ISPACG FIT/22

PBCS Monitoring in US Oceanic Airspace

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Overview

- Summary of Reported Outages
- PBCS Performance Criteria
- How to Read PBCS Monitoring Charts
- Summary of Flight Counts and Data Link Usage by FIR
- Aggregate Data Link Performance Tables
- ASP by Station Identifier by FIR
- Aggregate Data Link Performance by Operator
- Aggregate Data Link Performance by Business Jet Aircraft Type

Outages Reported Since August 2014

START DATE	START TIME (UTC)	DURATION (HH:MM:SS)	SERVICE IMPACTED	SATELLITE REGION IMPACTED	NOTIFICATION SOURCE	NOTES
8-Sep-14	20:35	01:38:00	SITA Iridium	Global	SITA	The flooding in the Tempe area is the suspected cause of the terrestrial link outage
11-Sep-14	08:55	00:23:00	SITA Iridium	Global	SITA	SITA Links to the Iridium Gateway were intermittently down
11-Sep-14	10:07	04:08:00	SITA Iridium	Global	SITA	SATELLITE AIRCOM-Iridium Datalink ACARS Service was down due to an interruption of the main lease lines which were affected by flooding
12-Sep-14	21:03	00:35:00	SITA Iridium	Global	SITA	Iridium has advised that Mobile terminated messages were degraded. Mobile originated messages were not affected.
13-Sep-14	09:14	00:41:00	SITA Satellite Voice and Data Services	AOE, AOW	SITA	Aircom Satellite Voice and Data services via Atlantic Ocean region were affected due to problem at the Inmarsat Ground Earth Station
23-Sep-14	19:12	03:40:00	Inmarsat Voice and Data Svcs	POR	SITA, ARINC	Inmarsat experienced an unscheduled loss of Network service over the Pacific Ocean Region
23-Oct-14	22:51	00:23:00	ARINC Iridium	Global	ARINC	
25-Oct-14	02:07	02:03:00	Inmarsat Data Services	POR	SITA	Satelite Data Services over Pacific Ocean Region were affected due to problem at the Ground Earth Station
25-Oct-14	02:11	02:01:00	Inmarsat Data Services	POR	ARINC	* same outage as above but different start/stop times reported

Outages Reported Since August 2014

START DATE	START TIME (UTC)	DURATION (HH:MM:SS)	SERVICE IMPACTED	SATELLITE REGION IMPACTED	NOTIFICATION SOURCE	NOTES
2-Nov-14	11:40	00:28:00	ARINC I-4	EMEA	ARINC	BGAN/FB/SB users connected to the network at the time of the incident were not affected. The problem only affected users on dark beams and those requiring extra capacity on illuminated beams. Traffic recovered after the master PCS switched to Burum.
17-Nov-14	15:45	01:29:00	SITA Iridium	Global	SITA	Iridium customers may have experienced intermittent Short Burst Data service delays during the above timeframe
18-Nov-14	17:16	00:17:00	ARINC I-4	EMEA	ARINC	
2-Dec-14	08:34	00:11:00	ARINC I-4	EMEA	ARINC	Inmarsat experienced a network service degradation
12-Dec-14	06:38	00:16:00	ARINC I-4	EMEA	ARINC	Inmarsat experienced a network service degradation
10-Jan-15	09:21	00:23:00	ARINC I-4	EMEA	ARINC	Inmarsat experienced a network service degradation
22-Jan-15	13:50	00:35:00	SITA I-3	IOR	SITA	Services were affected by a Ground Earth station computer issue. Aircraft reconnected to ocean region POR1
22-Jan-15	14:01	00:32:00	ARINC I-3	IOR	ARINC	Per Inmarsat, AIC Air Interface Computer switch was carried out at Perth GES at 14:26 UTC affecting some VC3's and temporarily migrating a few AES from IOR to POR
25-Jan-15	09:58	00:21:00	ARINC I-4	EMEA	ARINC	Inmarsat experienced a network service degradation

Summary of Reported Outages/Degradations

January to December 2014

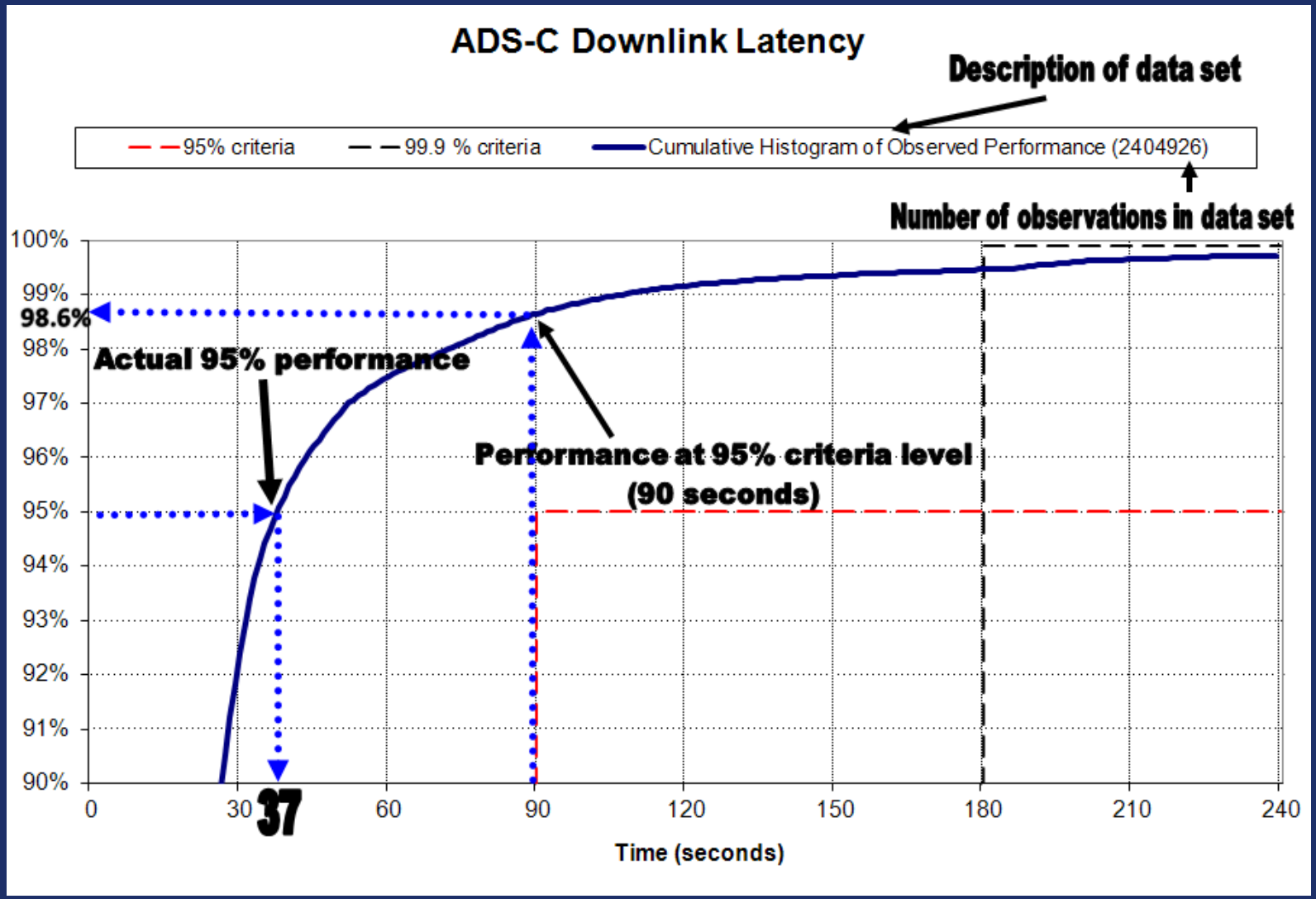
Satellite System	DSP	% Messages in Pacific	% Messages in Atlantic	# Unplanned outages > 10 min	Sum of unplanned outages > 10 min (min)
All	ARINC	45%	25%	1	24
IOR	ARINC	<1%		1	32
POR	ARINC	37%		2	199
Iridium	ARINC	4%	1%	2	34
I-4	ARINC		<1%	5	95
I-3	All	68%		2	343
Iridium	All	5%	4%	4	248
IOR	SITA	<1%		2	78
Iridium	SITA	1%	3%	8	854
All	SITA	36%	53%	1	90
POR	SITA	25%		1	87
AOE, AOW	SITA		21%	1	41
Total				***25***	***2008***

Availability Criteria	Max # unplanned outages > 10 min	Max sum of unplanned outages > 10 min (min)
Safety - 99.9%	48	520
Reliability - 99.99%	4	52

PBCS Performance Criteria
Time/Continuity

Performance Measure	Percentage of Messages Required to Meet Criteria	ADS-C		CPDLC	
		RSP180 Criteria (sec)	RSP400 Criteria (sec)	RCP240 Criteria (sec)	RCP400 Criteria (sec)
ASP	95%	90	300		
	99.9%	180	400		
ACTP	95%			120	260
	99.9%			150	310
ACP	95%			180	320
	99.9%			210	370
PORT	95%			60	60

How to Read PBCS Monitoring Charts



July – December 2014

DATA LINK PERFORMANCE BY MEDIA TYPE

Performance by Media Type

July – December 2014

New York

53,570 flights

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%	PORT 95%
Performance Criteria		**RSP 180**			**RCP 240**				
Aggregate	1,286,267	98.2%	99.3%	45,754	99.7%	99.8%	99.0%	99.3%	96.5%
SAT	1,019,933	98.1%	99.3%	41,822	99.7%	99.8%	99.1%	99.3%	96.5%
VHF	261,232	98.8%	99.5%	3,529	99.9%	99.9%	99.2%	99.4%	96.9%
Performance Criteria		**RSP 400**			**RCP 400**				
HF	5,096	92.0%	94.5%	5	--	--	--	--	--

Performance by Media Type

July – December 2014

Oakland

80,188 flights

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%	PORT 95%
Performance Criteria		**RSP 180**			**RCP 240**				
Aggregate	2,357,717	98.5%	99.4%	93,288	99.6%	99.7%	99.3%	99.6%	98.3%
SAT	2,092,372	98.5%	99.5%	91,009	99.7%	99.7%	99.4%	99.6%	98.4%
VHF	254,071	99.2%	99.6%	1,808	99.8%	99.8%	99.6%	99.6%	98.0%
Performance Criteria		**RSP 400**			**RCP 400**				
HF	11,227	91.3%	93.7%	17	--	--	--	--	--

Performance by Media Type

July – December 2014

Anchorage

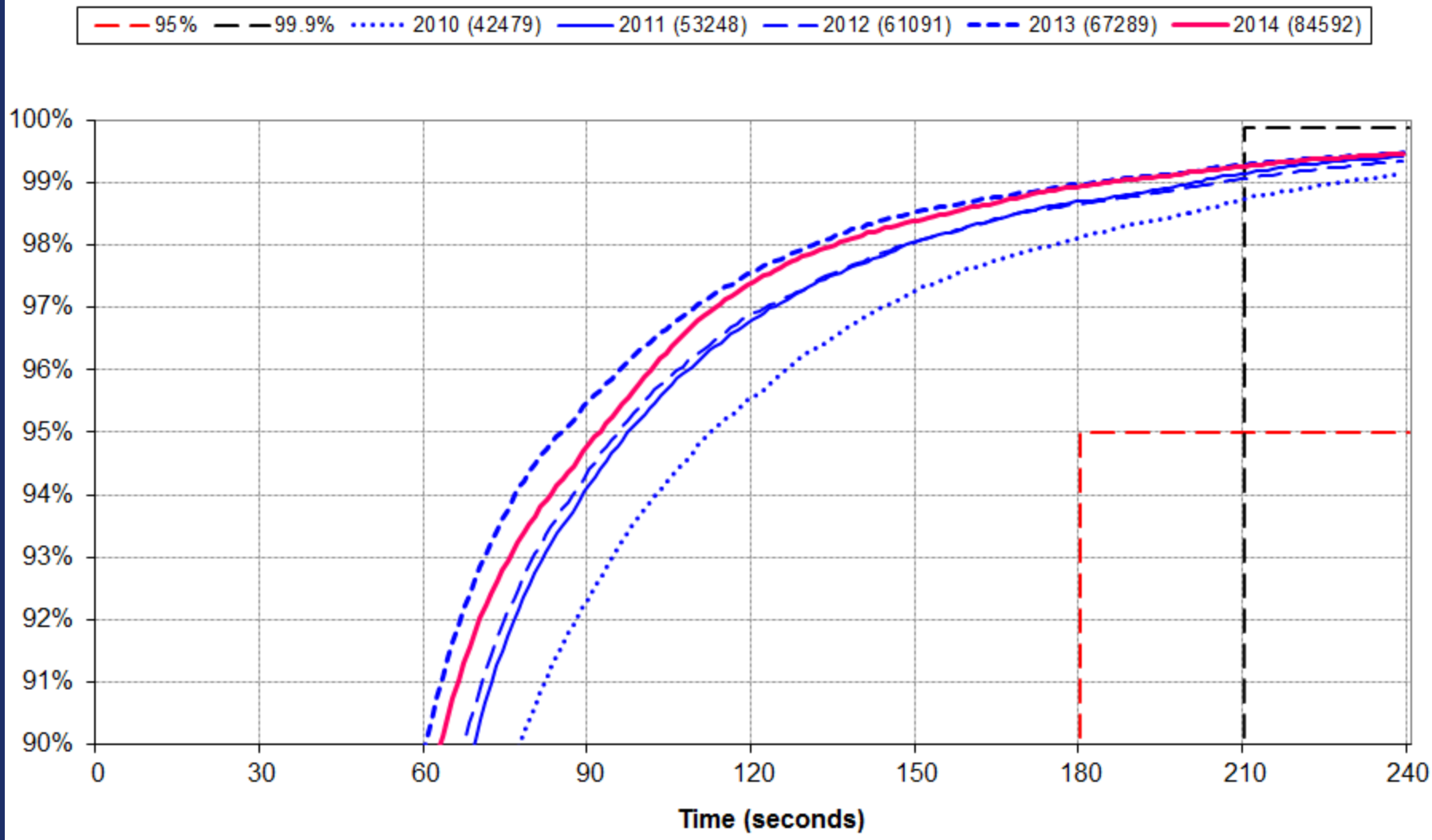
32,590 flights

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%	PORT 95%
Performance Criteria		**RSP 180**			**RCP 240**				
Aggregate	926,757	98.2%	99.4%	20,952	99.6%	99.7%	99.3%	99.5%	97.5%
SAT	597,867	97.8%	99.3%	13,452	99.5%	99.7%	99.1%	99.4%	97.0%
VHF	322,061	99.7%	99.8%	7,155	100.0%	100.0%	99.8%	99.9%	98.5%
Performance Criteria		**RSP 400**			**RCP 400**				
HF	6,827	88.9%	92.0%	9	--	--	--	--	--

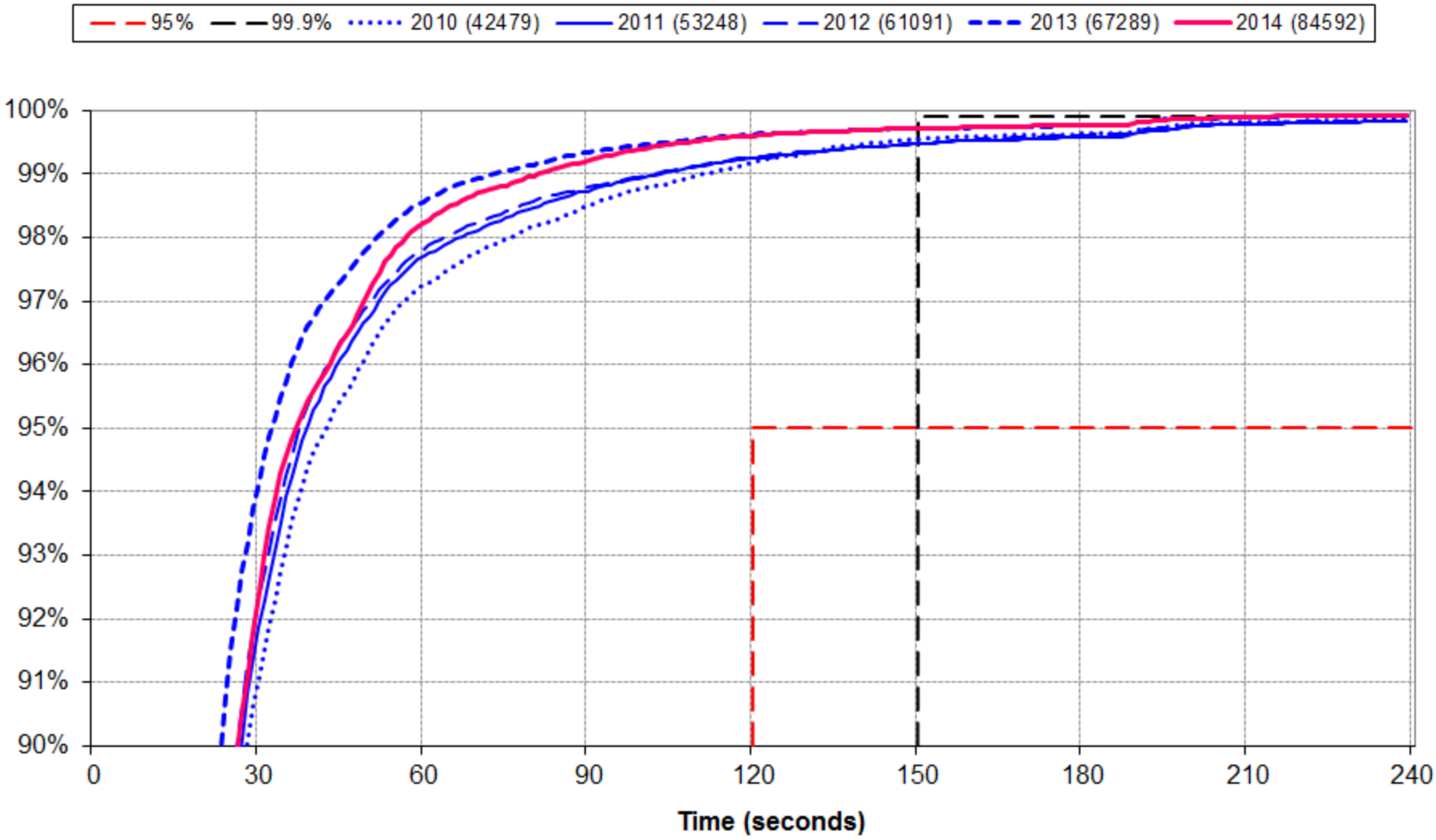
2010 - 2014

ANNUAL AGGREGATE FIR PERFORMANCE

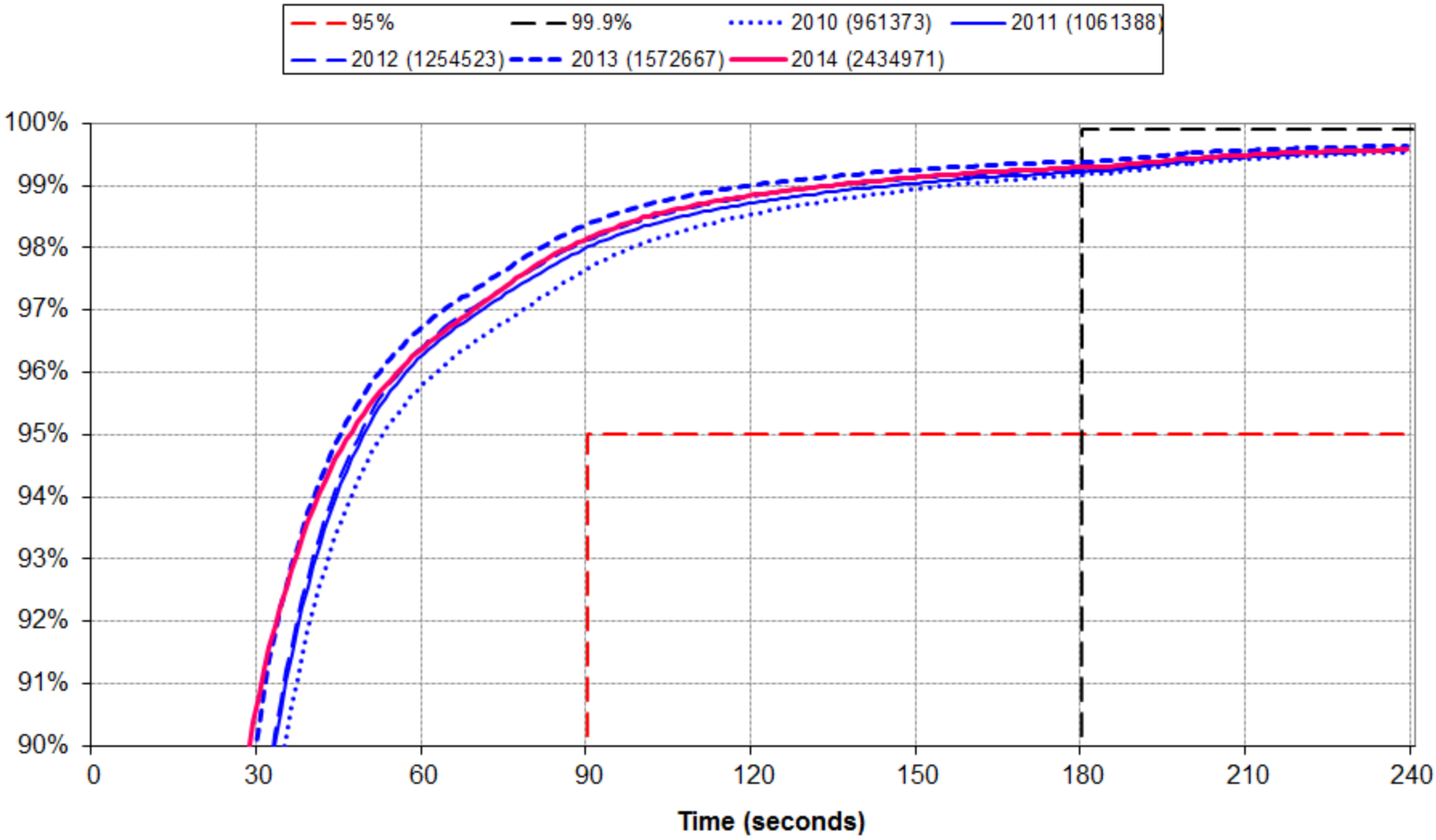
Actual Communication Performance (ACP)
New York FIR Aggregate



