



ISPACG/28 FIT/21

Data Link Performance Analysis

Papatee, Tahiti
5 March 2014



FAA

Overview

- Summary of Reported Outages
- GOLD Performance Criteria
- How to Read GOLD Charts
- Summary of Flight Counts and Data Link Usage by FIR
- Aggregate Data Link Performance Tables
- Annual Performance by FIR – 2010 to 2013
- ASP by Station Identifier by FIR
- Aggregate Data Link Performance by Operator
- Analysis of Effects of Media Transitions on ASP



Outages Reported Since ISPACG FIT/20

Last outage reported – 16 February 2013

START DATE	START TIME (UTC)	DURATION (HH:MM:SS)	SERVICE IMPACTED	SATELLITE REGION IMPACTED	NOTIFICATION SOURCE	NOTES
19-Feb-13	05:59	00:27:00	Iridium	Global	Sita, ARINC	Anomaly affecting Short Burst Data
21-Feb-13	19:25	05:40:00	Iridium	Global	Sita, ARINC	Internal network anomaly at the Tempe Gateway
8-Mar-13	18:13	03:01:00	Iridium	Global	ARINC	Iridium customers experienced intermittent SBD EMO Service delays during the above timeframe. The issue has been fully resolved and SBD E-mail MO transmissions are not experiencing any delays.
8-Mar-13	20:00	03:59:00	Iridium	Global	Sita, ARINC	Due to severe thunderstorms in the vicinity of the Tempe Gateway, customers may experience dropped calls and the inability to place or receive calls
12-Mar-13	16:44	04:17:00	Iridium	Global	ARINC	Iridium customers experienced intermittent Short Burst Data (SBD) EMO Service delays during the above timeframe. Iridium engineers have corrected this issue, and services are now working as normal.
12-Mar-13	23:40	03:31:00	Iridium	Global	ARINC	The problem with SPNet Pro and IWS has been corrected
23-Apr-13	06:30	01:00:00	Iridium	Global	Sita	Intermittent SBD service delays due to anomaly on the Iridium network
23-Apr-13	21:25	00:12:00	Iridium	Global	ARINC	IRIDIUM experienced an outage of all Short Burst Data services which has since restored
30-Apr-13	19:00	00:15:00	Iridium	Global	ARINC	Intermittent Short Burst Data (SBD) service
2-May-13	12:57	00:08:00	ARINC I-4	EMEA	ARINC	BGAN/FB/SB
2-May-13	20:39	00:08:00	Iridium	Global	Sita, ARINC	Intermittent SDB service delays
10-May-13	14:16	00:03:00	Sita	Global	Sita	Emergency switchover of our system to mitigate a potential failure on X25 connected host connections



Outages Reported Since ISPACG FIT/20 (Continued)

START DATE	START TIME (UTC)	DURATION (HH:MM:SS)	SERVICE IMPACTED	SATELLITE REGION IMPACTED	NOTIFICATION SOURCE	NOTES
26-May-13	19:52	00:30:00	Iridium	Global	Sita, ARINC	Intermittent Short Burst Data service delays
30-May-13	20:02	00:03:00	Sita	Global	Sita	Emergency switchover of our systems due to a network issue
14-Jun-13	23:44	00:48:00	ARINC I-4	EMEA	ARINC	BGAN/FB/SB
17-Jun-13	02:19	00:18:00	Iridium	Global	Sita, ARINC	Satellite voice services via Iridium was not available due to an unexpected outage at Iridium
27-Jun-13	18:03	00:19:00	ARINC I-3	IOR, POR	ARINC	Inmarsat restored server connections
28-Aug-13	10:27	00:25:00	Iridium	Global	Sita, ARINC	Problem at Iridium
23-Sep-13	12:43	00:28:00	ARINC	Global	ARINC	ARINC ACARS outage
20-Nov-13	00:00	18:55:00	Sita Iridium	Global	Sita	The Iridium Short Burst Data service was degraded and customers may have experienced a high uplink reject rate and delayed downlinks
20-Jan-14	02:14	00:11:00	ARINC Iridium	Global	ARINC	IRIDIUM outage of Telephony, Paging, SMS messaging, Short Burst Data, and Circuit Switch Data
23-Jan-14	22:26	00:17:00	Sita Iridium	Global	Sita	Intermittent Short Burst Data service delays
31-Jan-14	05:40	00:24:00	ARINC Inmarsat	POR	ARINC	Defective link between Perth and Hong Kong
1-Feb-14	06:02	00:24:00	ARINC	Global	ARINC	GMP on-call was unable to get GMP1 to recover. Power recycled GMP1 to allow auto switchover to GMP2.



