uplinks on Path	No MAS Received	Outage Related Sector Queue Messages
24-Jan-20	FANS CRA PR - 3208-MM	Detected	IGW1	14:33:37	14:46:38	14.00	12	9	6	6	3	98	212
		Detected	APK1	14:33:45	14:45:48	13.00	59	45	33	33	17	98	205
		Detected	AME1	14:33:59	14:45:44	12.00	25	19	16	16	1	98	204
		Detected	APK2	14:34:48	14:46:35	12.00	14	10	7	7	1	93	212
		Detected	MTS1	14:35:02	14:45:35	11.00	14	12	8	8	1	91	202

- Opened up PR 3028-MM for this outage/degradation
- This outage/degradation was also observed in the KZWY and PAZN data

Improved monitoring capabilities for communication and surveillance network performance

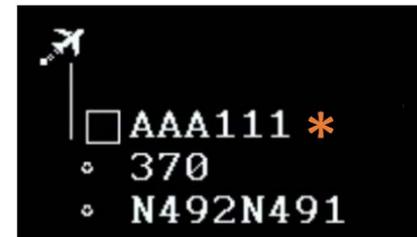


Outage Detection

- Outage detection based upon evaluation that is performed upon individual adapted paths
- Adapted values will be used to determine thresholds for determining when a path is degraded
- At least two aircraft must be impacted to declare a path degraded
- Recordings will be saved when a degradation is detected. These recordings can then be used to open up problem reports when an unreported outage/degradation is detected.

Air Traffic Improvements

- A visual indication will be displayed to a controller when an aircraft operating over a degraded path is encountering delayed messages
- Suppression of Outage Related Sector Queue Messages during an outage/degradation.
 - No Link delivery confirmation
 - Contract request timed out
 - ADS Report Overdue
 - SVC messages reporting - "UNABLE TO PROCESS – MESSAGE TOO OLD"



Tech Ops Improvements

- Ability to view/monitor the status of a ground station
- Ability to identify if a degradation is ground station specific or potentially linked to a SSP/DSP
- Ability to view/monitor network traffic of messages
- Ability to view/monitor flights actively sending messages through a ground station
- Ability to view/monitor flights that are receiving delayed messages.
- Ability to view/monitor impacts to controlling sectors