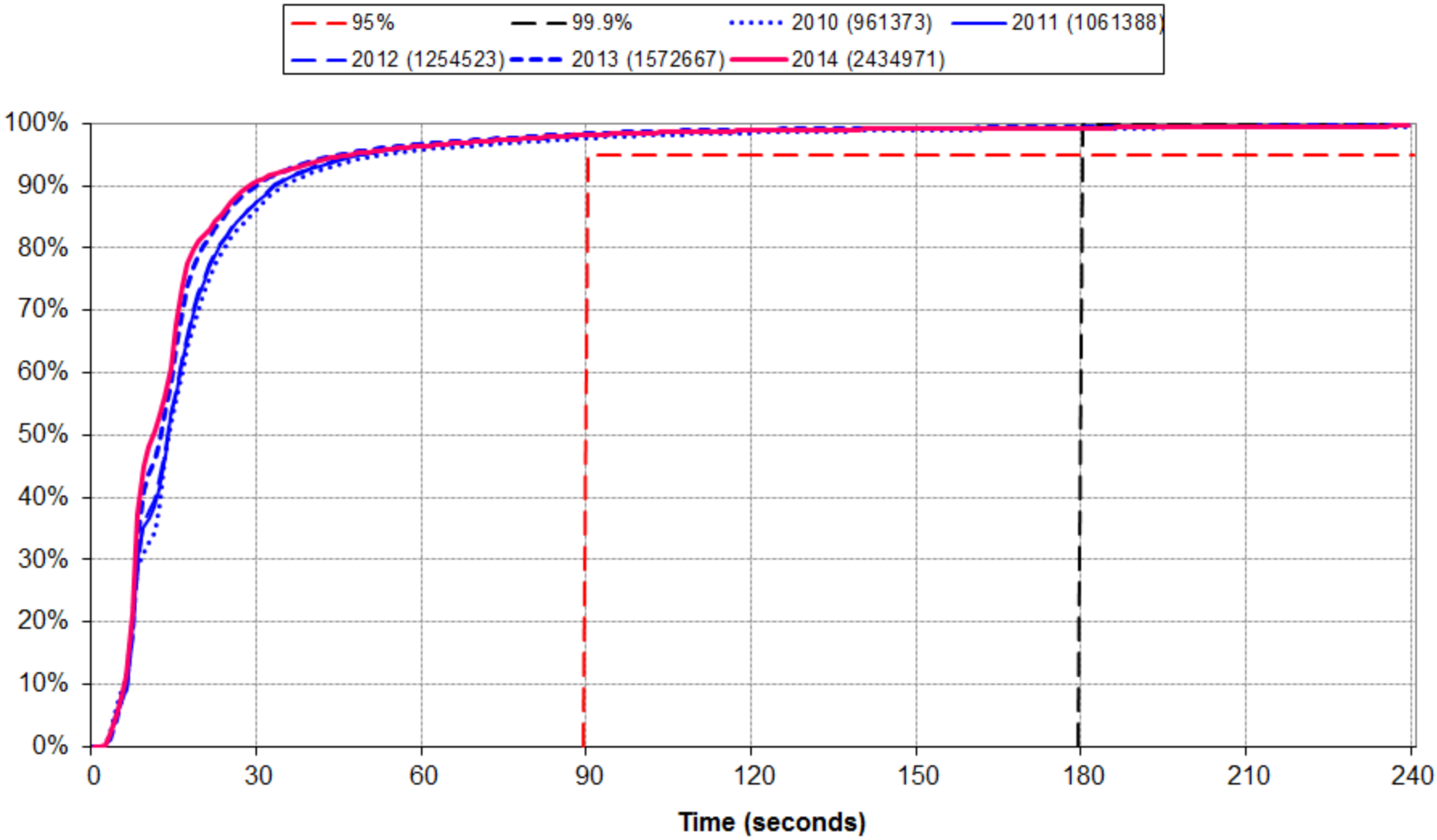
Actual Communication Technical Performance (ACTP)
New York FIR Aggregate



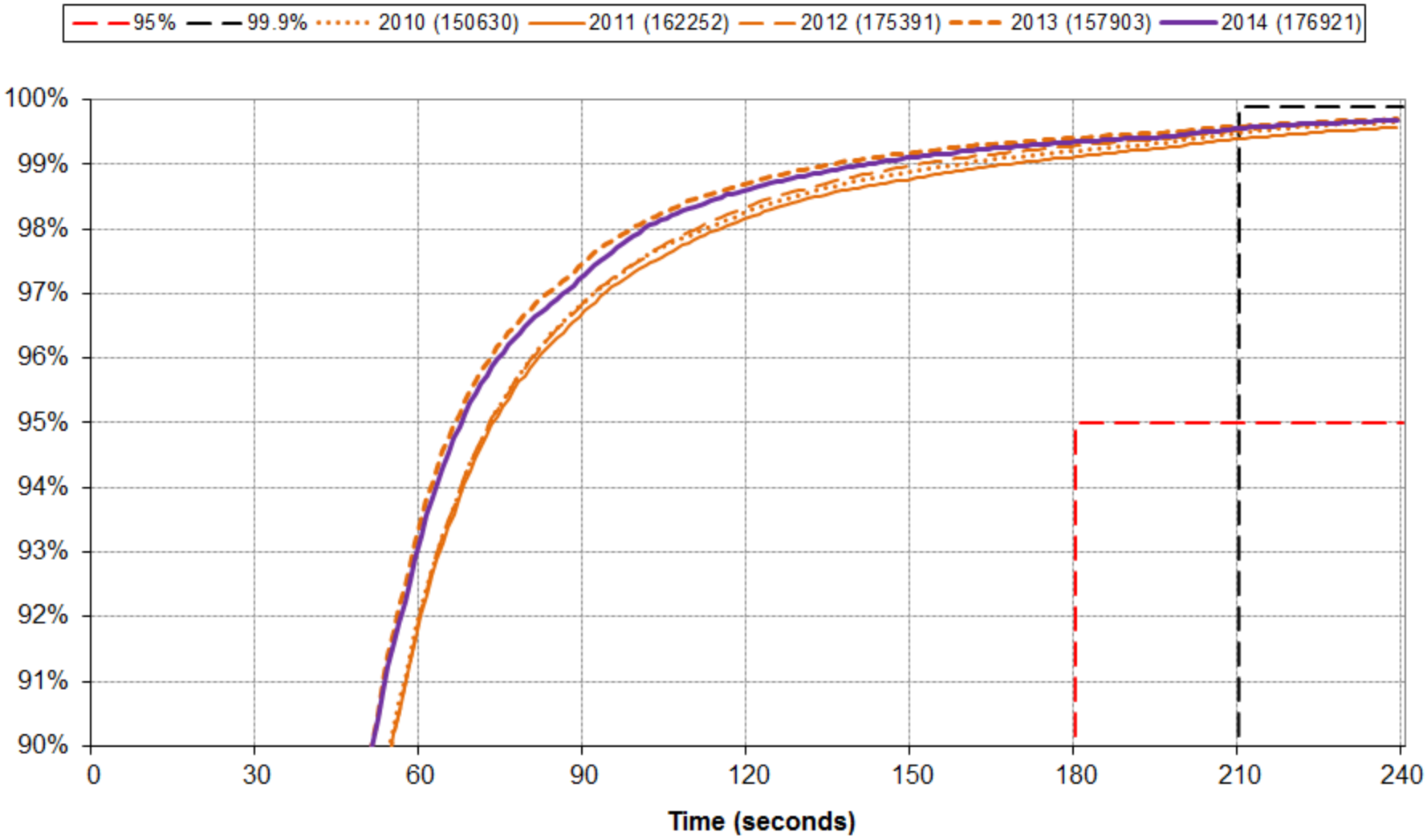
Actual Surveillance Performance (ASP)
New York FIR Aggregate



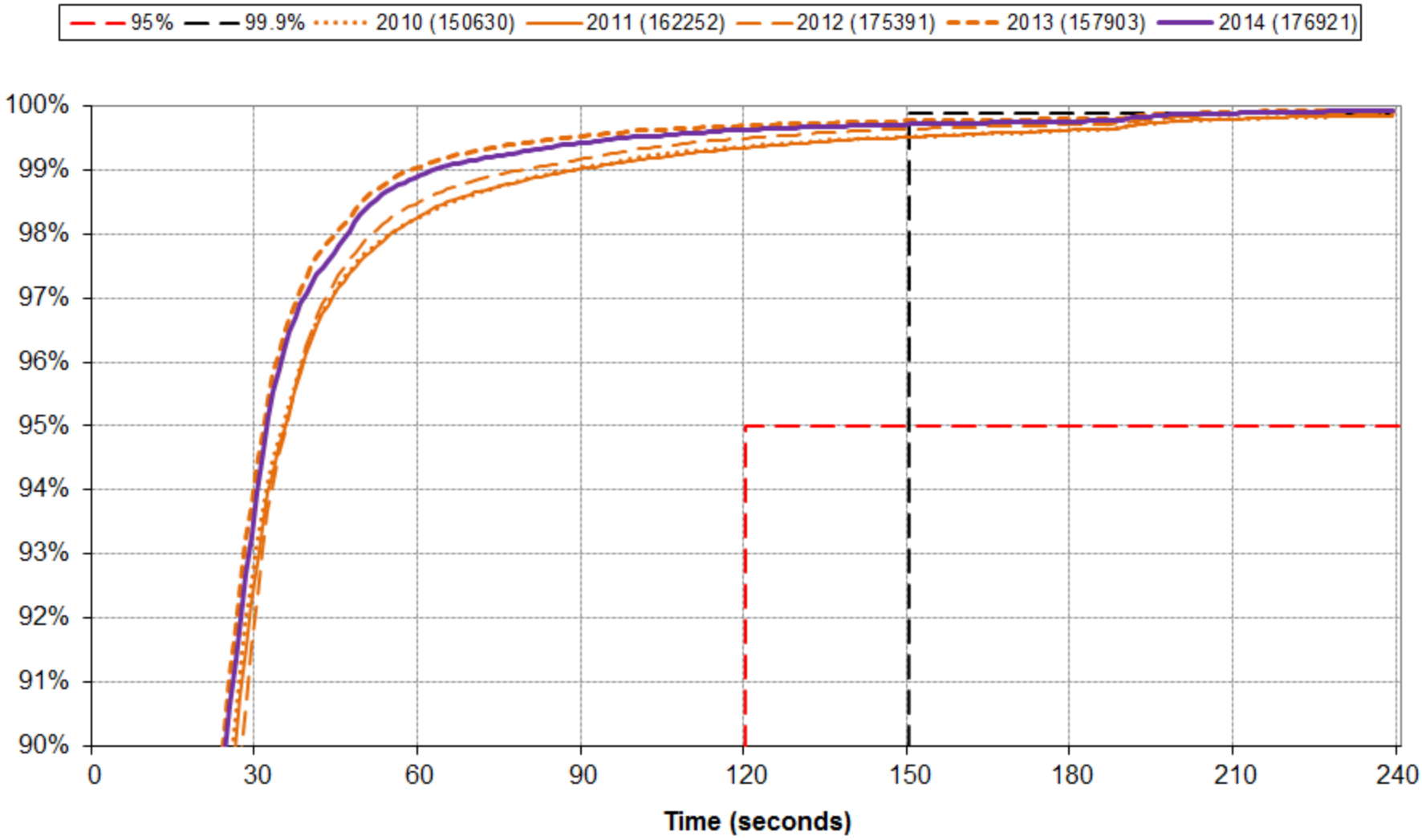
Actual Surveillance Performance (ASP)
New York FIR Aggregate



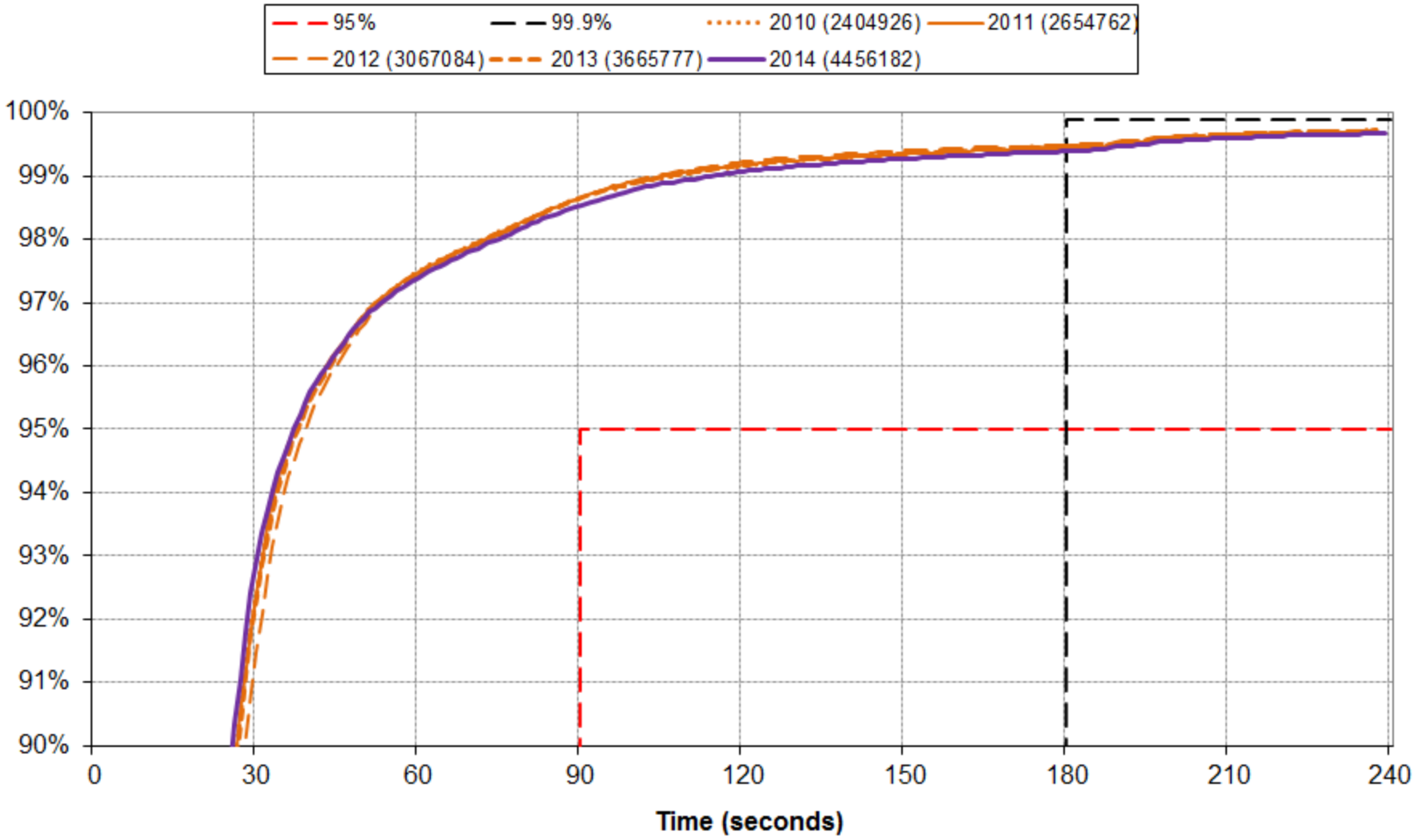
Actual Communication Performance (ACP)
Oakland FIR Aggregate



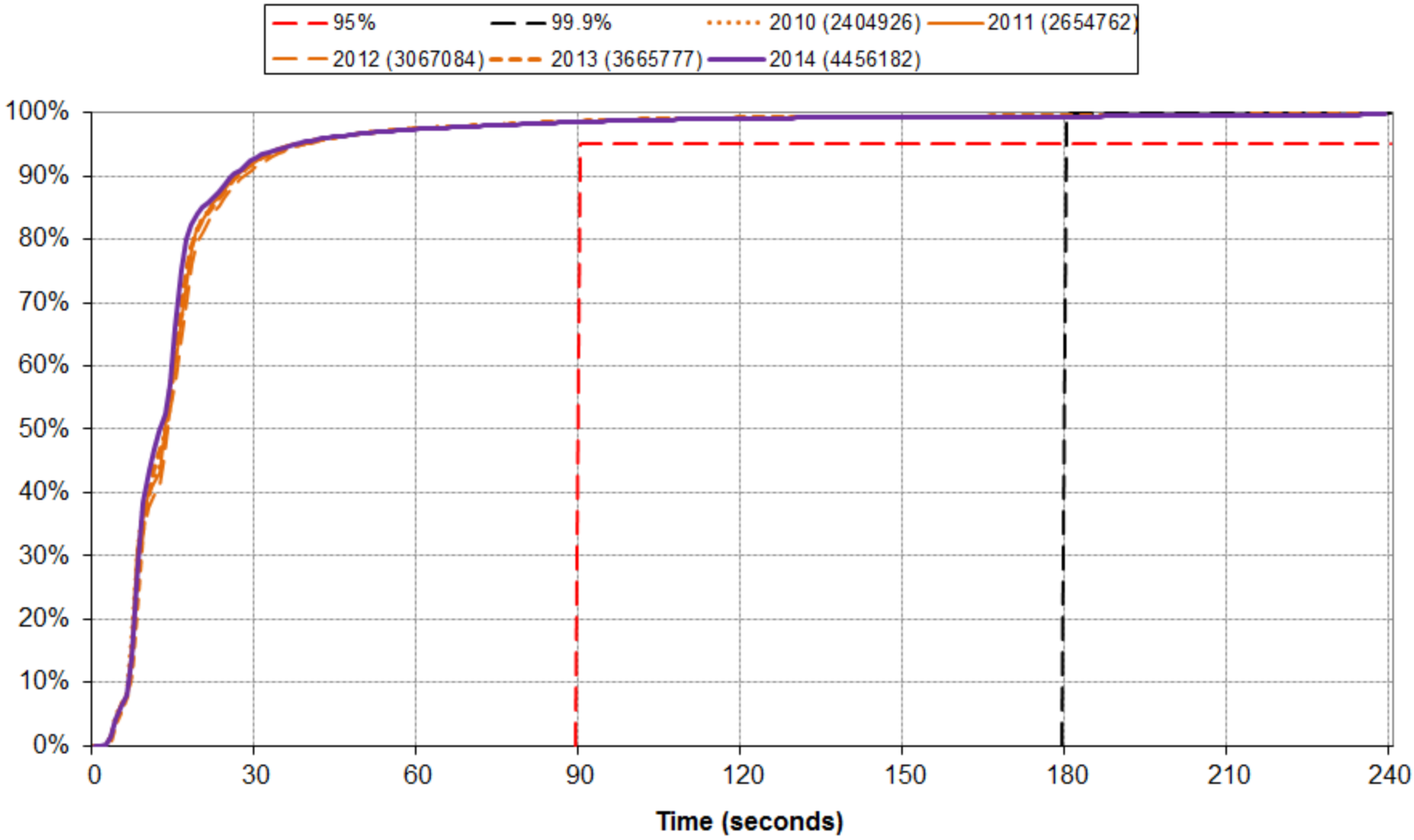
Actual Communication Technical Performance (ACTP)
Oakland FIR Aggregate



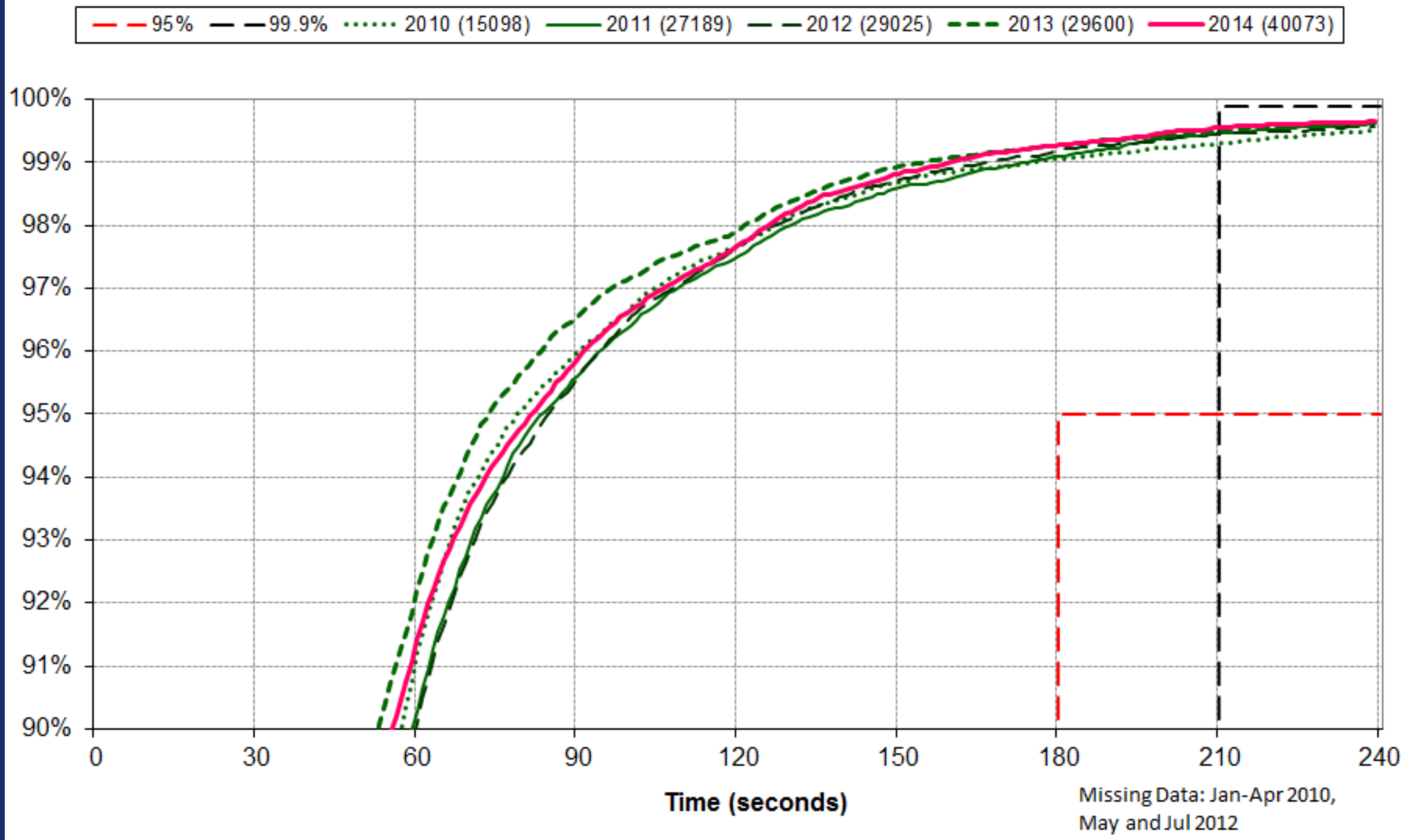
Actual Surveillance Performance (ASP)
Oakland FIR Aggregate