Summary of Reported Outages

July to December 2013

Satellite System	DSP	% Messages in Pacific Jul-Dec 2013	% Messages in Atlantic Jul-Dec 2013	# Unplanned outages > 10 min	Sum of unplanned outages > 10 min (min)
Iridium	All	4.6%	1.5%	1	25
All	ARINC	42.3%	23.5%	1	28
Iridium	Sita	1.0%	1.1%	1	1,135

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



January – December 2013

FLIGHT COUNTS AND DATA LINK USAGE BY FIR

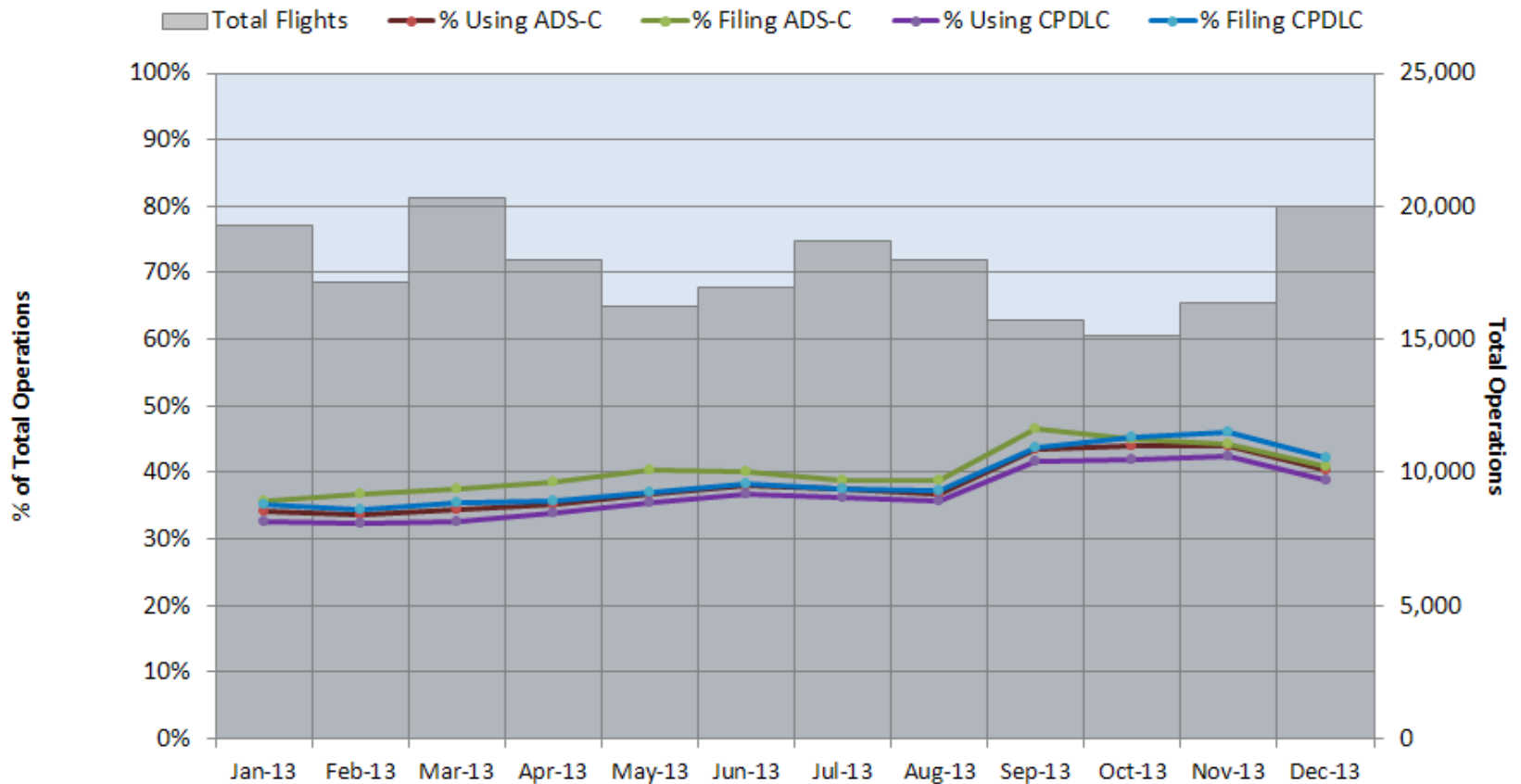


ADS/CPDLC Equipage and Usage

- A flight is determined to be “**using ADS-C**” if there is one ADS-C report observed
- A flight is determined to be “**filing ADS-C**” if a “D1” is observed in field 10b of the ICAO flight plan observed
- A flight is determined to be “**using CPDLC**” if there is one CPDLC message observed
- A flight is determined to be “**filing CPDLC**” if a “J2,” “J3,” “J4,” “J5,” “J6” or “J7” is observed in field 10a of the ICAO flight plan observed