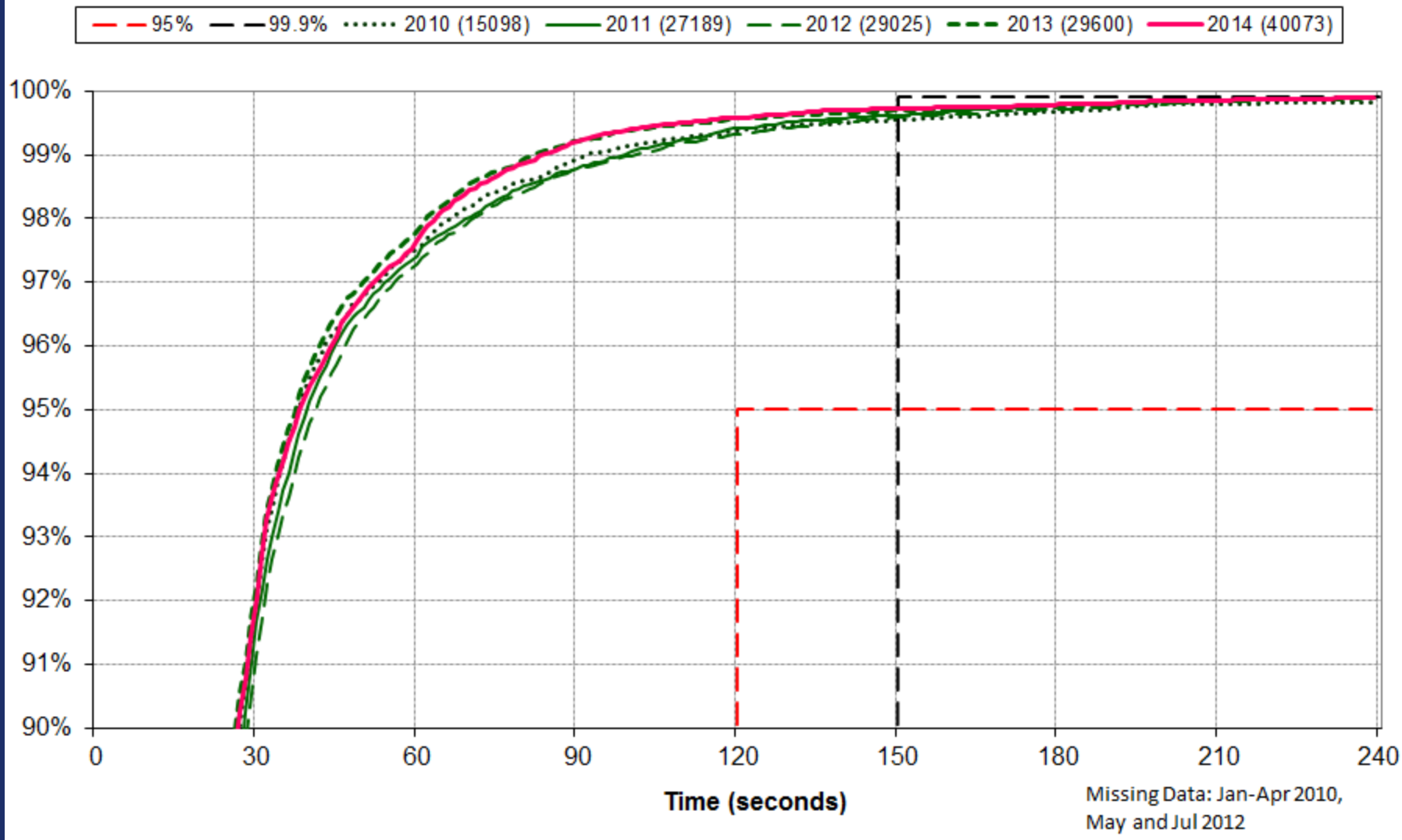
Actual Surveillance Performance (ASP)
Oakland FIR Aggregate



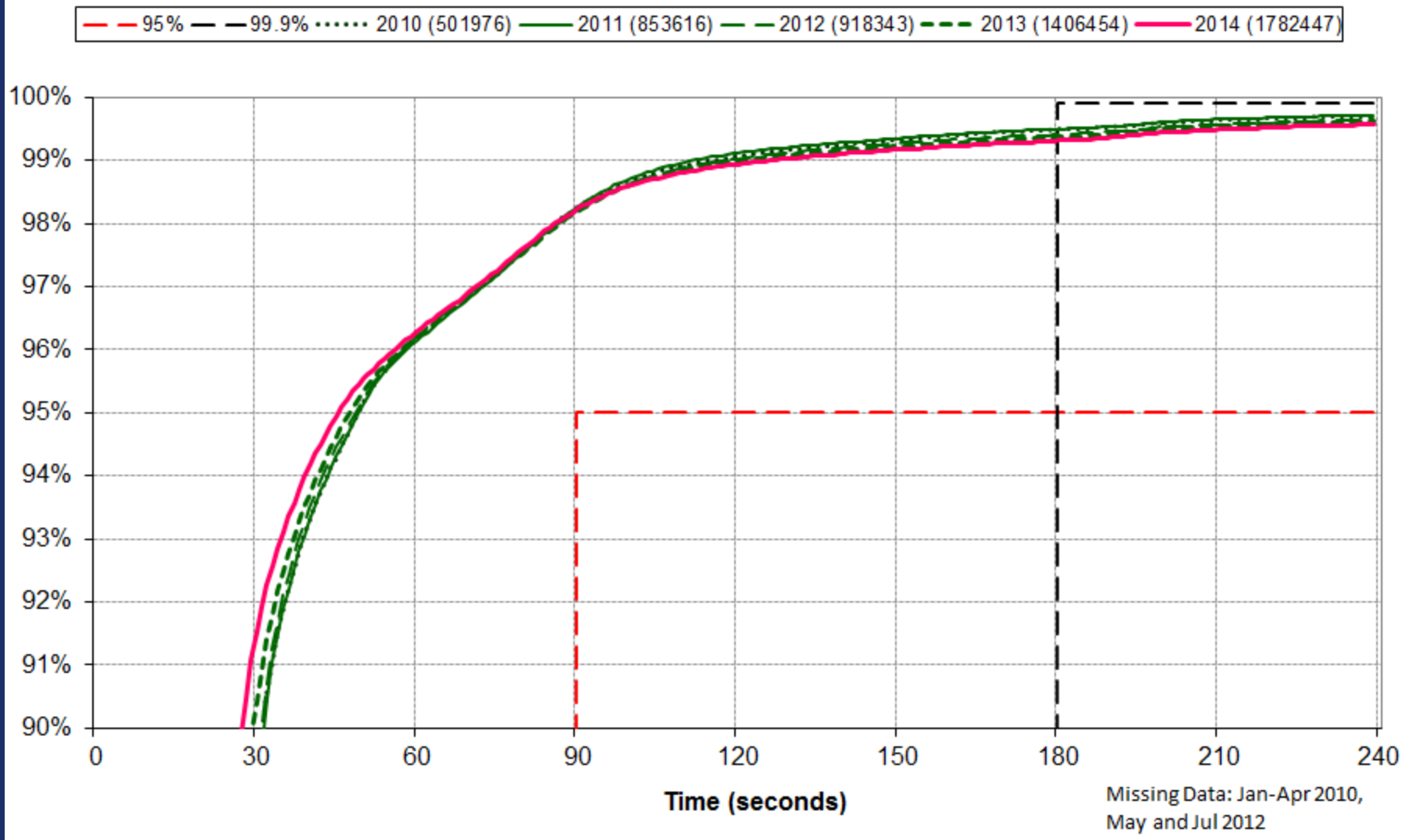
Actual Communication Performance (ACP)
Anchorage FIR Aggregate



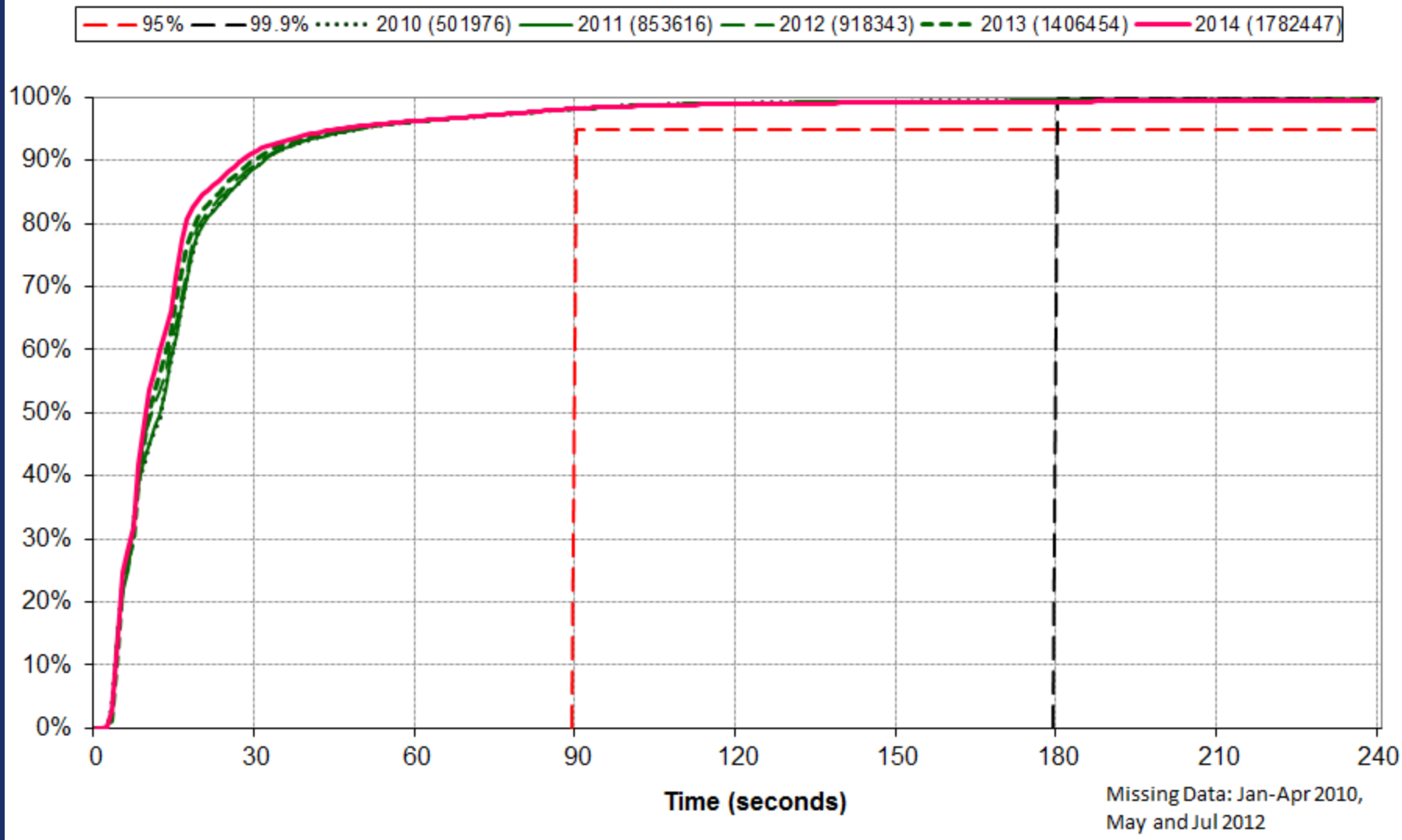
Actual Communication Technical Performance (ACTP)
Anchorage FIR Aggregate



Actual Surveillance Performance (ASP)
Anchorage FIR Aggregate



Actual Surveillance Performance (ASP)
Anchorage FIR Aggregate



Overview

- Analysis period: July – December 2014
- Analysis by FIR: Oakland, Anchorage, New York
- ASP → RSP180 criteria
- Station identifiers designate "path" taken by data link messages between aircraft and ATC
- "Paths" vary between the four constellations of satellites and between the two data link service providers

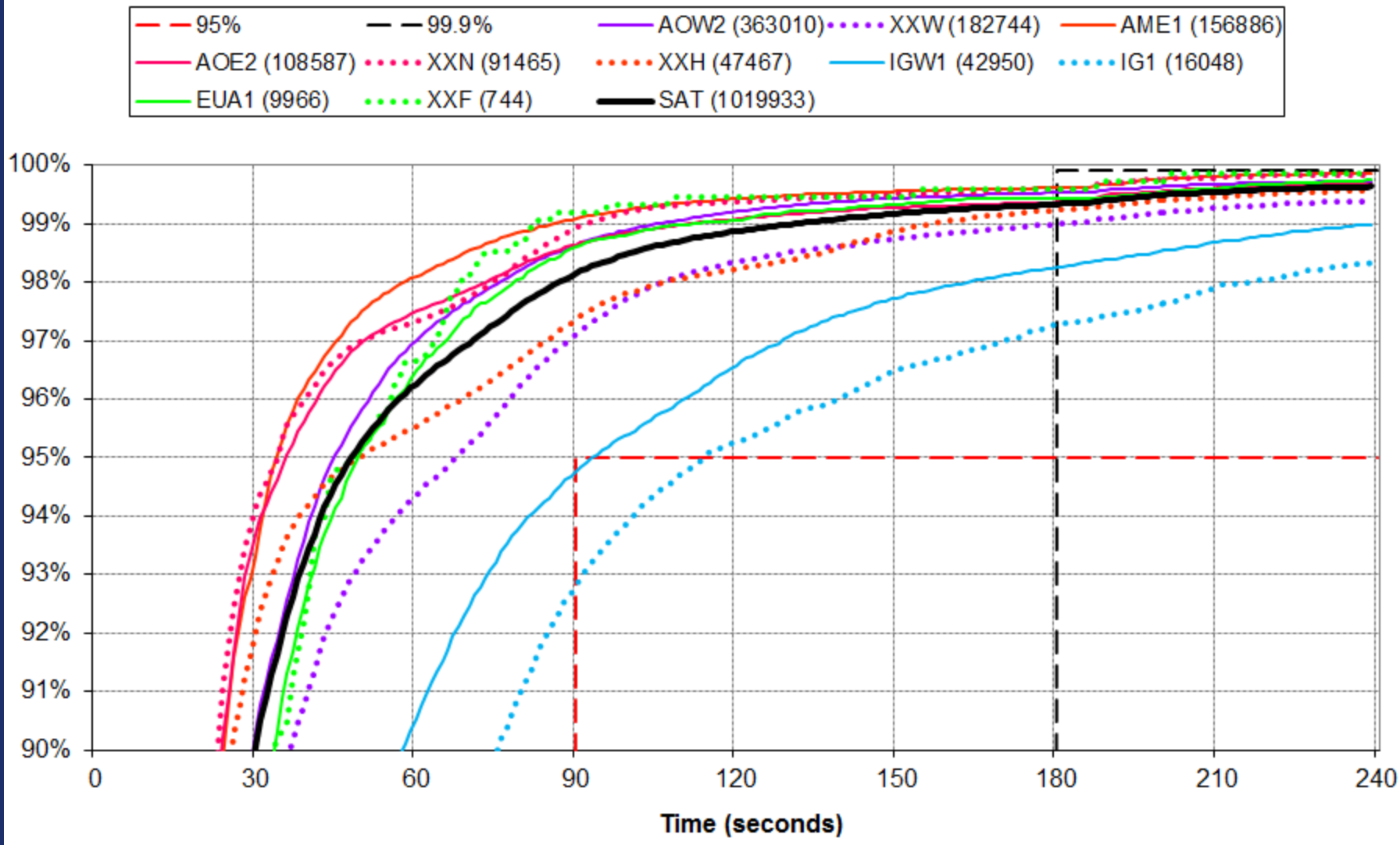
July – December 2014

ADS-C PERFORMANCE BY STATION IDENTIFIER

Station/Gateway Identifiers

GES LOCATION(S)	SATELLITE/ REGION	SITA	ARINC
Burum, Netherlands	Inmarsat I-3 AOR-E	AOE2	XXN
	Inmarsat I-3 AOR-W	AOW2	XXW
Perth, Australia	Inmarsat I-3 IOR	IOR2	XXI
	Inmarsat I-3 POR	POR1	XXP
Fucino, Italy	Inmarsat I-4 EMEA	EUA1	XXF
Paumalu, Hawaii, US	Inmarsat I-4 Americas	AME1	XXH
	Inmarsat I-4 Asia-Pac	APK1	XXA
Kobe and Hitachiota, Japan	MTSAT Japan	MTS1	--
Phoenix, Arizona, US	Iridium Global	IGW1	IG1

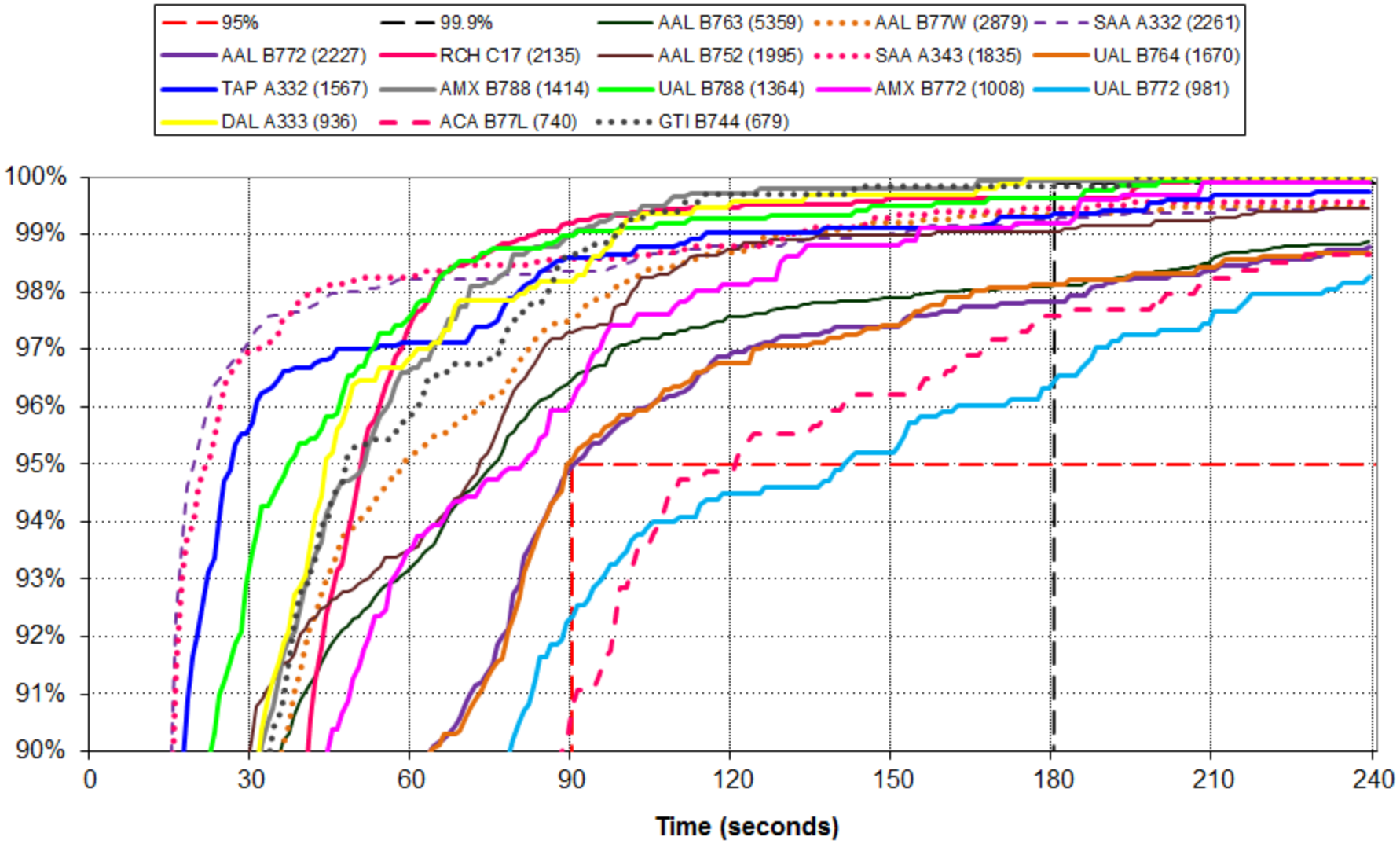
New York FIR - July to December 2014
Actual Surveillance Performance (ASP)



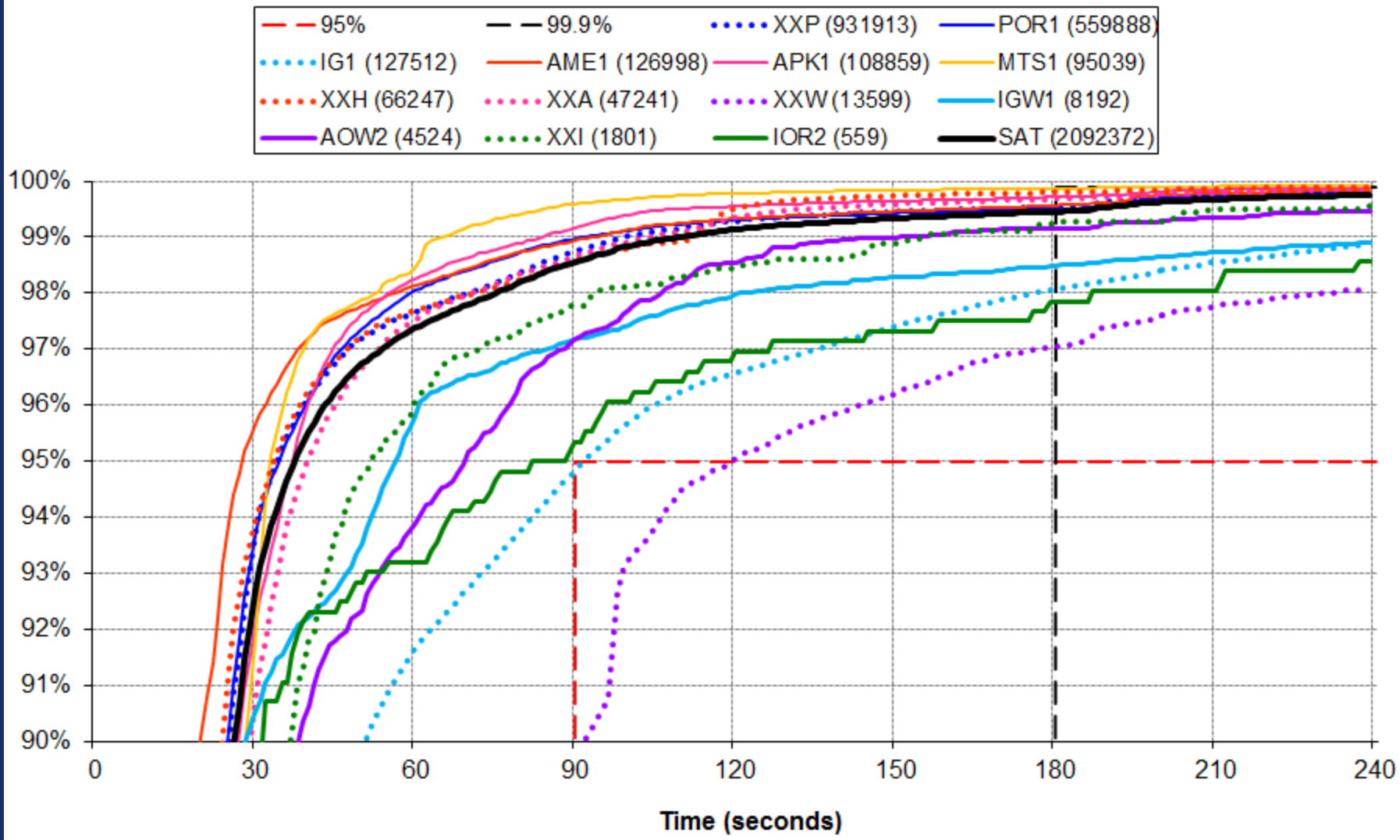
PR 1411-MM: Poor performance for AOR-W over I-3

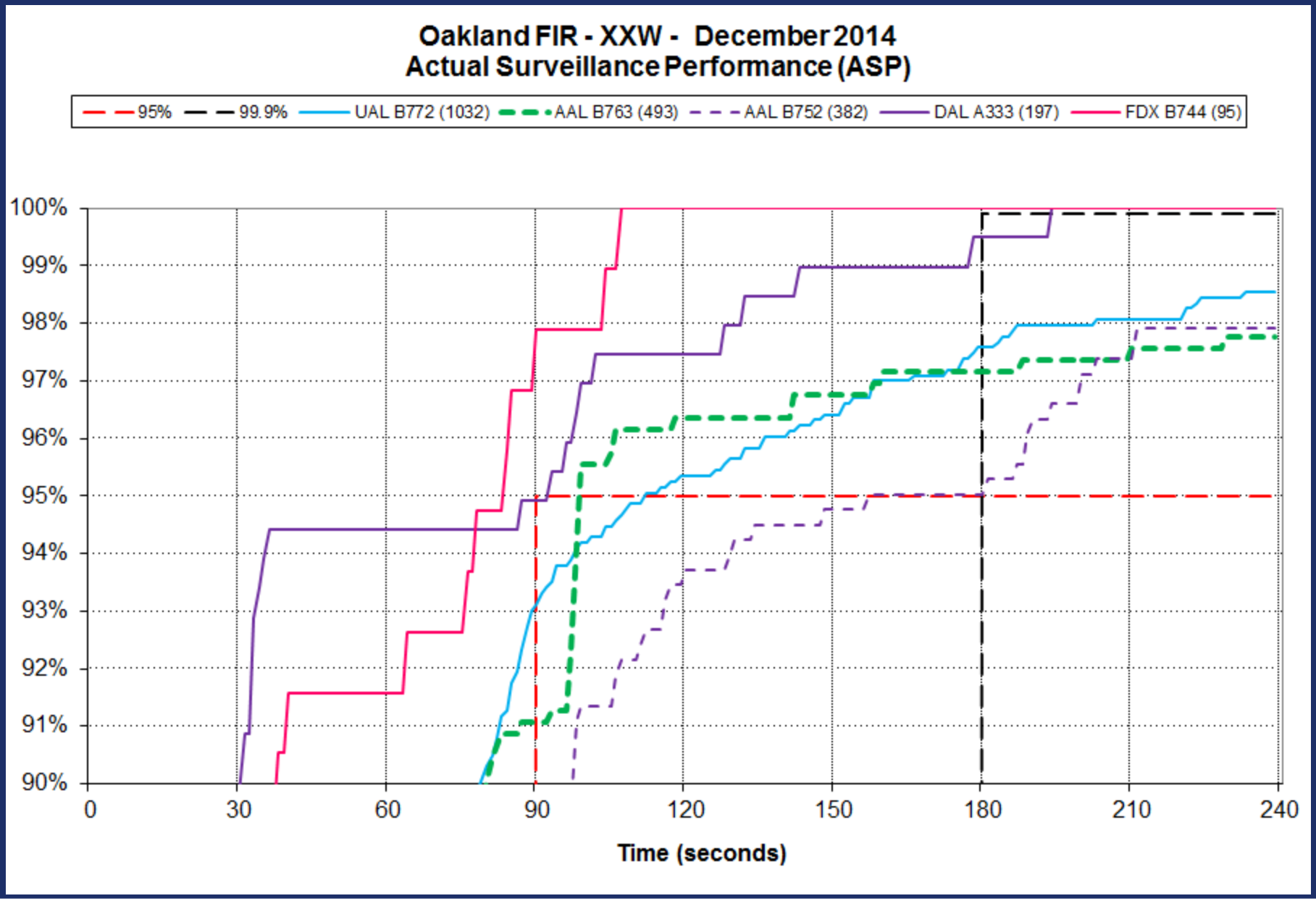
- Submitted PR to DLMA for performance over XXW – 11/8/2013
- Inmarsat investigation revealed it is not an Inmarsat issue
- Suggested the issue could be investigated as an issue with operator/aircraft
  - ASP chart on next slide → December 2014
- Still under investigation

New York FIR - XXW - December 2014
Actual Surveillance Performance (ASP)

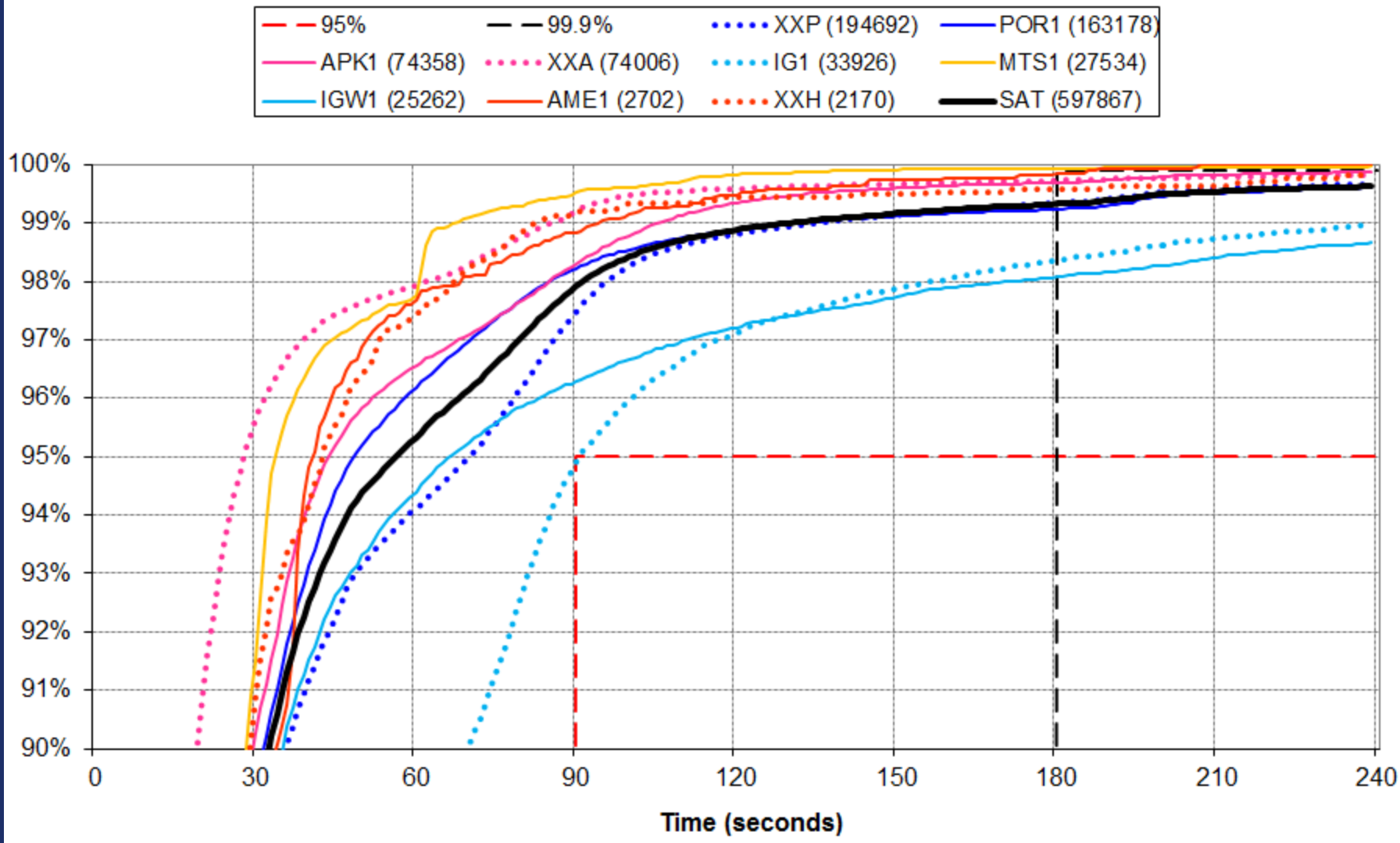


Oakland FIR - July to December 2014
Actual Surveillance Performance (ASP)




Oakland FIR - XXW - December 2014
Actual Surveillance Performance (ASP)
95%
99.9%
UAL B772 (1032)
AAL B763 (493)
AAL B752 (382)
DAL A333 (197)
FDX B744 (95)
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
0
30
60
90
120
150
180
210
240
Time (seconds)

Anchorage FIR - July to December 2014
Actual Surveillance Performance (ASP)

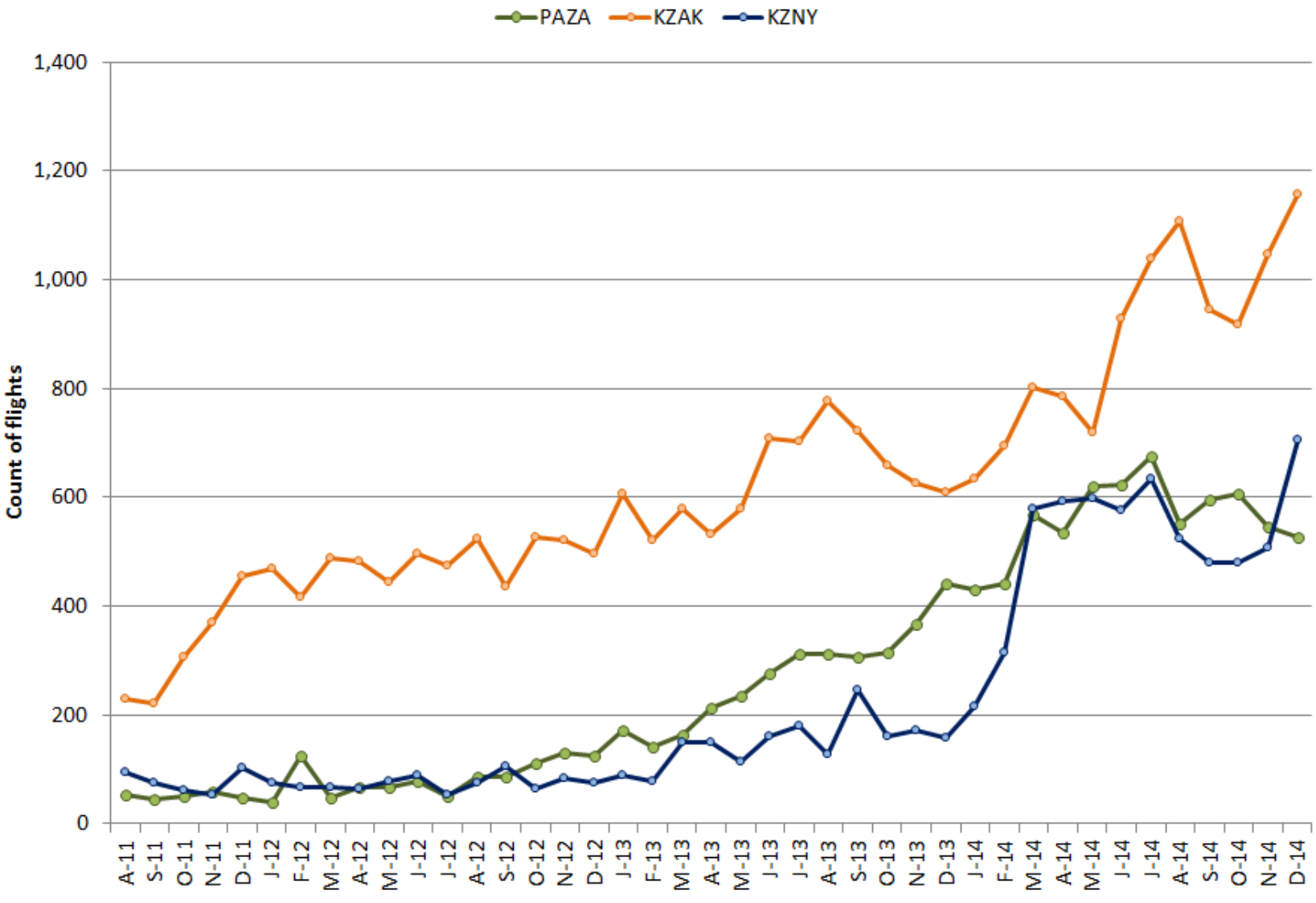


Usage Trends and
ADS-C Performance by Operator/Aircraft Type

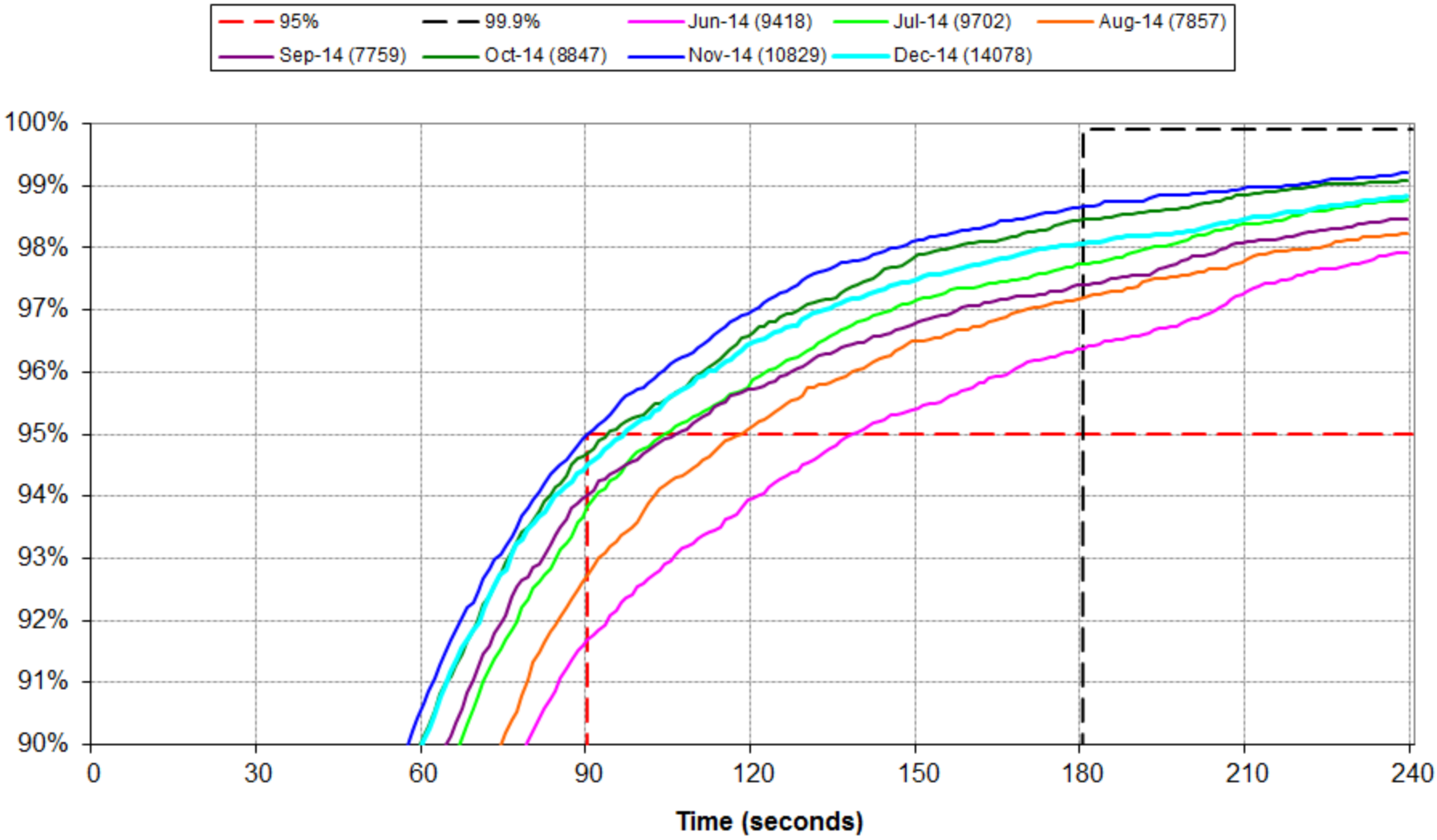
FANS OVER IRIDIUM (FOI)

Iridium Usage

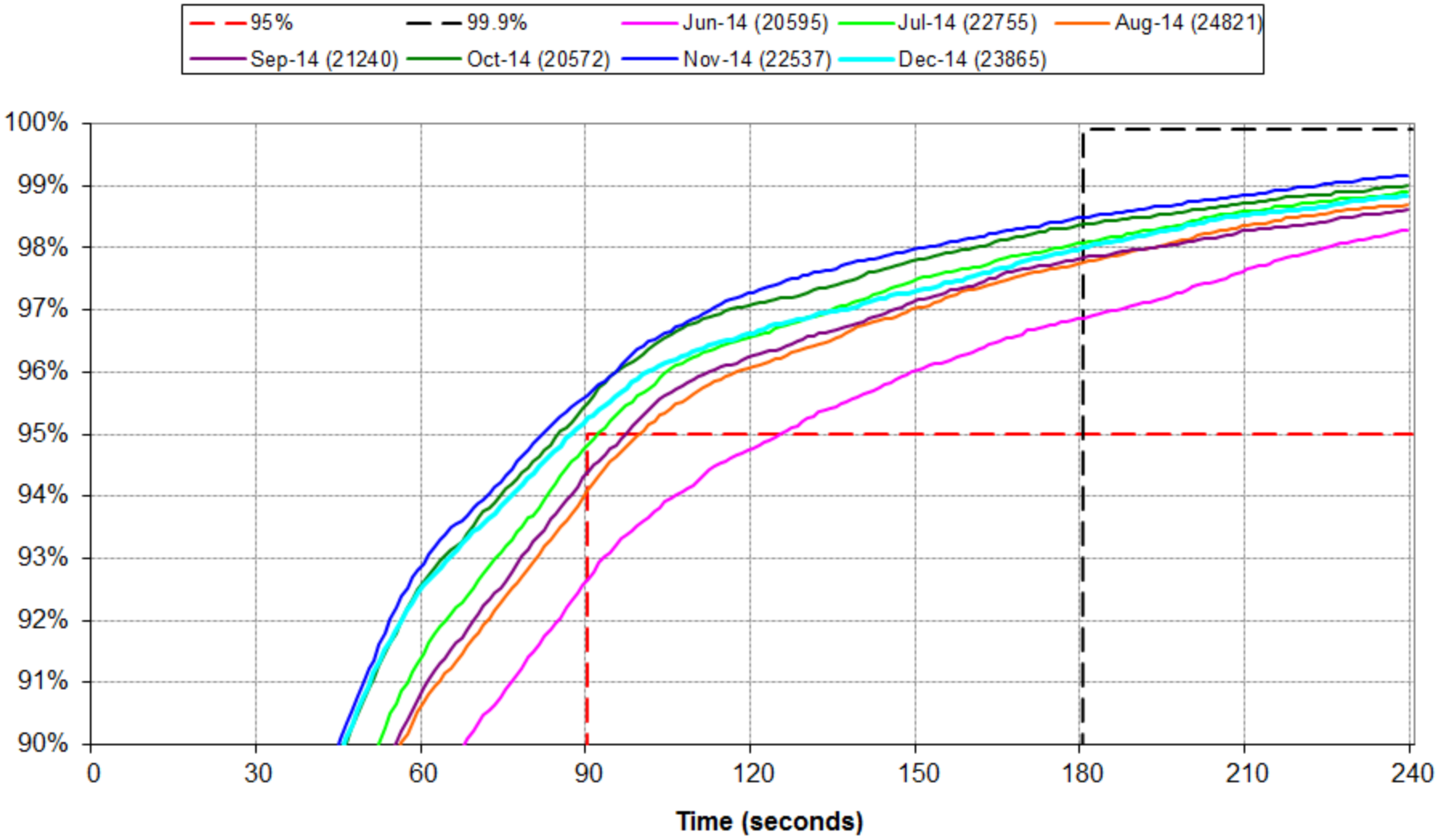
Month	Jul-13	Dec-13	Jul-14	Dec-14
# Airframes	124	167	214	227