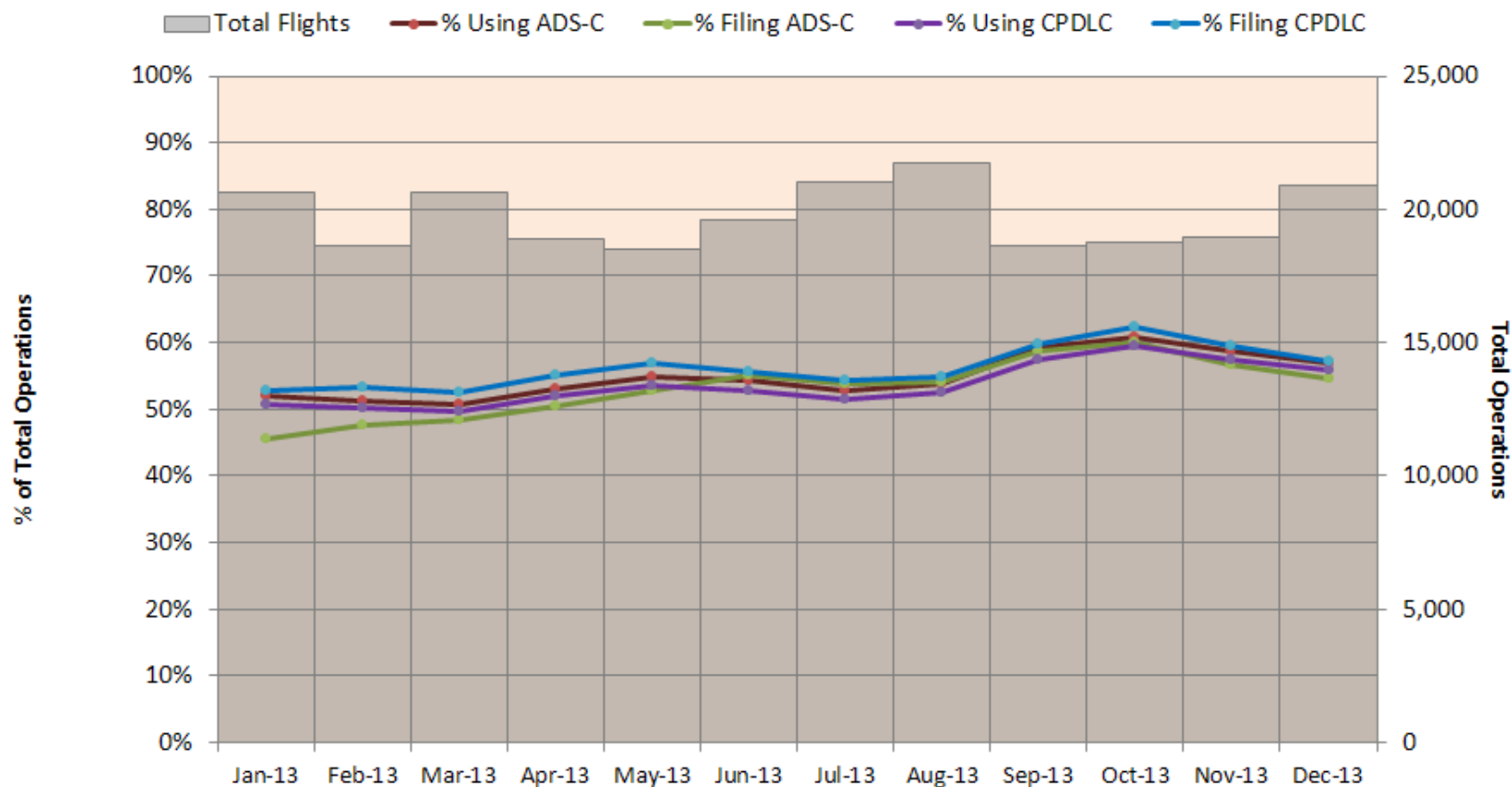
Data Link Equipage in ZNY Oceanic FIR



	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
█ Total Flights	19,298	17,145	20,306	18,006	16,264	16,920	18,671	18,011	15,715	15,105	16,357	19,958
—●— % Using ADS-C	34.2%	33.7%	34.3%	35.2%	36.8%	38.1%	37.5%	36.8%	43.4%	43.9%	44.1%	40.2%
—●— % Filing ADS-C	35.8%	36.6%	37.6%	38.5%	40.3%	40.1%	38.8%	38.7%	46.6%	45.1%	44.3%	40.8%
—●— % Using CPDLC	32.6%	32.3%	32.5%	33.8%	35.4%	36.7%	36.3%	35.6%	41.7%	41.8%	42.4%	38.7%
—●— % Filing CPDLC	35.1%	34.4%	35.5%	35.8%	37.1%	38.4%	37.4%	37.3%	43.8%	45.4%	46.0%	42.2%

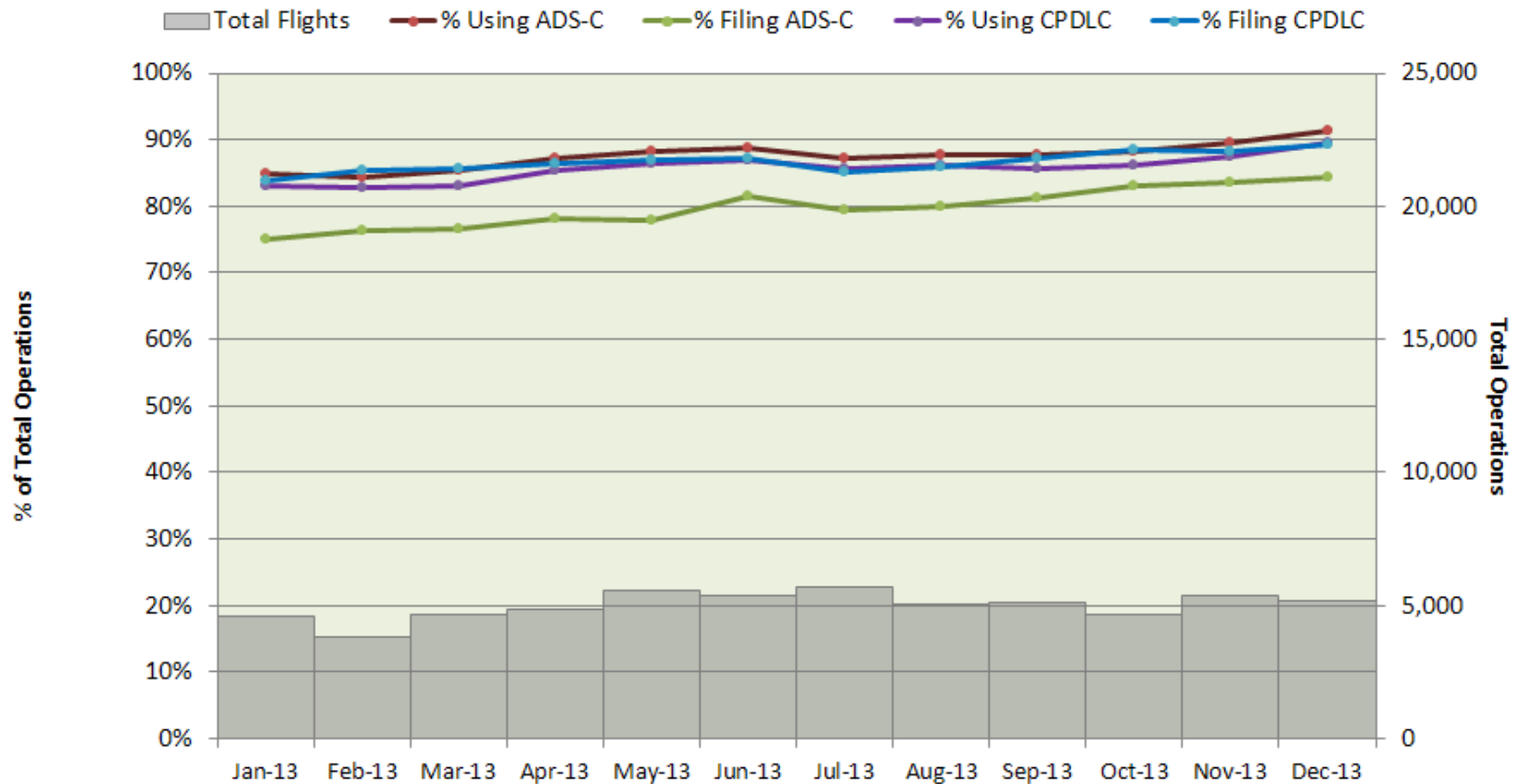


Data Link Equipage in ZAK Oceanic FIR



	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
Total Flights	20,626	18,600	20,629	18,883	18,497	19,633	21,016	21,706	18,639	18,734	18,951	20,925
% Using ADS-C	51.9%	51.3%	50.7%	53.0%	55.0%	54.3%	52.8%	53.9%	59.2%	60.9%	58.6%	57.0%
% Filing ADS-C	45.5%	47.6%	48.3%	50.5%	52.8%	55.2%	53.9%	54.2%	58.8%	59.9%	56.8%	54.5%
% Using CPDLC	50.7%	50.1%	49.5%	51.9%	53.6%	52.9%	51.5%	52.5%	57.4%	59.4%	57.4%	55.8%
% Filing CPDLC	52.8%	53.3%	52.6%	55.2%	57.0%	55.6%	54.4%	54.8%	59.9%	62.3%	59.6%	57.2%

Data Link Equipage in ZAN Oceanic FIR



	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
■ Total Flights	4,620	3,791	4,635	4,858	5,565	5,337	5,707	5,045	5,124	4,679	5,375	5,169
—● % Using ADS-C	84.9%	84.4%	85.5%	87.3%	88.3%	88.8%	87.3%	87.7%	87.7%	88.2%	89.5%	91.4%
—● % Filing ADS-C	75.1%	76.4%	76.6%	78.2%	77.9%	81.6%	79.4%	79.8%	81.4%	83.1%	83.5%	84.4%
—● % Using CPDLC	83.1%	82.7%	83.2%	85.5%	86.4%	87.0%	85.7%	86.1%	85.6%	86.2%	87.6%	89.5%
—● % Filing CPDLC	83.9%	85.3%	85.8%	86.5%	86.9%	87.1%	85.2%	85.9%	87.3%	88.5%	88.3%	89.3%



July – December 2013

DATA LINK PERFORMANCE BY MEDIA TYPE



Performance by Media Type

July - December 2013

New York

41,920
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	847,694	98.5%	99.4%	35,324	99.7%	99.8%	99.0%	99.4%	96.3%
SAT	670,475	98.5%	99.5%	32,164	99.7%	99.8%	99.1%	99.4%	96.4%
VHF	174,554	99.1%	99.5%	2,870	99.9%	100.0%	99.5%	99.7%	96.2%
Performance Criteria		RSP 400			RCP 400				
HF	2,662	87.2%	90.2%	12	--	--	--	--	--



Performance by Media Type

July - December 2013

Oakland

67,292
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	2,007,861	98.7%	99.5%	85,317	99.7%	99.8%	99.4%	99.6%	98.2%
SAT	1,769,677	98.7%	99.5%	83,383	99.7%	99.8%	99.4%	99.6%	98.2%
VHF	231,510	99.4%	99.8%	1,639	99.9%	99.9%	99.7%	99.8%	97.7%
Performance Criteria		RSP 400			RCP 400				
HF	6,665	92.9%	95.5%	47	--	--	--	--	--