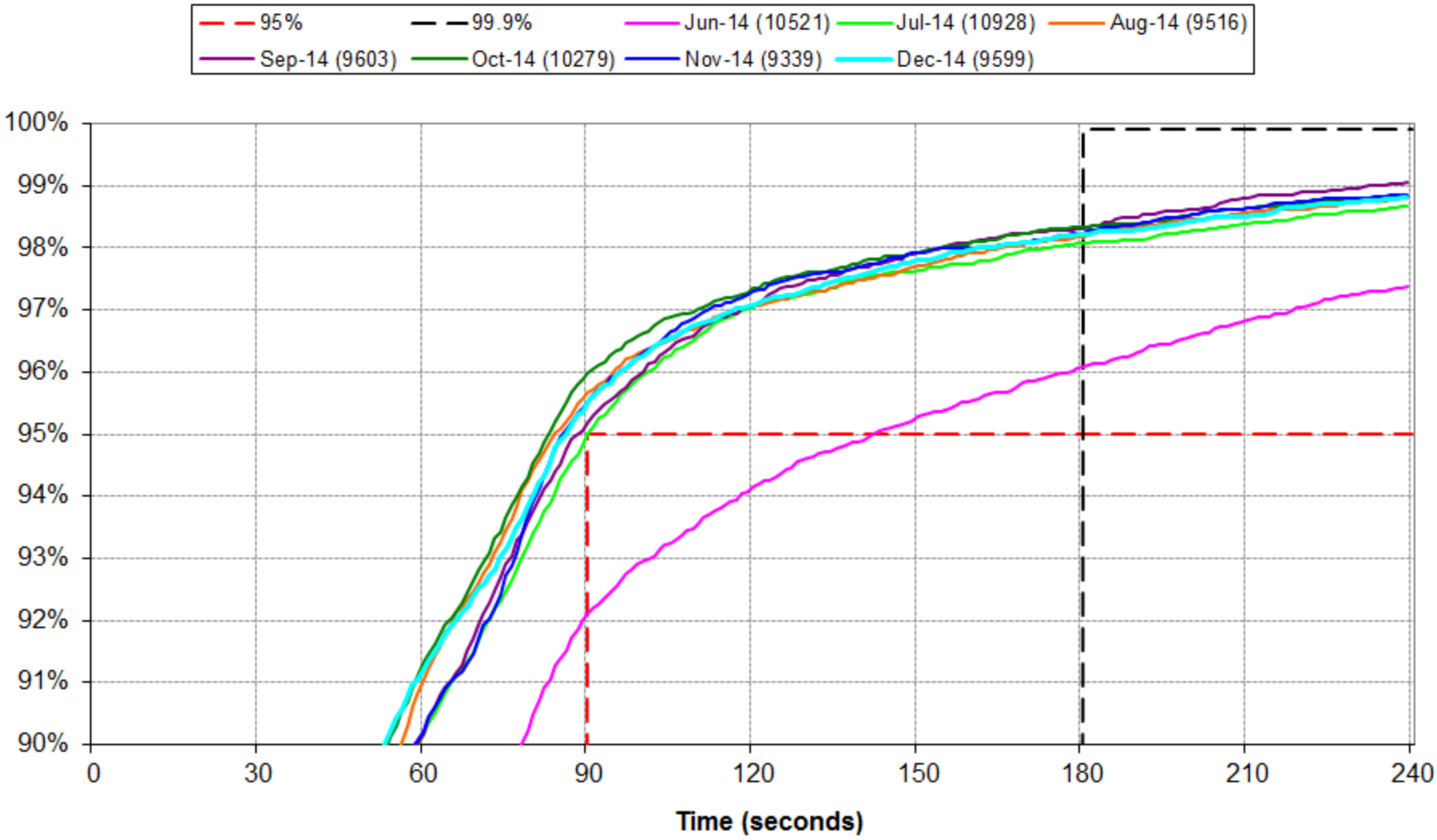
New York FIR - Iridium - June to December 2014
Actual Surveillance Performance (ASP)



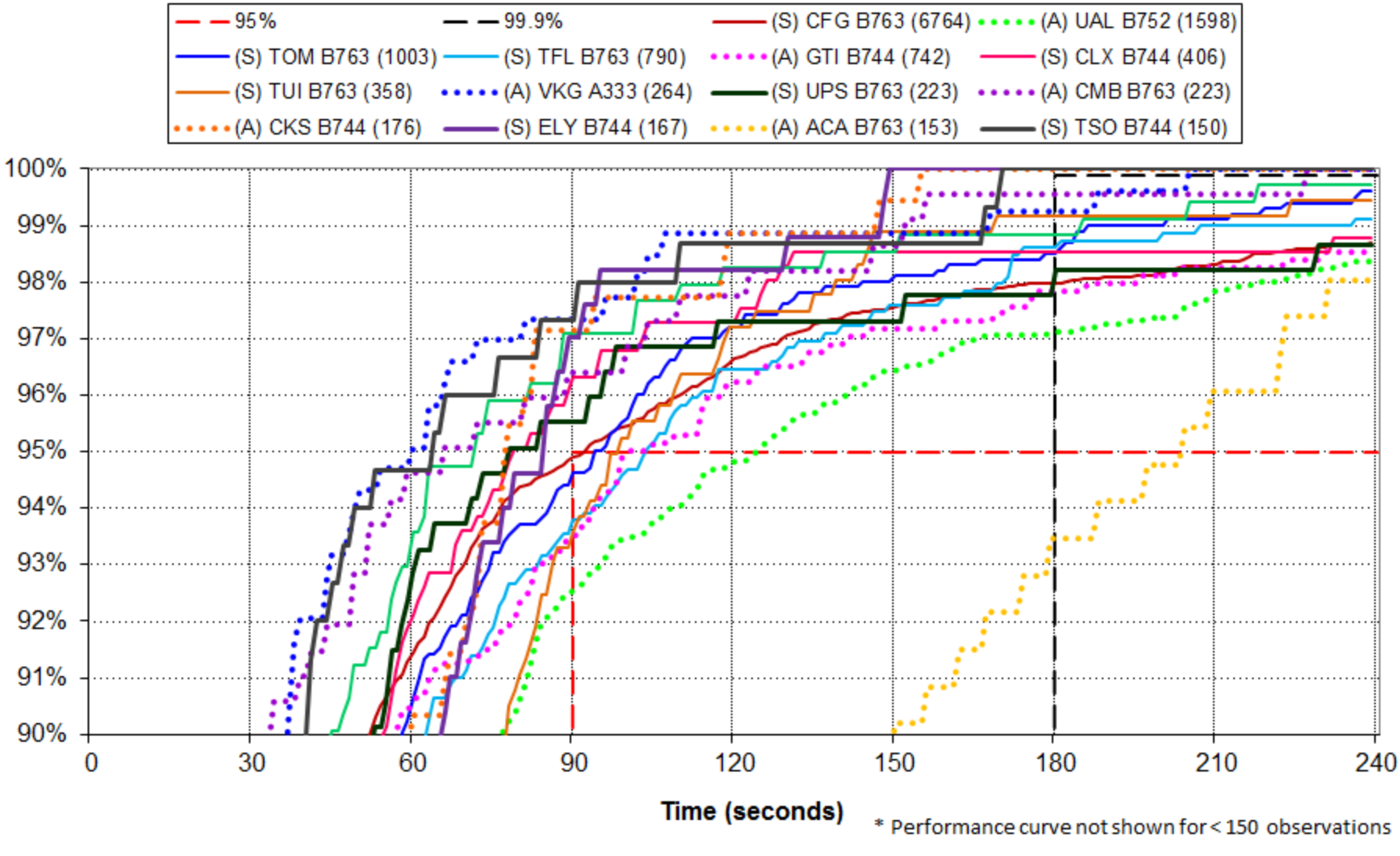
Oakland FIR - Iridium - June to December 2014
Actual Surveillance Performance (ASP)



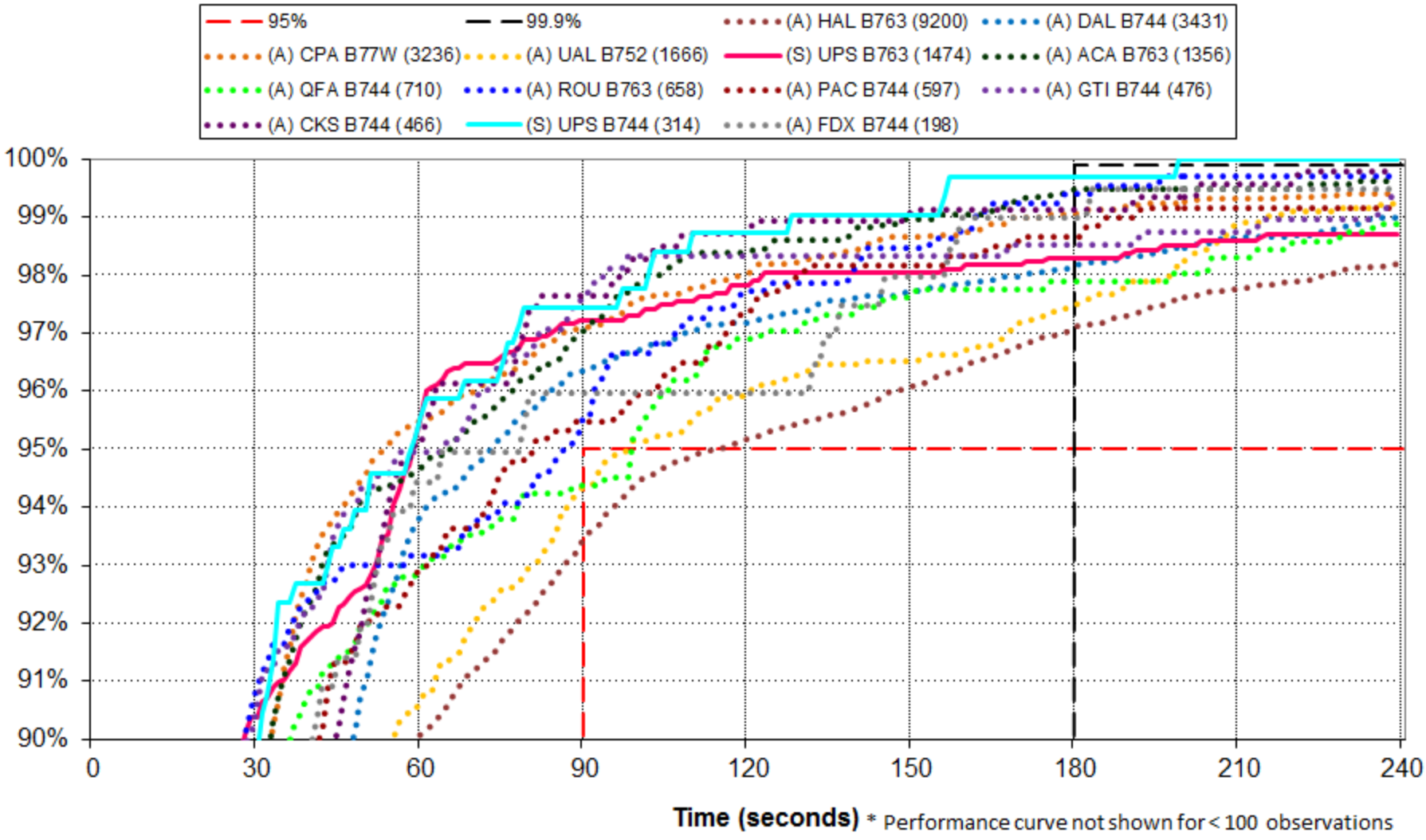
Anchorage FIR - Iridium - June to December 2014
Actual Surveillance Performance (ASP)



New York FIR - Iridium - December 2014
Actual Surveillance Performance (ASP)

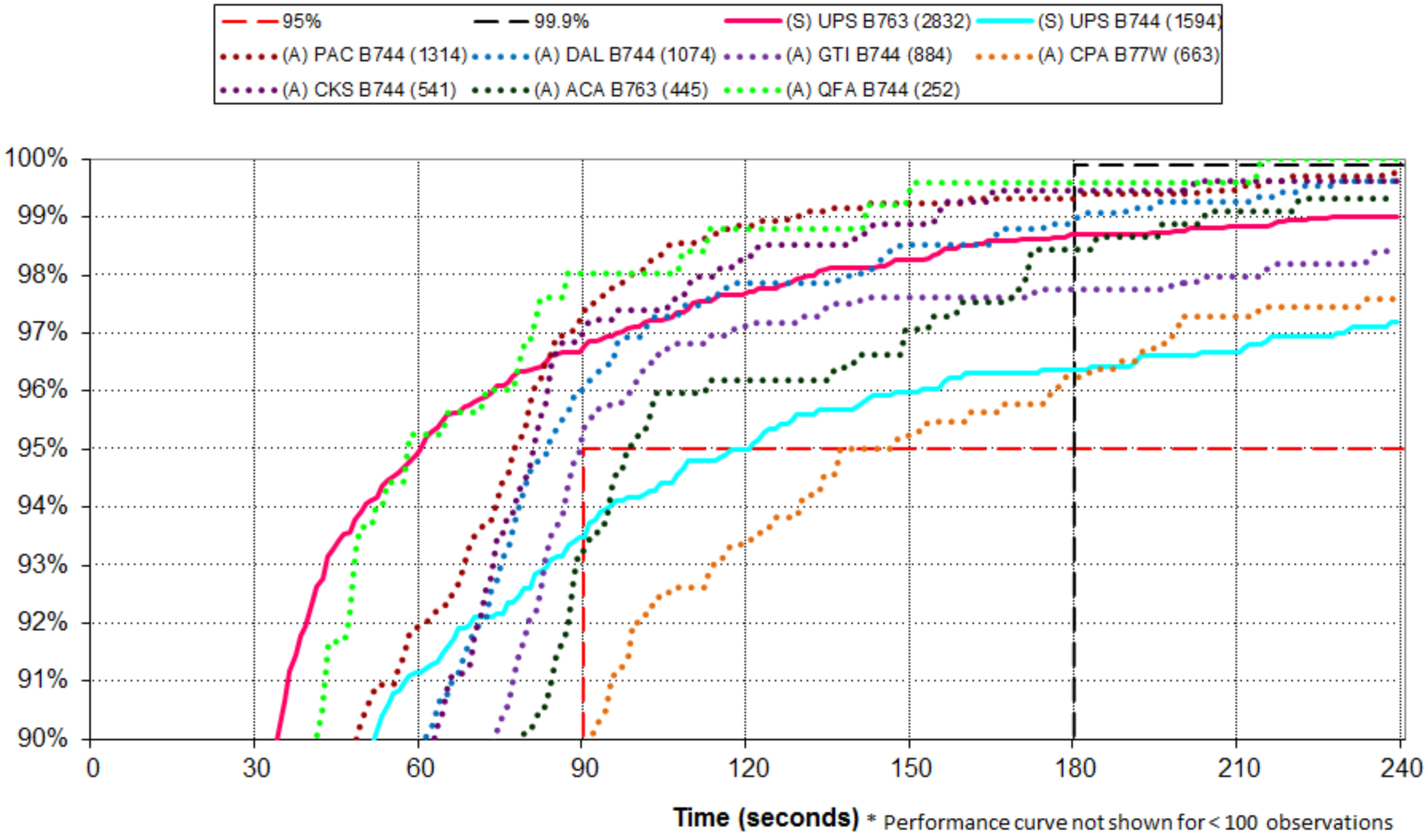


Oakland FIR - Iridium - December 2014
Actual Surveillance Performance (ASP)



* Performance curve not shown for < 100 observations

Anchorage FIR - Iridium - December 2014
Actual Surveillance Performance (ASP)



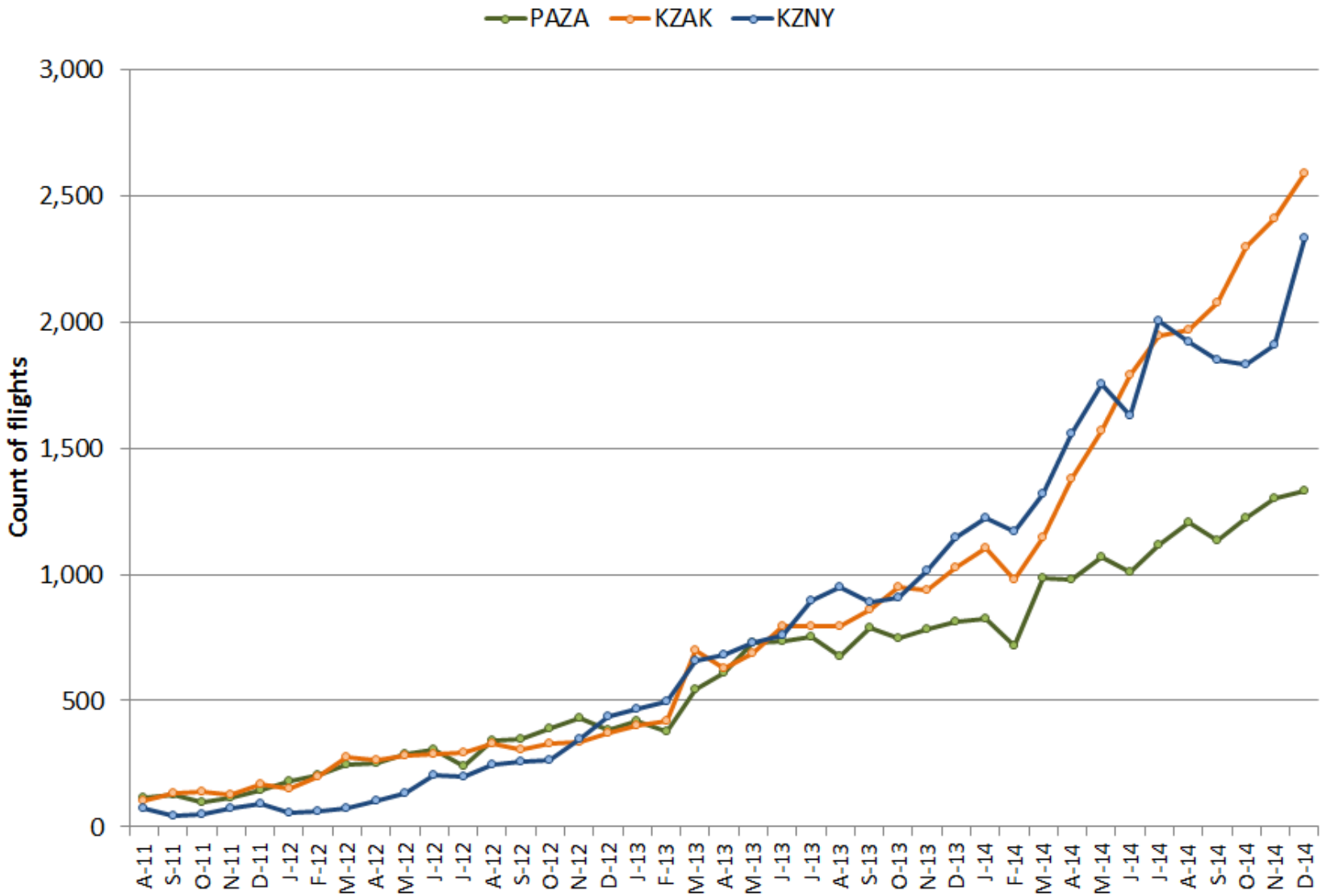
* Performance curve not shown for < 100 observations

Usage Trends and PR Update

FANS OVER INMARSAT I-4

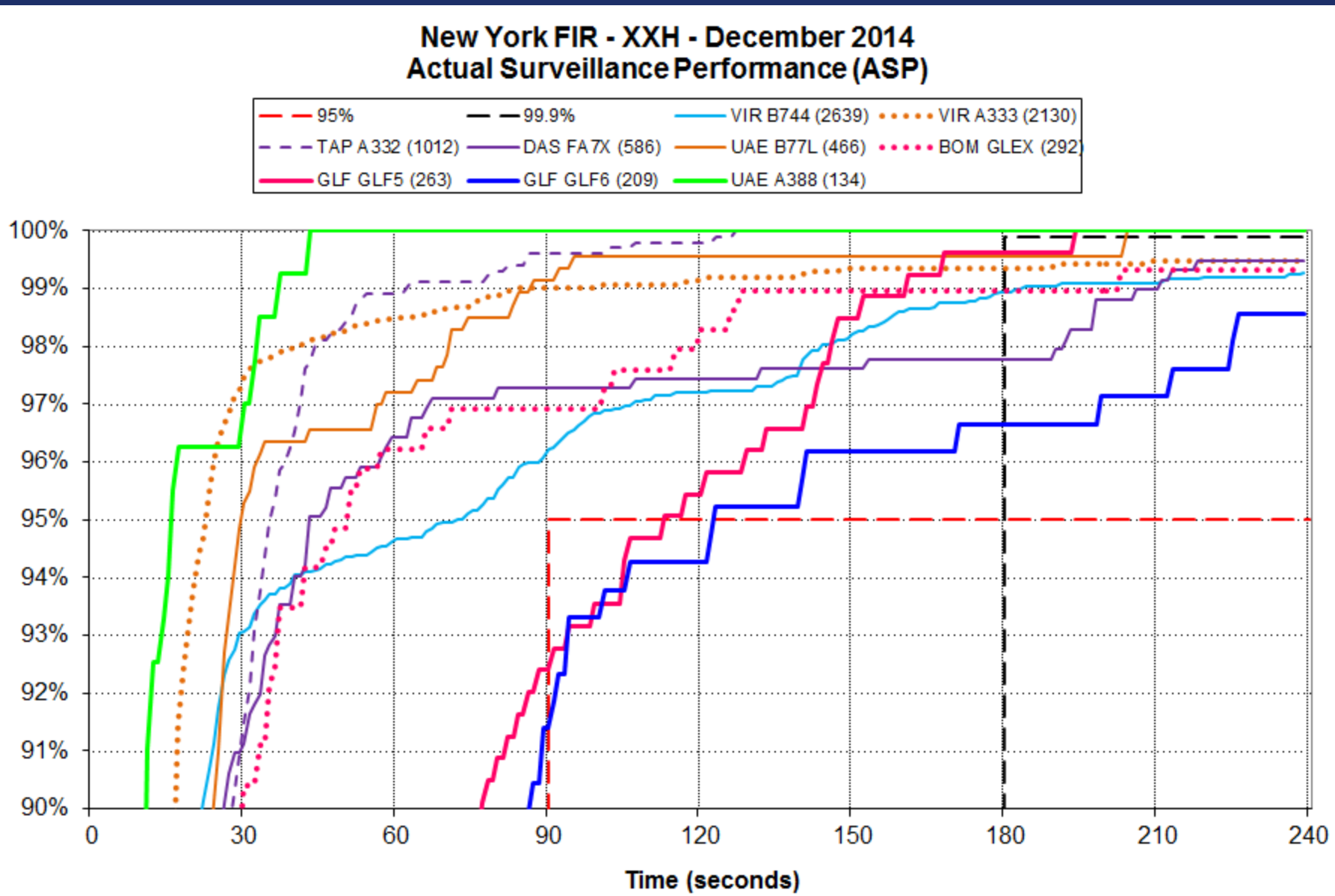
Inmarsat over I-4 Usage

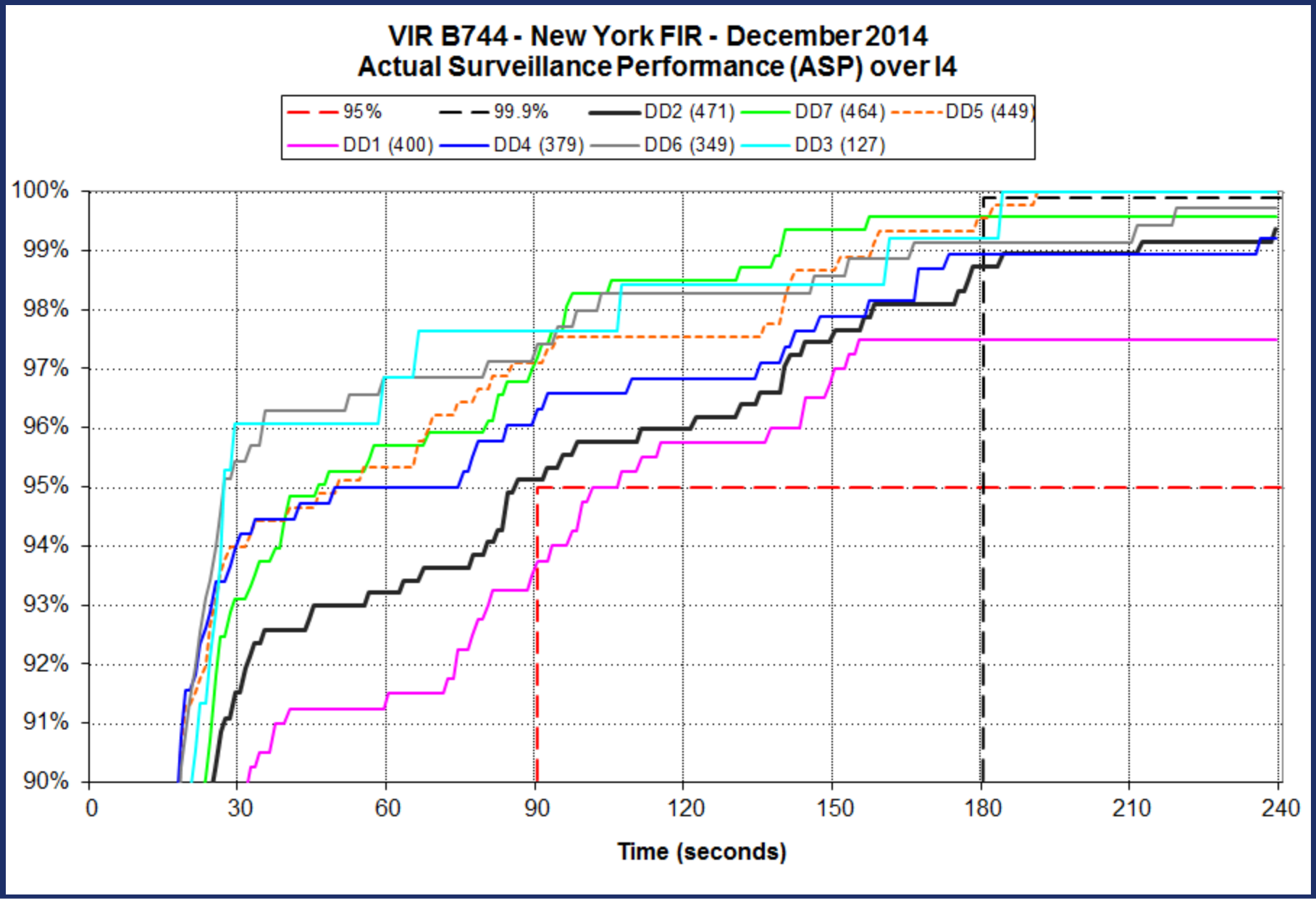
Month	13-Jul	13-Dec	14-Jul	14-Dec
# Airframes	269	367	556	705



PR 1508-MM: Poor performance for AOR-E over I-4

- Submitted PR to DLMA for performance over XXH – 2/5/2014
- Variation in performance by operator/aircraft type
  - ASP chart on next slide → December 2014
- VIR B744 performance improved but still low
  - ASP chart for December 2014 by airframe shows performance improved for part of fleet


New York FIR - XXH - December 2014
Actual Surveillance Performance (ASP)
95%
99.9%
VIR B744 (2639)
VIR A333 (2130)
TAP A332 (1012)
DAS FA7X (586)
UAE B77L (466)
BOM GLEX (292)
GLF GLF5 (263)
GLF GLF6 (209)
UAE A388 (134)
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
0
30
60
90
120
150
180
210
240
Time (seconds)


VIR B744 - New York FIR - December 2014
Actual Surveillance Performance (ASP) over I4
95%
99.9%
DD2 (471)
DD7 (464)
DD5 (449)
DD1 (400)
DD4 (379)
DD6 (349)
DD3 (127)
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
0
30
60
90
120
150
180
210
240
Time (seconds)

Overview

- Analysis period: July to December 2014
- Analysis by FIR: New York, Oakland, Anchorage,
- All media types combined
- RCP240 and RSP180 criteria
- Operators ordered in summary tables by descending count of ADS-C downlink messages
- Green highlights where criteria is met
- Red highlights where criteria is not met
- Yellow highlights where 99.9% performance is 99.0% - 99.9%

July – December 2014

DATA LINK PERFORMANCE BY OPERATOR

Summary of Performance by Operator New York FIR

- There were 96 operators with at least 100 ADS-C messages during this 6-month period
- Summary of how many operators meet criteria:

Criteria	ASP	ACTP	ACP	PORT
95% within 90 sec (60 sec for PORT)	88	93	90	63
99.9% within 180 sec	11	67	42	
99.0% - 99.9% within 180 sec	67	21	33	
Less than 99.0% within 180 sec	18	5	18	

Observed Performance by Operator New York FIR

July – December 2014

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
R	148,467	11.5%	97.7%	99.0%	3,003	6.6%	99.6%	99.7%	99.0%	99.3%	96.9%
AA	120,612	9.4%	99.2%	99.8%	5,557	12.1%	99.9%	100.0%	99.7%	99.8%	97.8%
L	108,020	8.4%	98.4%	99.5%	3,373	7.4%	99.5%	99.7%	98.8%	99.1%	96.5%
A	74,607	5.8%	96.1%	98.4%	1,942	4.2%	98.9%	99.3%	98.3%	98.7%	96.8%
BB	63,851	5.0%	99.2%	99.5%	3,424	7.5%	99.7%	99.7%	99.3%	99.5%	97.9%
II	62,662	4.9%	99.4%	99.8%	2,188	4.8%	99.9%	100.0%	99.3%	99.4%	97.1%
FF	60,264	4.7%	97.9%	99.4%	3,317	7.2%	99.6%	99.6%	99.1%	99.4%	97.4%
GG	48,648	3.8%	99.6%	99.8%	1,454	3.2%	99.9%	99.9%	99.2%	99.5%	96.9%
DD	42,901	3.3%	96.4%	99.0%	2,376	5.2%	99.7%	99.9%	98.7%	99.1%	94.7%
HH	38,428	3.0%	99.2%	99.5%	1,168	2.6%	99.8%	99.9%	99.6%	99.7%	96.0%
EE	36,659	2.9%	99.2%	99.6%	2,274	5.0%	99.9%	99.9%	99.3%	99.5%	96.1%
BH	35,812	2.8%	95.6%	98.4%	1,091	2.4%	99.1%	99.5%	97.9%	99.0%	95.4%
PP	28,575	2.2%	99.3%	99.8%	785	1.7%	99.8%	100.0%	98.9%	99.4%	96.3%
JJ	27,943	2.2%	97.6%	99.4%	401	0.9%	99.8%	99.8%	98.8%	99.0%	95.5%
SS	27,712	2.2%	98.4%	99.5%	771	1.7%	99.6%	99.6%	97.9%	98.4%	92.5%
CC	26,920	2.1%	98.0%	99.0%	732	1.6%	99.7%	99.7%	99.6%	99.6%	98.0%
AQ	24,905	1.9%	98.0%	99.1%	1,066	2.3%	99.9%	99.9%	99.4%	99.5%	97.8%
MM	24,742	1.9%	99.4%	99.7%	852	1.9%	99.9%	99.9%	98.9%	99.4%	95.2%
WW	22,122	1.7%	98.3%	99.6%	495	1.1%	99.6%	99.6%	99.0%	99.0%	96.6%
KKKK	20,933	1.6%	99.7%	99.8%	1,613	3.5%	99.8%	99.9%	99.8%	99.8%	98.0%
ZZZZ	15,758	1.2%	98.8%	99.5%	424	0.9%	100.0%	100.0%	98.1%	98.1%	91.3%
ZZ	14,738	1.1%	99.3%	99.6%	639	1.4%	99.8%	99.8%	99.7%	99.7%	97.5%

Observed Performance by Operator New York FIR

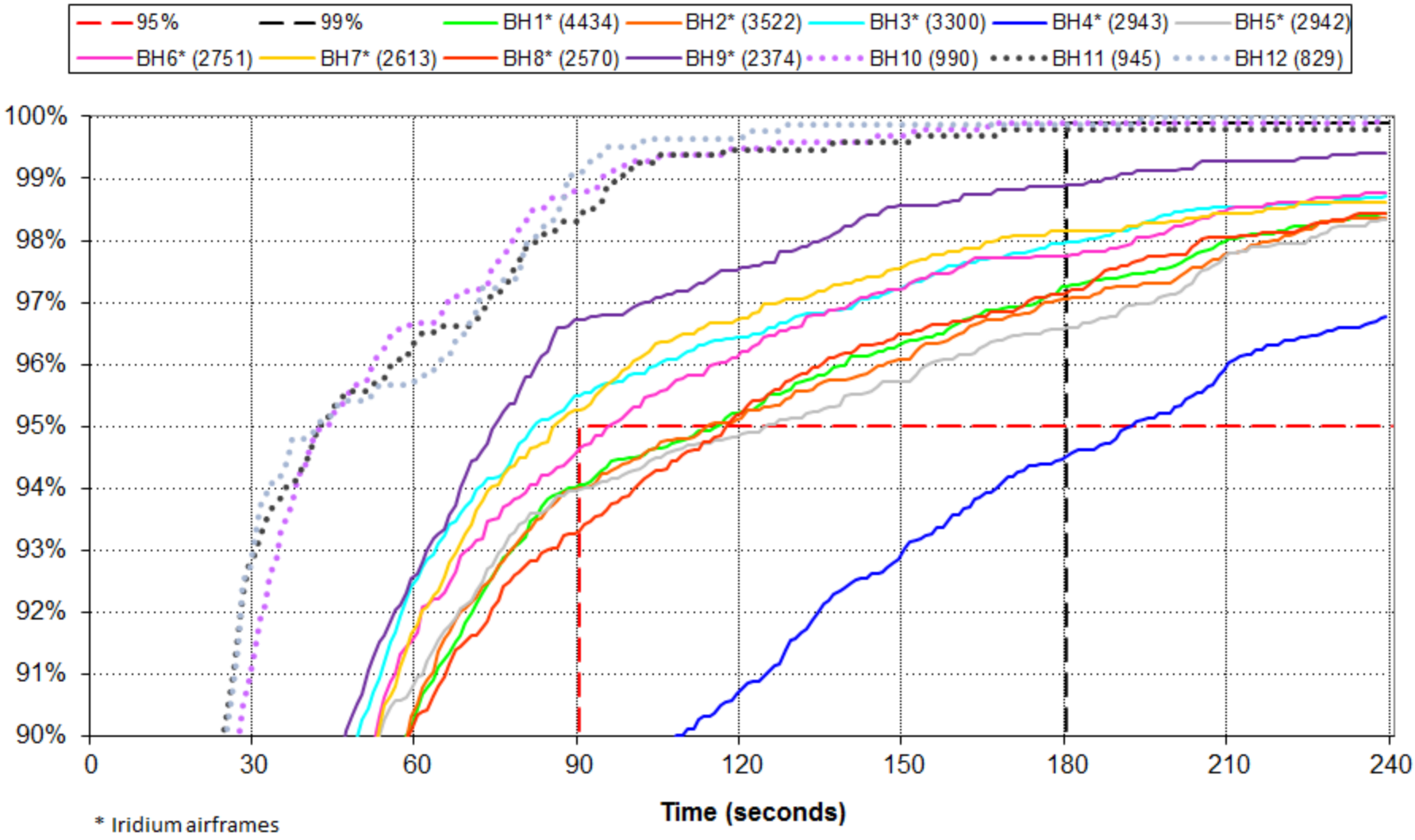
July – December 2014 (Continued)

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
MMMM	13,860	1.1%	95.7%	98.4%	324	0.7%	99.4%	99.7%	95.1%	96.9%	88.0%
EEE	11,819	0.9%	98.4%	99.5%	296	0.6%	100.0%	100.0%	99.0%	99.0%	97.3%
TT	10,853	0.8%	99.5%	99.8%	330	0.7%	99.7%	99.7%	99.4%	99.7%	97.6%
LL	10,552	0.8%	99.2%	99.5%	810	1.8%	99.6%	99.6%	99.3%	99.6%	96.7%
CCCC	10,437	0.8%	96.6%	98.7%	348	0.8%	99.4%	99.7%	98.9%	99.1%	96.0%
IGA	9,985	0.8%	96.0%	98.8%	490	1.1%	99.2%	99.8%	98.8%	99.2%	95.1%
P	9,481	0.7%	94.7%	98.5%	134	0.3%	99.3%	99.3%	97.0%	98.5%	94.0%
BY	8,483	0.7%	97.4%	99.5%	201	0.4%	100.0%	100.0%	97.0%	97.5%	90.1%
BA	8,039	0.6%	99.3%	99.7%	181	0.4%	99.5%	100.0%	99.5%	100.0%	97.8%
XX	7,673	0.6%	98.2%	99.5%	185	0.4%	99.5%	99.5%	99.5%	99.5%	97.3%
FFF	7,438	0.6%	97.2%	99.1%	243	0.5%	99.6%	99.6%	99.2%	99.6%	96.3%
BC	6,903	0.5%	98.3%	99.0%	352	0.8%	100.0%	100.0%	100.0%	100.0%	98.3%
TTTT	5,516	0.4%	96.1%	98.9%	153	0.3%	99.4%	100.0%	99.4%	99.4%	85.6%
BP	5,409	0.4%	98.5%	99.3%	232	0.5%	98.3%	98.3%	98.3%	98.3%	99.1%
QQ	5,368	0.4%	99.0%	99.4%	214	0.5%	99.5%	99.5%	98.6%	99.1%	96.3%
HHHH	5,025	0.4%	99.1%	99.8%	85	0.2%	98.8%	98.8%	98.8%	98.8%	92.9%
Y	4,176	0.3%	94.4%	97.1%	52	0.1%	96.2%	96.2%	96.2%	96.2%	100.0%
AT	3,978	0.3%	96.9%	99.0%	126	0.3%	100.0%	100.0%	100.0%	100.0%	99.2%
BZ	3,915	0.3%	97.3%	98.9%	160	0.3%	99.4%	99.4%	97.5%	97.5%	89.4%
NN	3,621	0.3%	98.6%	99.8%	161	0.4%	100.0%	100.0%	99.4%	99.4%	95.0%
RRRR	3,294	0.3%	93.6%	95.2%	80	0.2%	100.0%	100.0%	100.0%	100.0%	87.5%
AS	3,114	0.2%	99.6%	99.8%	170	0.4%	100.0%	100.0%	100.0%	100.0%	97.7%

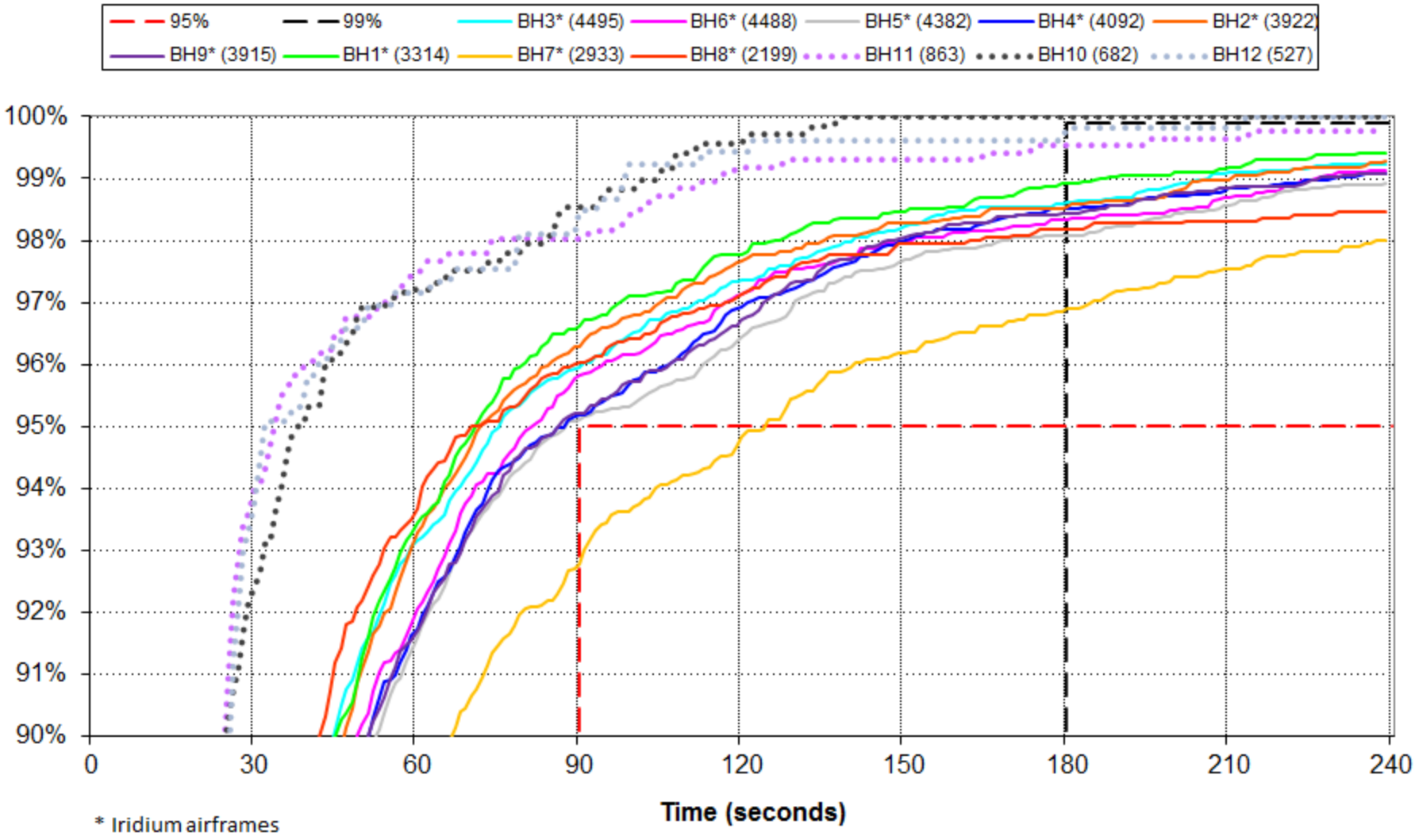
Update: BH (CFG)