Performance by Media Type

July - December 2013

Anchorage

27,681
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	759,030	98.2%	99.4%	16,170	99.5%	99.6%	99.2%	99.4%	97.7%
SAT	490,328	97.6%	99.3%	10,897	99.5%	99.6%	99.1%	99.4%	97.5%
VHF	263,342	99.7%	99.8%	5,058	99.9%	99.9%	99.7%	99.8%	98.4%
Performance Criteria		RSP 400			RCP 400				
HF	5,269	90.9%	94.1%	22	--	--	--	--	--

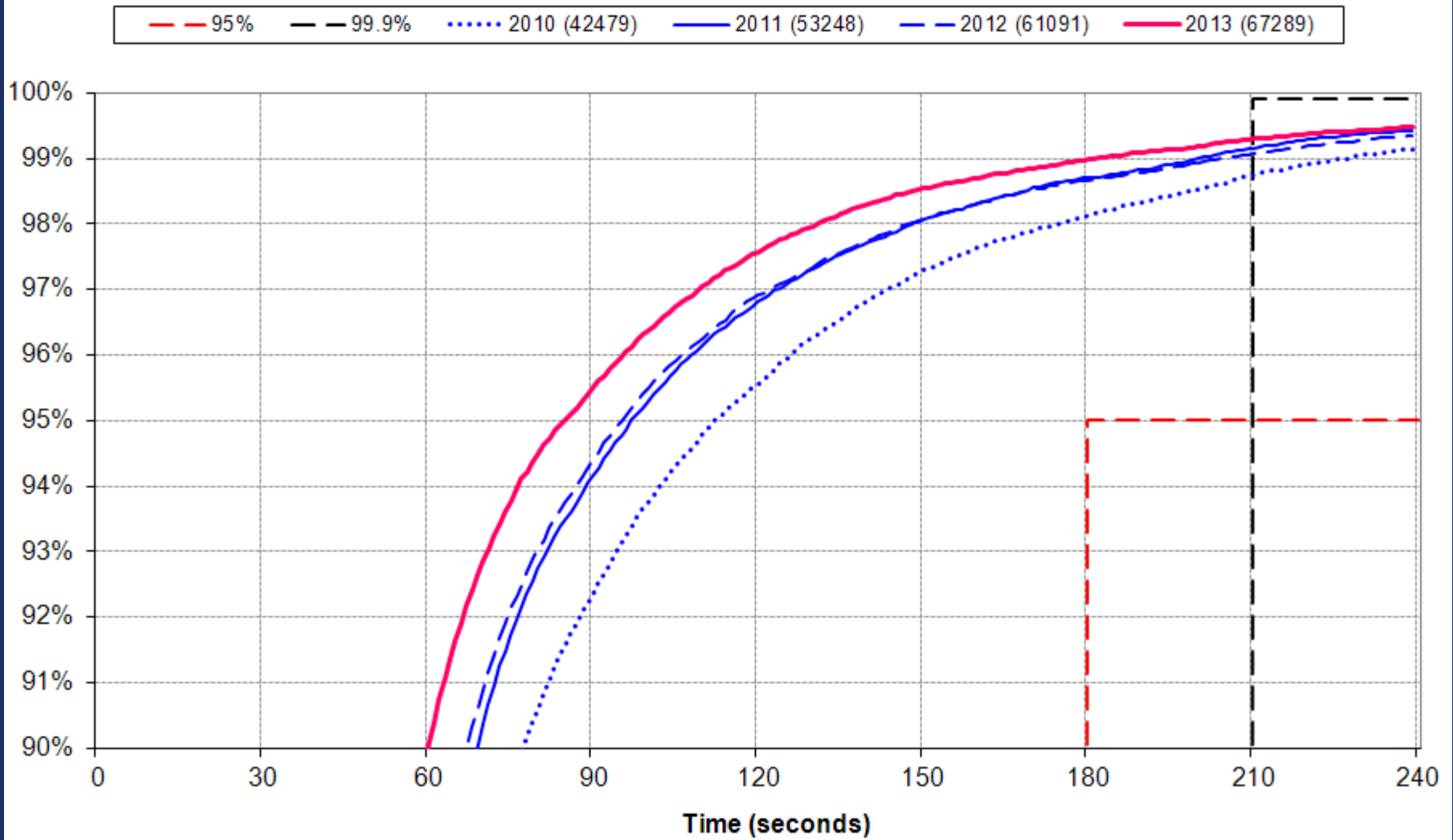


2010 - 2013

ANNUAL AGGREGATE FIR PERFORMANCE

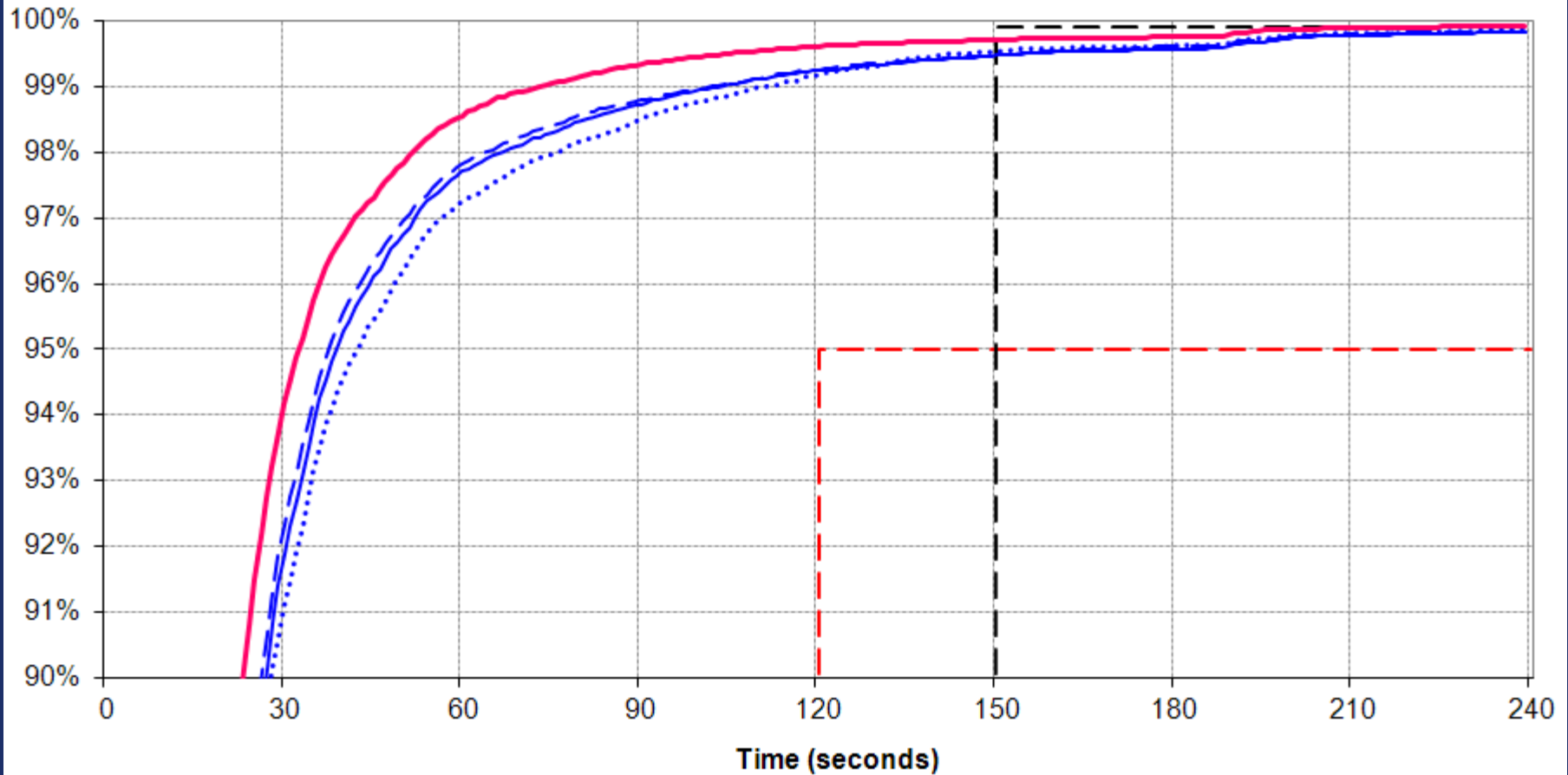


Actual Communication Performance (ACP) New York FIR Aggregate