- Fleet of 12 – B763 aircraft
  - 9 using Iridium → 3/9 meet 95% RSP180
  - 3 using I-3 → all meet 95% and 99.9% RSP180
- DSP: SITA
- Issue had been identified with 1 airframe (BH4) performing well below 95% and rest of fleet – recent analysis shows improvement
- Different airframe now performing below 95% (BH7)

New York FIR - BH B763 - Jan to Jun 2014
Actual Surveillance Performance (ASP)



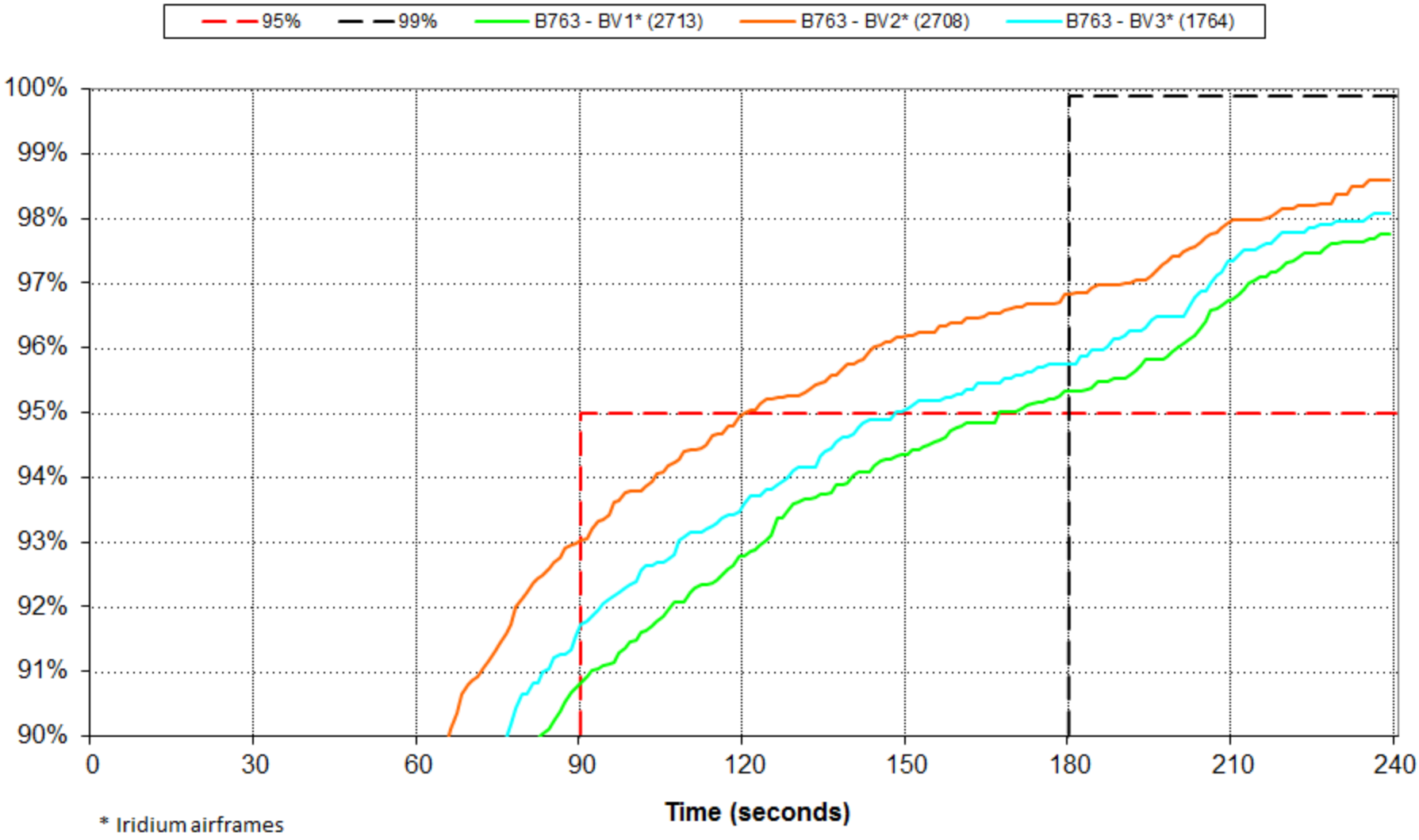
New York FIR - BH B763 - Jul to Dec 2014
Actual Surveillance Performance (ASP)



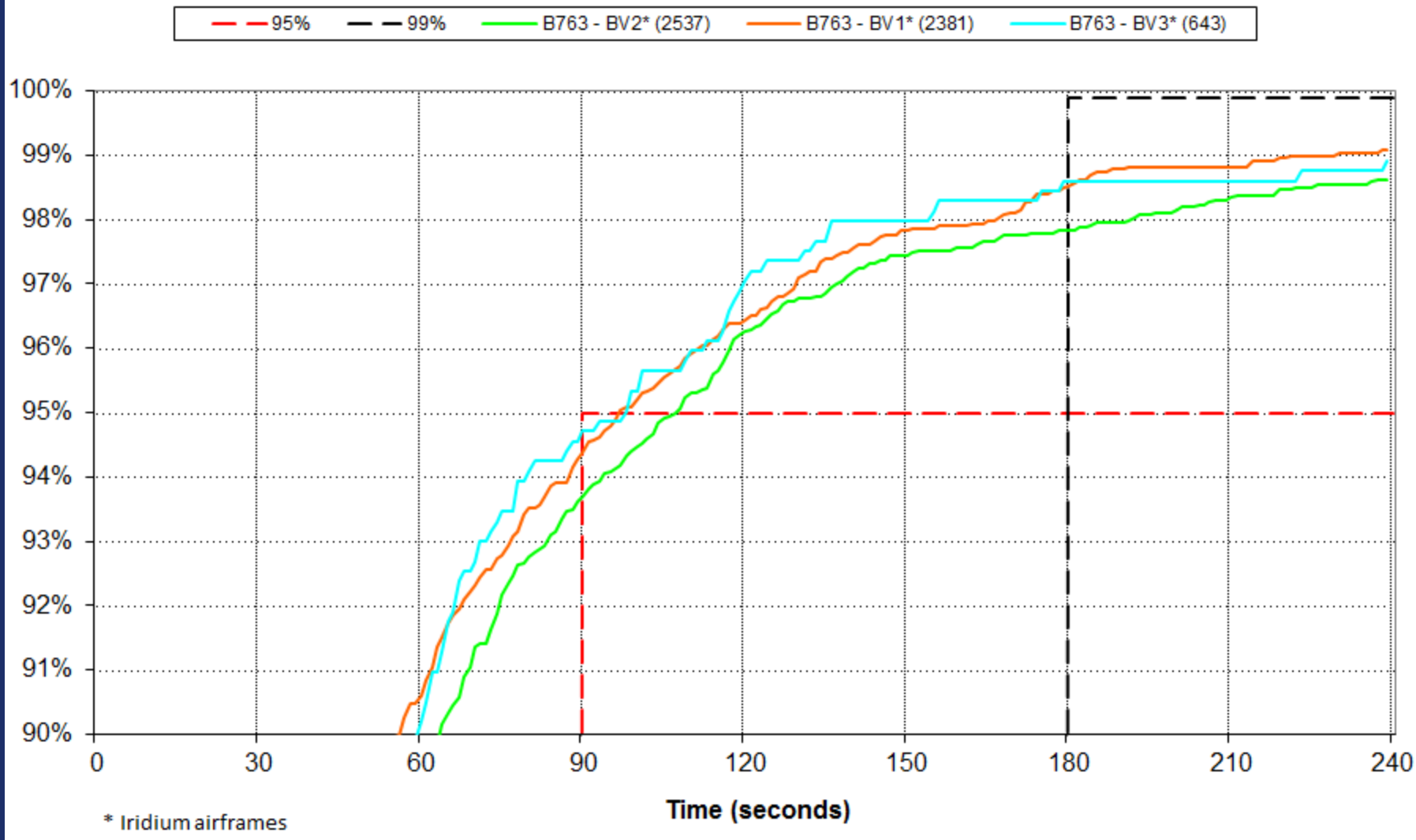
Update: BV (TFL)

- Fleet of 3 – B763 aircraft
  - Using Iridium → none meet 95% RSP180
- Fleet of 1 – B788
  - Using I-4 → meets 95% and above 99.0% RSP180
- DSP: SITA
- Improvement observed for Jul-Dec 2014

New York FIR - BV - Jan to Jun 2014
Actual Surveillance Performance (ASP)

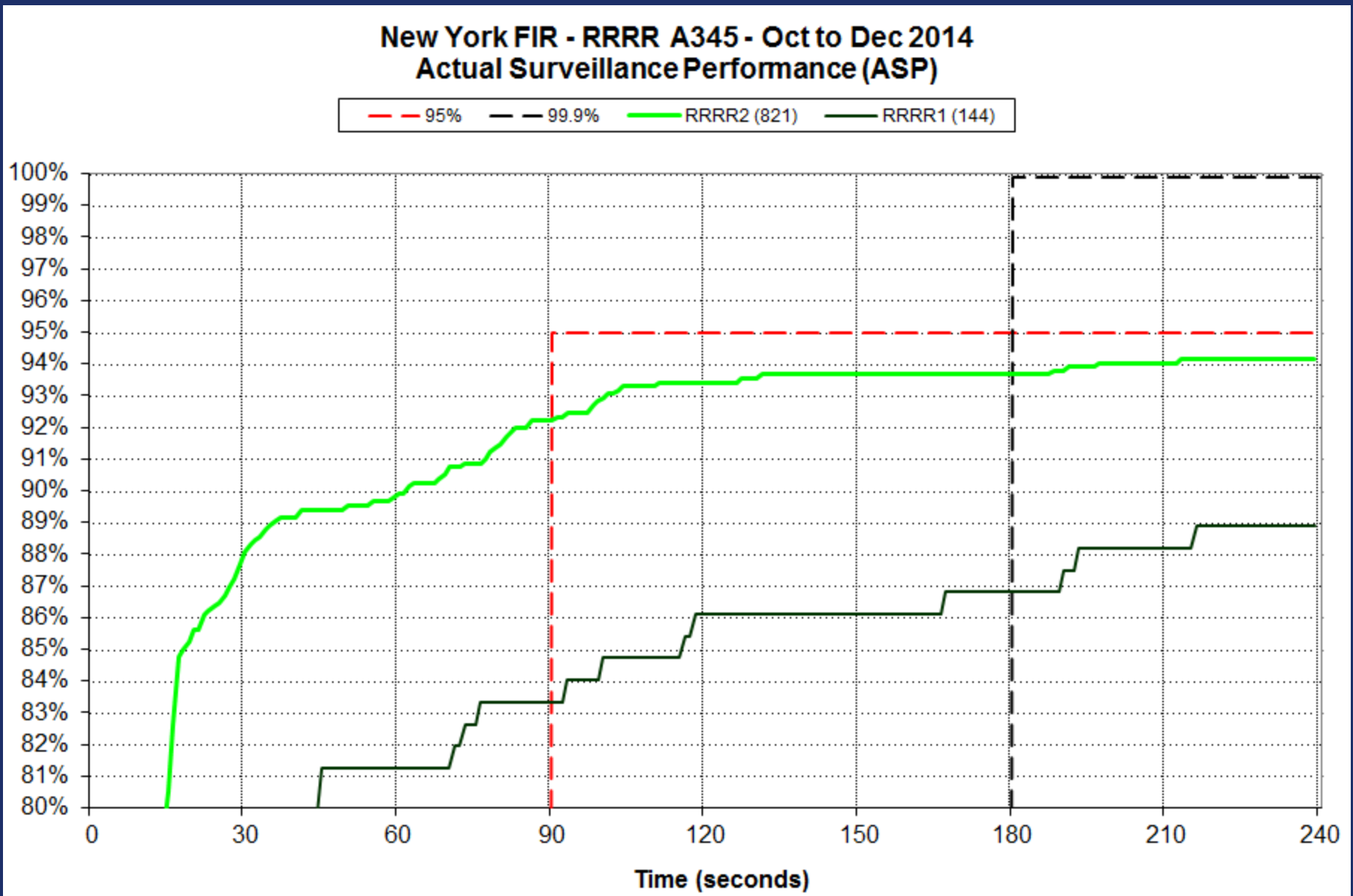


New York FIR - BV - Jul to Dec 2014
Actual Surveillance Performance (ASP)



PR 1502-SN: Poor performance Operator RRRR

- Submitted PR to DLMA for performance of RRRR (ARA) - 1/29/14
- Assigned to Airbus
- Still under investigation
- Further drop in performance observed for Oct – Dec 2014
  - DSP: SITA
  - Using I-3
  - VHF performance same as SAT performance


New York FIR - RRRR A345 - Oct to Dec 2014
Actual Surveillance Performance (ASP)
95%
99.9%
RRRR2 (821)
RRRR1 (144)
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
89%
88%
87%
86%
85%
84%
83%
82%
81%
80%
0
30
60
90
120
150
180
210
240
Time (seconds)

Summary of Performance by Operator Oakland FIR

- There were 60 operators with at least 100 ADS-C messages during this 6-month period
- Summary of how many operators meet criteria:

Criteria	ASP	ACTP	ACP	PORT
95% within 90 sec (60 sec for PORT)	60	57	55	47
99.9% within 180 sec	5	31	18	
99.0% - 99.9% within 180 sec	50	22	30	
Less than 99.0% within 180 sec	5	4	9	

Observed Performance by Operator Oakland FIR

July – December 2014

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
A	298,715	12.7%	97.9%	99.1%	14,176	15.2%	99.4%	99.5%	99.2%	99.4%	97.5%
NNN	236,651	10.0%	97.2%	99.2%	5,180	5.6%	99.7%	99.8%	98.8%	99.2%	97.0%
R	151,232	6.4%	98.3%	99.2%	4,732	5.1%	99.5%	99.5%	99.0%	99.2%	98.4%
L	149,800	6.4%	98.5%	99.4%	7,373	7.9%	99.7%	99.8%	99.3%	99.6%	97.4%
G	134,483	5.7%	99.5%	99.8%	6,445	6.9%	99.9%	99.9%	99.7%	99.8%	99.3%
D	132,786	5.6%	99.0%	99.7%	4,437	4.8%	99.8%	99.9%	99.7%	99.8%	98.8%
Q	112,573	4.8%	98.3%	99.5%	5,640	6.0%	99.8%	99.9%	99.8%	99.8%	99.0%
B	110,694	4.7%	98.9%	99.4%	4,239	4.5%	99.3%	99.4%	99.1%	99.5%	98.6%
J	91,687	3.9%	99.6%	99.8%	5,149	5.5%	99.9%	99.9%	99.8%	99.8%	99.5%
H	83,788	3.6%	99.5%	99.8%	3,468	3.7%	99.9%	99.9%	99.8%	99.8%	99.5%
E	71,808	3.0%	98.8%	99.4%	2,799	3.0%	99.8%	99.8%	99.7%	99.9%	99.1%
T	62,867	2.7%	99.3%	99.7%	2,494	2.7%	99.6%	99.7%	99.6%	99.8%	99.3%
S	62,120	2.6%	98.0%	99.2%	1,803	1.9%	99.6%	99.6%	99.6%	99.7%	98.6%
QQQQ	60,956	2.6%	99.6%	99.8%	2,536	2.7%	99.9%	99.9%	99.6%	99.8%	98.4%
F	56,509	2.4%	99.0%	99.5%	4,569	4.9%	99.7%	99.7%	99.6%	99.8%	99.5%
N	48,122	2.0%	98.2%	99.3%	918	1.0%	99.6%	99.6%	99.5%	99.8%	99.1%
NNNN	44,432	1.9%	98.0%	99.2%	871	0.9%	99.4%	99.8%	99.3%	99.5%	98.1%
Y	40,617	1.7%	96.5%	98.2%	686	0.7%	98.0%	98.1%	97.1%	97.8%	97.2%
O	37,040	1.6%	98.6%	99.4%	1,583	1.7%	99.6%	99.7%	99.7%	99.8%	99.8%
P	36,308	1.5%	98.2%	99.4%	2,255	2.4%	99.8%	99.9%	99.4%	99.5%	98.6%
PPPP	35,580	1.5%	99.1%	99.6%	2,165	2.3%	99.6%	99.7%	99.6%	99.8%	99.5%
ZZZZ	34,498	1.5%	99.1%	99.4%	1,119	1.2%	99.8%	99.9%	98.2%	98.8%	94.3%

Observed Performance by Operator Oakland FIR

July – December 2014 (Continued)

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
US MIL	31,949	1.4%	98.5%	99.3%	511	0.5%	99.4%	99.4%	96.9%	97.1%	90.4%
V	23,614	1.0%	99.6%	99.7%	928	1.0%	100.0%	100.0%	100.0%	100.0%	99.7%
X	21,298	0.9%	98.1%	99.0%	930	1.0%	99.4%	99.6%	99.5%	99.9%	98.7%
JJJ	19,198	0.8%	97.5%	98.7%	320	0.3%	99.4%	99.4%	99.1%	99.4%	98.4%
MMM	17,537	0.7%	98.9%	99.4%	554	0.6%	99.6%	99.6%	99.5%	99.5%	99.5%
MMMM	17,072	0.7%	97.1%	98.7%	420	0.5%	98.3%	99.1%	93.8%	95.5%	85.2%
LLL	14,852	0.6%	99.4%	99.8%	709	0.8%	99.7%	99.9%	99.4%	99.6%	99.2%
W	14,636	0.6%	98.0%	99.5%	416	0.4%	99.8%	100.0%	99.5%	99.8%	98.1%
RRR	11,253	0.5%	97.2%	99.0%	239	0.3%	100.0%	100.0%	98.3%	98.7%	95.8%
QQQ	10,967	0.5%	99.4%	99.6%	851	0.9%	99.9%	99.9%	99.8%	99.9%	99.2%
WW	10,864	0.5%	98.8%	99.3%	395	0.4%	99.8%	99.8%	99.5%	99.8%	98.2%
AB	10,565	0.4%	98.8%	99.8%	445	0.5%	100.0%	100.0%	99.8%	99.8%	98.4%
OOOO	8,963	0.4%	98.7%	99.5%	292	0.3%	100.0%	100.0%	100.0%	100.0%	99.0%
BY	8,363	0.4%	98.2%	99.6%	191	0.2%	99.5%	100.0%	97.9%	97.9%	92.7%
Z	5,291	0.2%	98.9%	99.5%	293	0.3%	99.3%	99.3%	99.3%	99.7%	99.7%
CCCC	5,251	0.2%	95.9%	98.0%	112	0.1%	99.1%	99.1%	97.3%	98.2%	87.5%
AA	4,791	0.2%	99.5%	99.8%	233	0.2%	98.3%	98.3%	97.4%	98.7%	97.4%
AM	4,784	0.2%	96.8%	99.1%	198	0.2%	99.0%	100.0%	97.5%	97.5%	94.4%
AC	4,656	0.2%	98.2%	99.4%	61	0.1%	100.0%	100.0%	100.0%	100.0%	96.7%
BW	2,760	0.1%	96.3%	99.1%	123	0.1%	98.4%	98.4%	96.8%	97.6%	92.7%
AE	2,479	0.1%	99.3%	99.6%	125	0.1%	99.2%	99.2%	96.8%	96.8%	96.0%
LLLL	2,011	0.1%	99.0%	99.6%	75	0.1%	98.7%	100.0%	98.7%	98.7%	97.3%

Summary of Performance by Operator Anchorage FIR

- There were 39 operators with at least 100 ADS-C messages during this 6-month period
- Summary of how many operators meet criteria:

Criteria	ASP	ACTP	ACP	PORT
95% within 90 sec (60 sec for PORT)	38	39	39	31
99.9% within 180 sec	7	25	17	
99.0% - 99.9% within 180 sec	28	12	17	
Less than 99.0% within 180 sec	4	2	5	

Observed Performance by Operator Anchorage FIR

July – December 2014

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
D	94,935	10.2%	98.4%	99.6%	1,619	7.7%	99.3%	99.6%	99.1%	99.4%	97.8%
Q	89,784	9.7%	97.7%	99.1%	2,013	9.6%	99.6%	99.8%	99.5%	99.7%	98.5%
A	81,312	8.8%	98.5%	99.4%	2,025	9.7%	99.8%	99.9%	99.3%	99.6%	95.2%
L	77,804	8.4%	98.5%	99.6%	1,887	9.0%	99.6%	99.9%	99.1%	99.5%	95.2%
Y	64,543	7.0%	95.1%	97.3%	722	3.4%	97.2%	97.5%	96.7%	97.5%	95.8%
J	63,262	6.8%	99.6%	99.8%	1,742	8.3%	99.8%	99.8%	99.5%	99.7%	99.0%
H	57,231	6.2%	99.1%	99.6%	1,434	6.8%	100.0%	100.0%	99.6%	99.7%	97.0%
S	53,473	5.8%	97.5%	99.5%	980	4.7%	99.2%	99.6%	98.9%	99.4%	98.1%
G	51,953	5.6%	99.2%	99.7%	1,234	5.9%	99.9%	99.9%	99.7%	99.8%	99.2%
F	38,343	4.1%	98.9%	99.8%	1,700	8.1%	99.8%	99.9%	99.6%	99.8%	99.1%
R	36,511	3.9%	98.1%	99.5%	653	3.1%	99.5%	99.9%	99.4%	99.5%	97.9%
RRR	29,498	3.2%	98.2%	99.3%	458	2.2%	99.6%	99.8%	98.9%	99.3%	96.1%
P	25,922	2.8%	97.8%	99.3%	880	4.2%	99.2%	99.6%	99.2%	99.6%	98.8%
T	24,368	2.6%	99.0%	99.6%	665	3.2%	99.9%	100.0%	99.7%	99.9%	97.6%
NNNN	22,027	2.4%	98.8%	99.7%	315	1.5%	100.0%	100.0%	100.0%	100.0%	99.1%
CCCC	17,179	1.9%	96.9%	98.4%	314	1.5%	99.4%	99.4%	99.4%	99.7%	96.5%
QQQ	13,203	1.4%	99.5%	99.7%	549	2.6%	99.8%	99.8%	99.8%	100.0%	99.5%
LLL	10,966	1.2%	98.7%	99.8%	230	1.1%	100.0%	100.0%	99.6%	99.6%	96.1%