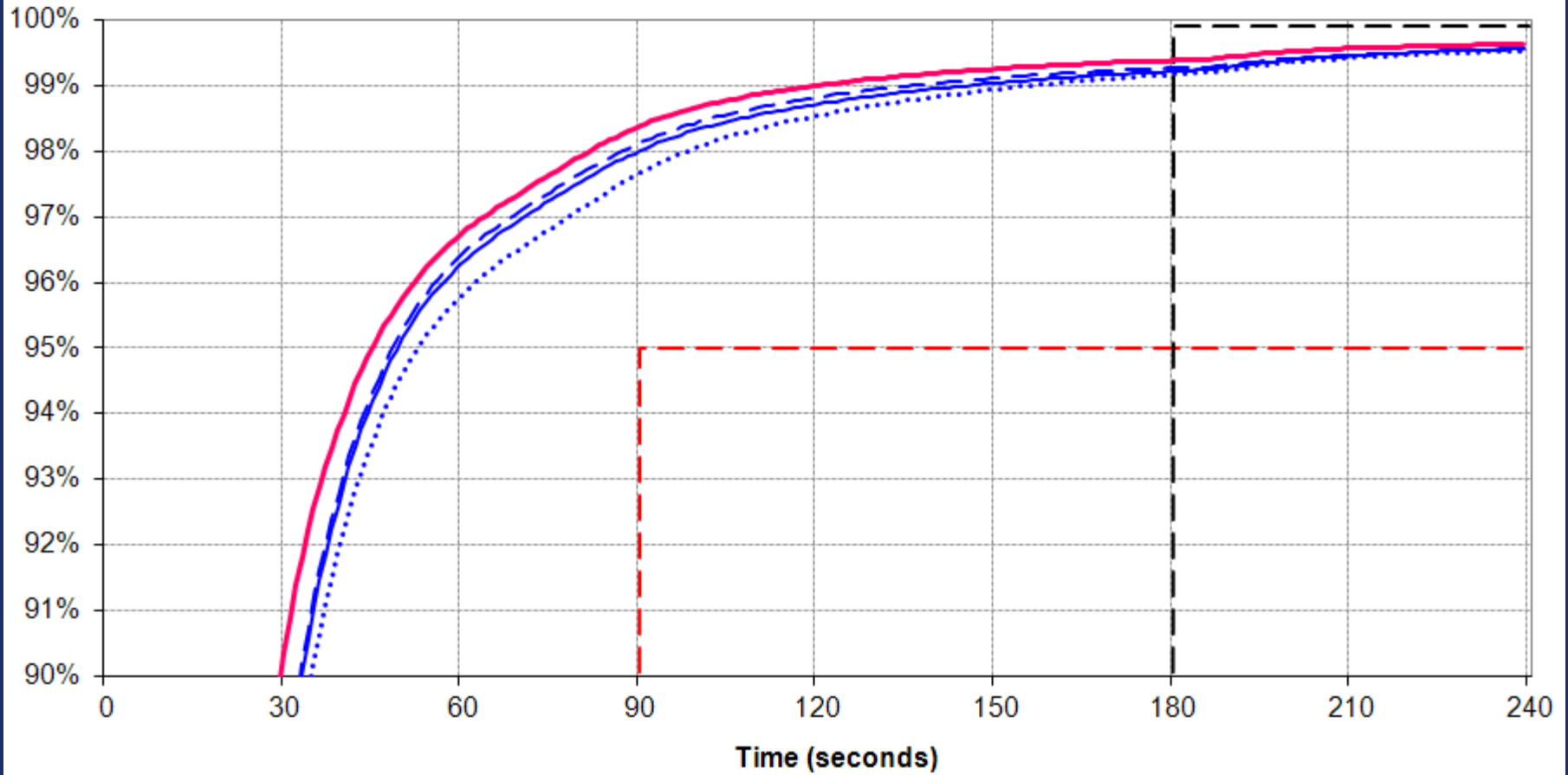
Actual Communication Technical Performance (ACTP) New York FIR Aggregate

--- 95%
 --- 99.9%
 2010 (42479)
 --- 2011 (53248)
 --- 2012 (61091)
 --- 2013 (67289)



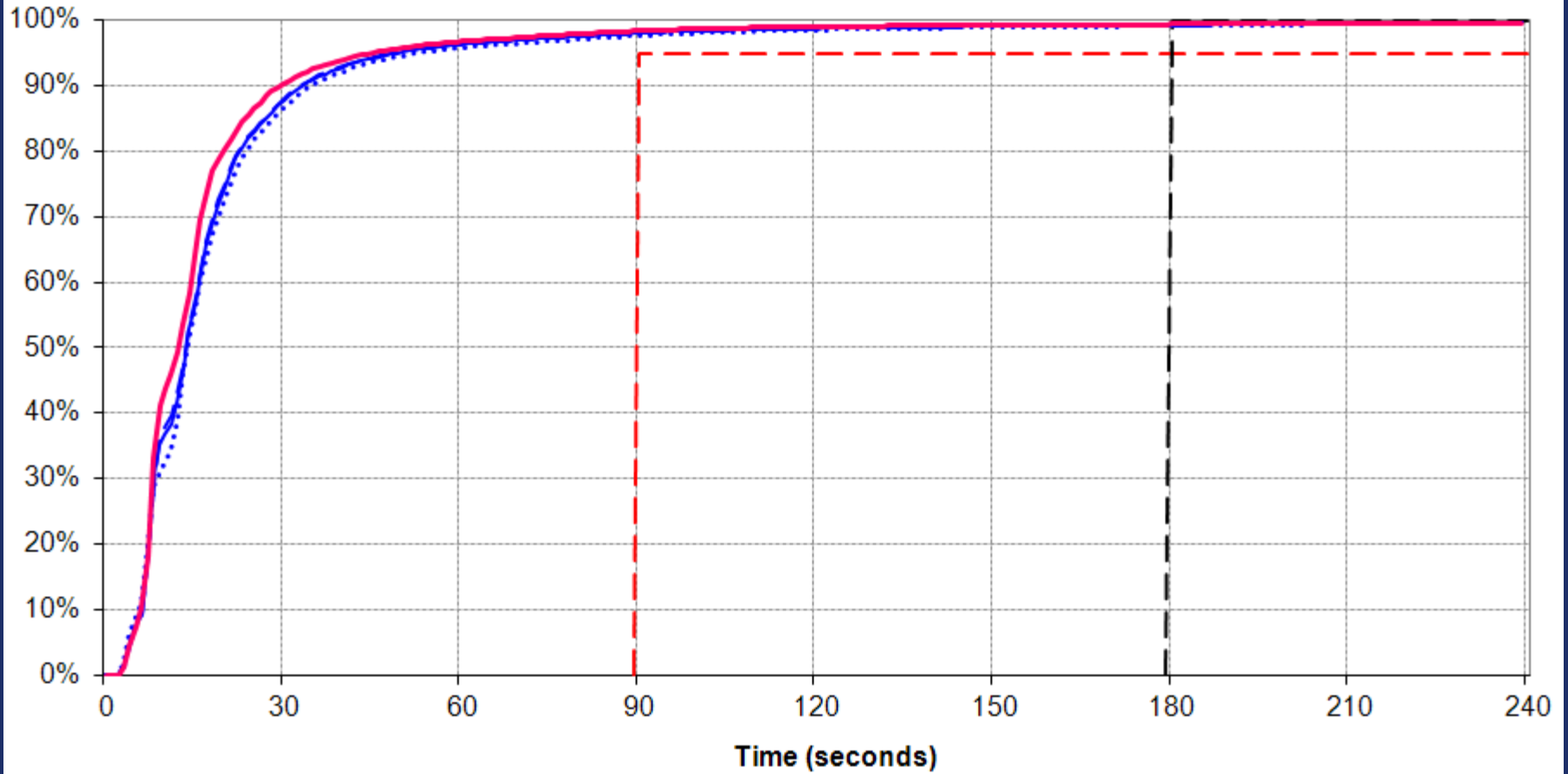
Actual Surveillance Performance (ASP) New York FIR Aggregate