Observed Performance by Operator Anchorage FIR

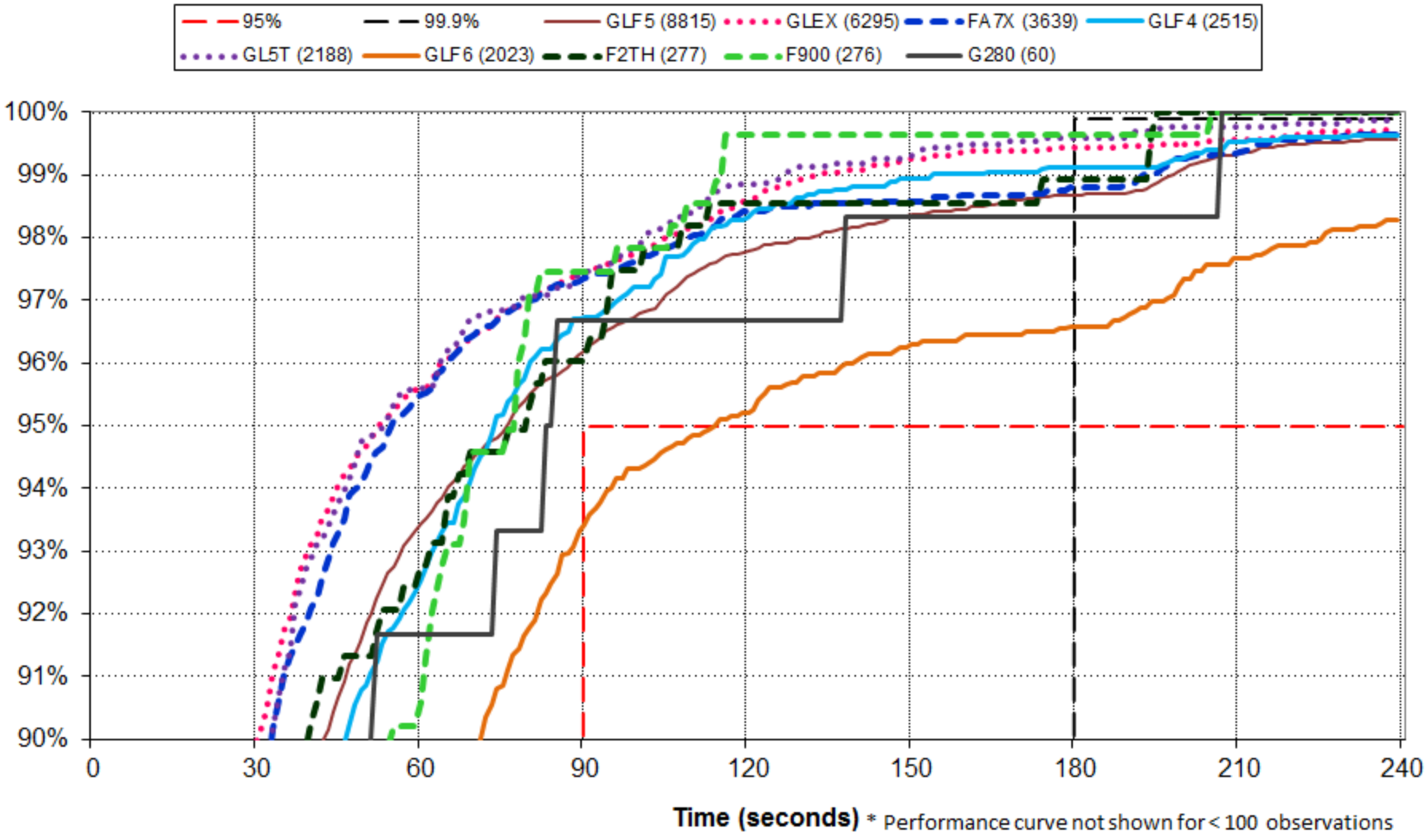
July – December 2014 (Continued)

Oper	ADS-C				CPDLC						
Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
O	8,872	1.0%	97.9%	99.4%	238	1.1%	99.6%	99.6%	99.6%	99.6%	98.7%
OOOO	7,173	0.8%	98.8%	99.8%	116	0.6%	100.0%	100.0%	100.0%	100.0%	96.6%
QQQQ	6,741	0.7%	99.9%	99.9%	158	0.8%	100.0%	100.0%	100.0%	100.0%	98.1%
AM	6,121	0.7%	97.6%	99.7%	144	0.7%	100.0%	100.0%	100.0%	100.0%	96.5%
FFF	6,104	0.7%	99.9%	99.9%	162	0.8%	100.0%	100.0%	100.0%	100.0%	98.8%
MMMM	5,365	0.6%	97.5%	98.8%	73	0.3%	100.0%	100.0%	97.3%	97.3%	90.4%
MMM	5,289	0.6%	98.2%	98.9%	91	0.4%	100.0%	100.0%	100.0%	100.0%	98.9%
ZZZZ	4,923	0.5%	99.2%	99.5%	107	0.5%	100.0%	100.0%	97.2%	98.1%	91.6%
US MIL	4,650	0.5%	99.0%	99.4%	51	0.2%	100.0%	100.0%	98.0%	100.0%	92.2%
WW	4,337	0.5%	98.9%	99.6%	54	0.3%	100.0%	100.0%	98.2%	100.0%	96.3%
III	3,624	0.4%	99.5%	100.0%	127	0.6%	99.2%	99.2%	99.2%	99.2%	100.0%
GGG	3,207	0.3%	98.6%	99.9%	66	0.3%	100.0%	100.0%	98.5%	98.5%	93.9%
B	3,088	0.3%	99.0%	99.6%	60	0.3%	100.0%	100.0%	100.0%	100.0%	96.7%
BY	1,575	0.2%	98.4%	100.0%	24	0.1%	95.8%	95.8%	95.8%	95.8%	79.2%
Z	940	0.1%	98.5%	100.0%	20	0.1%	100.0%	100.0%	100.0%	100.0%	100.0%
ZO	704	0.1%	98.3%	99.9%	12	0.1%	100.0%	100.0%	100.0%	100.0%	91.7%
BZ	421	0.0%	97.2%	98.1%	5	0.0%	100.0%	100.0%	100.0%	100.0%	80.0%

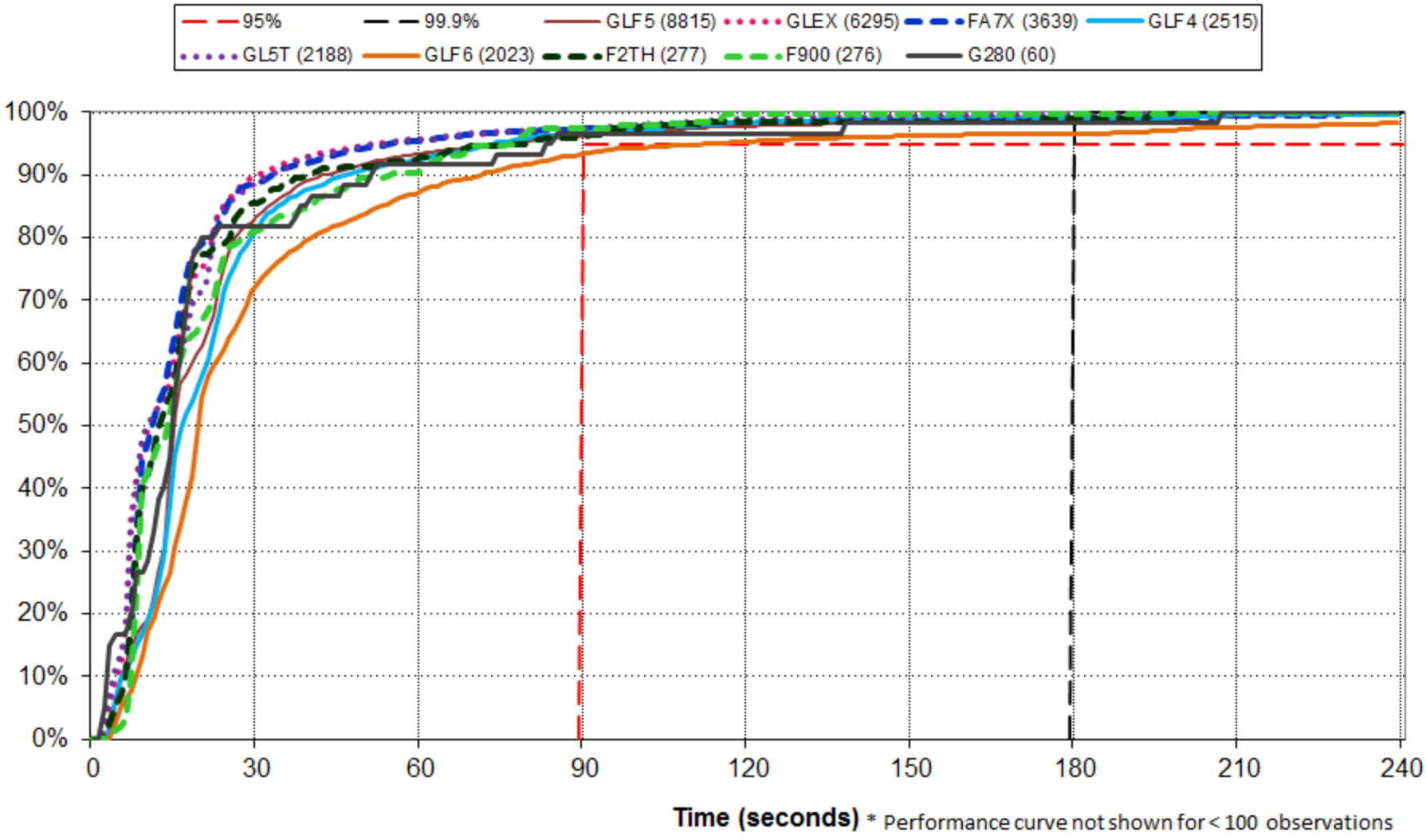
New York, Oakland, Anchorage FIRs

ASP FOR BUSINESS JET AIRCRAFT
AGGREGATE (ALL MEDIA COMBINED)

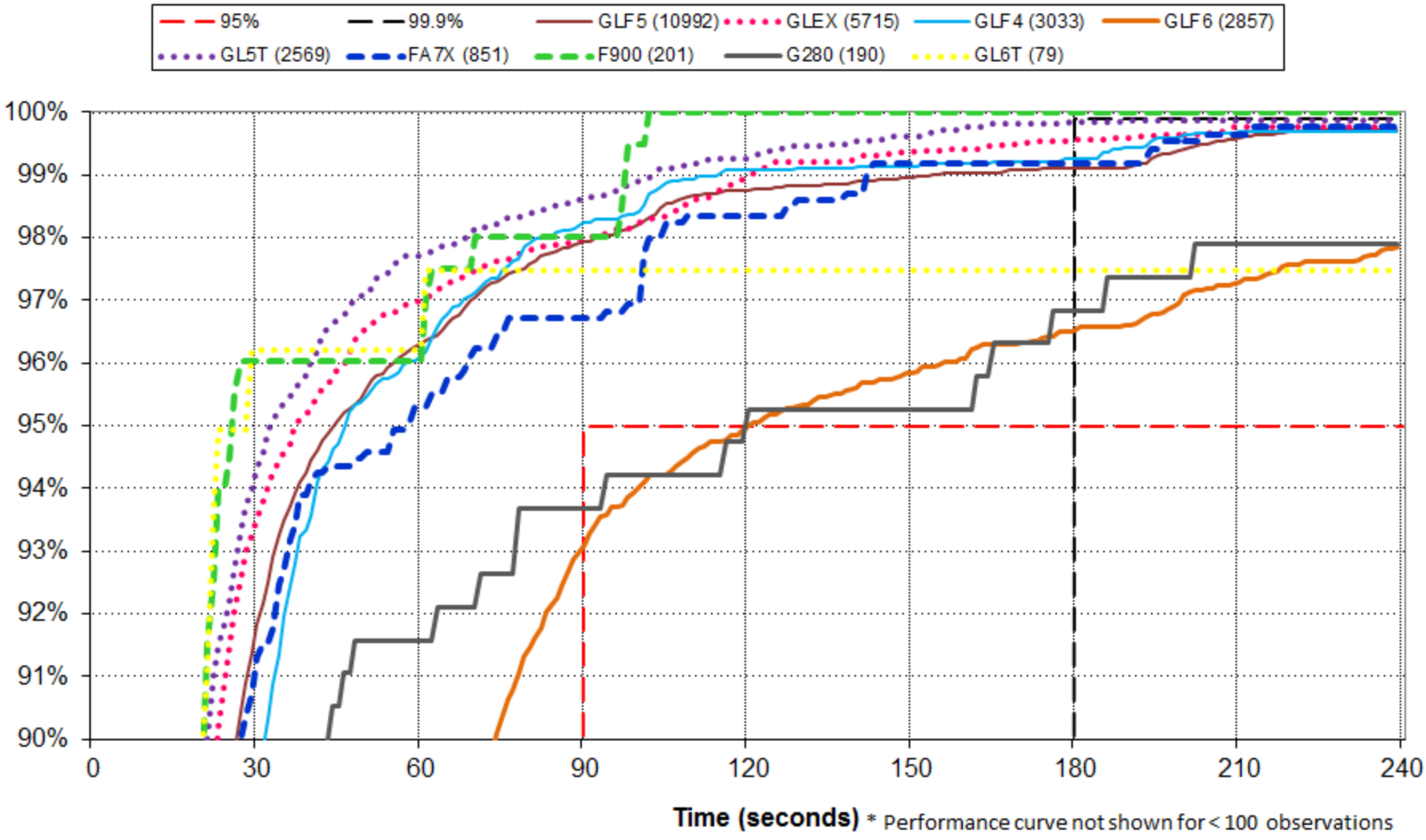
New York FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)



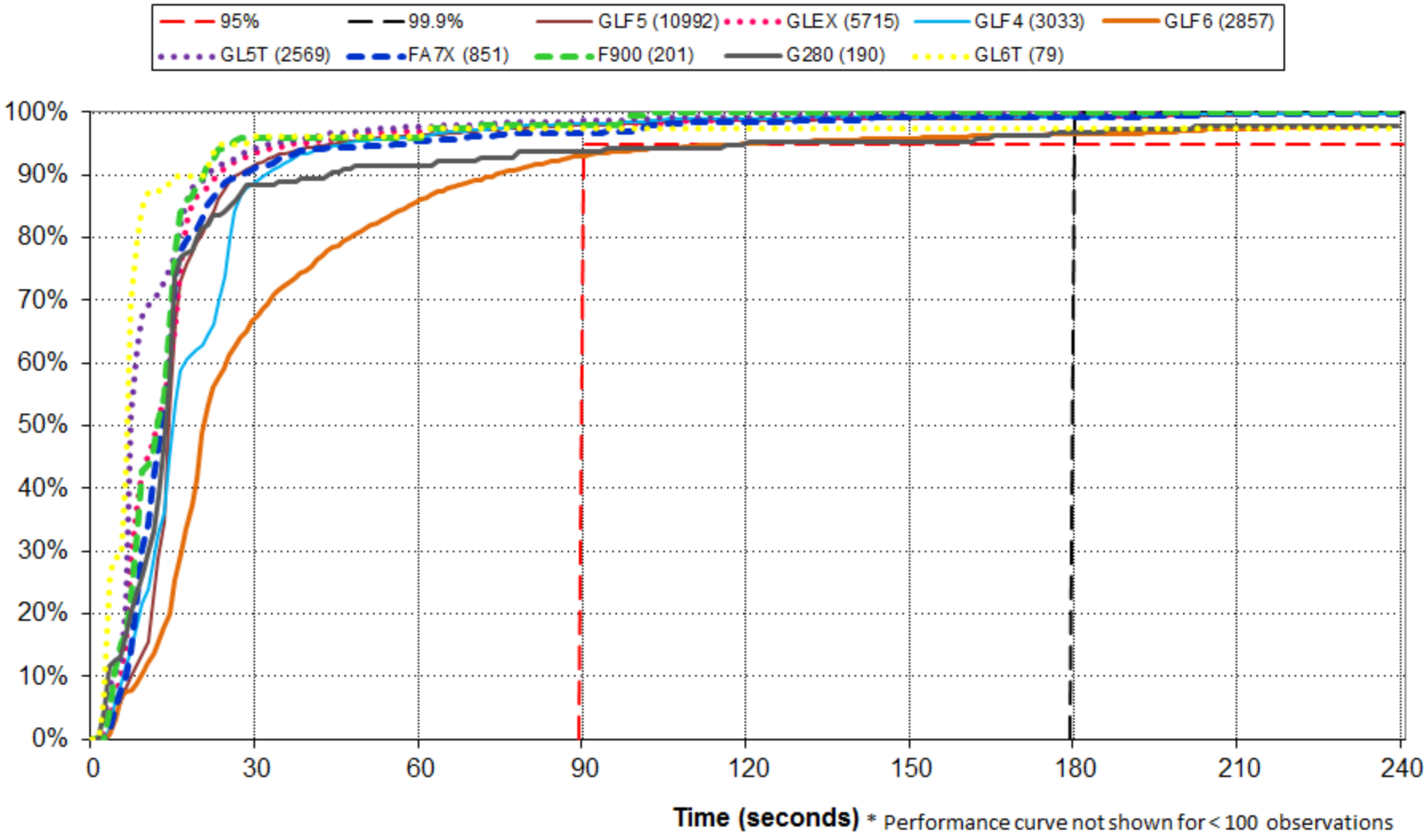
New York FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)



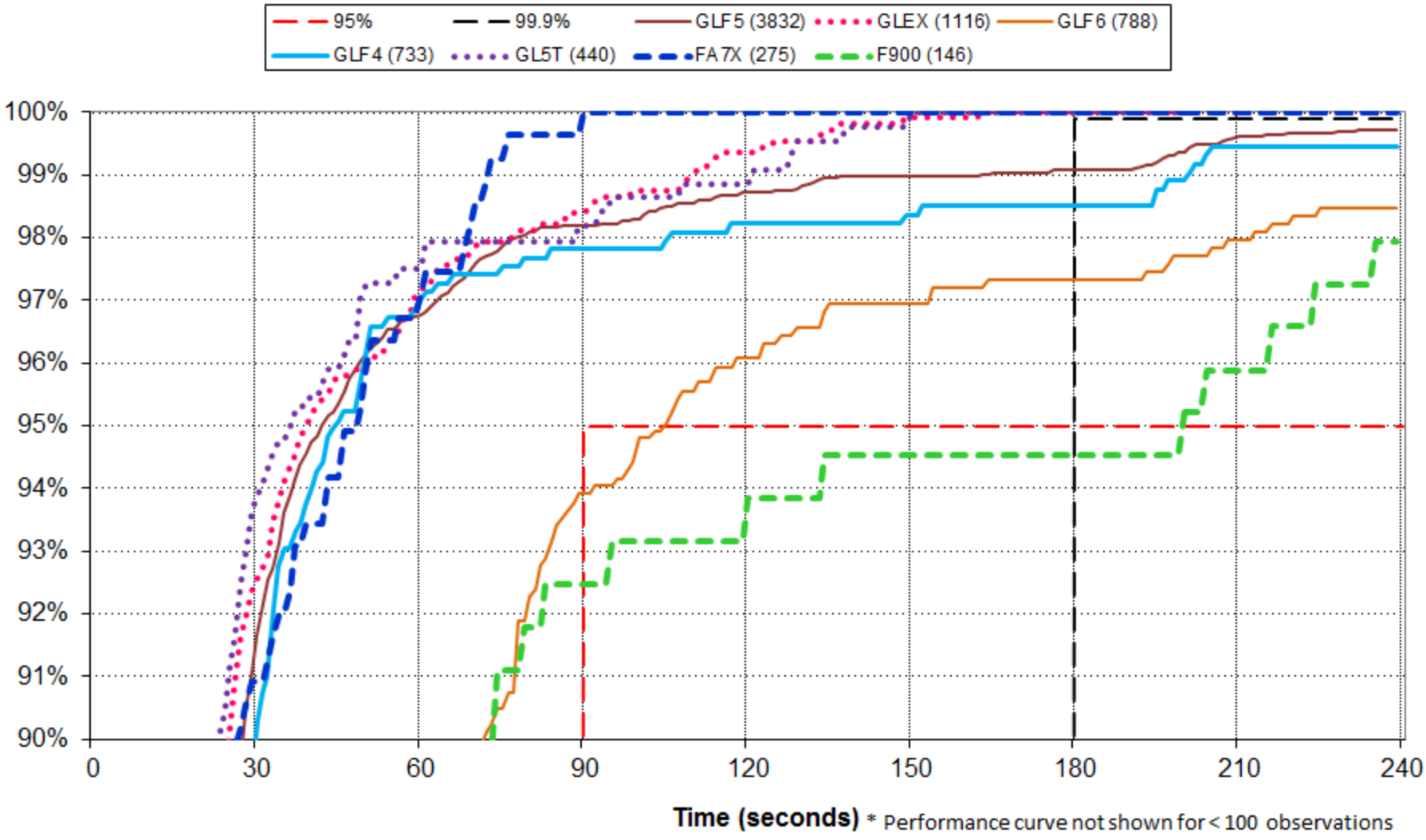
Oakland FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)



Oakland FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)



Anchorage FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)



Anchorage FIR - Business Jet - July to December 2014
Actual Surveillance Performance (ASP)