— 95% — 99.9% 2010 (961373) — 2011 (1061388) — 2012 (1254523) — 2013 (1572667)



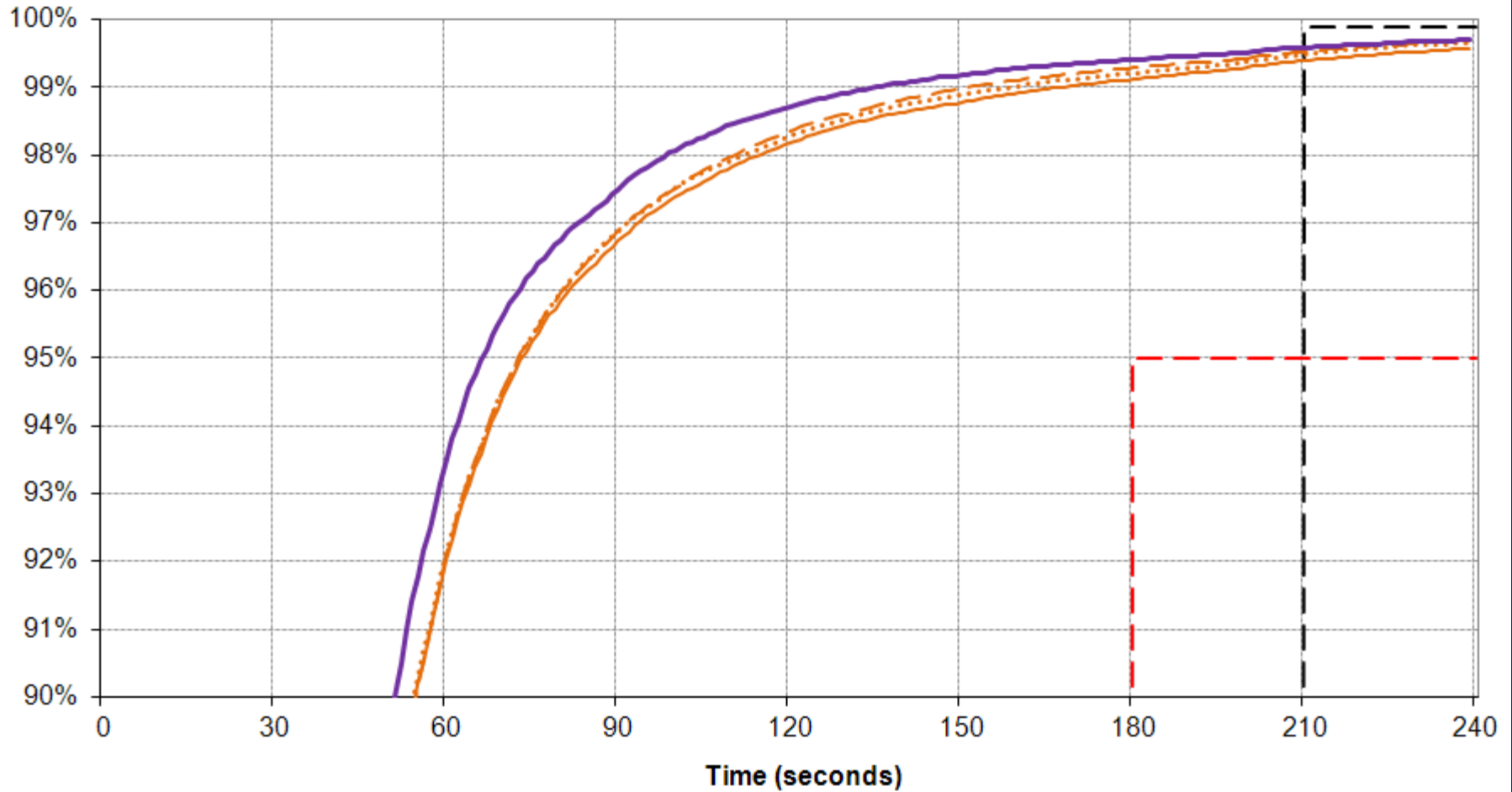
Actual Surveillance Performance (ASP) New York FIR Aggregate

— 95% — 99.9% 2010 (961373) — 2011 (1061388) — 2012 (1254523) — 2013 (1572667)

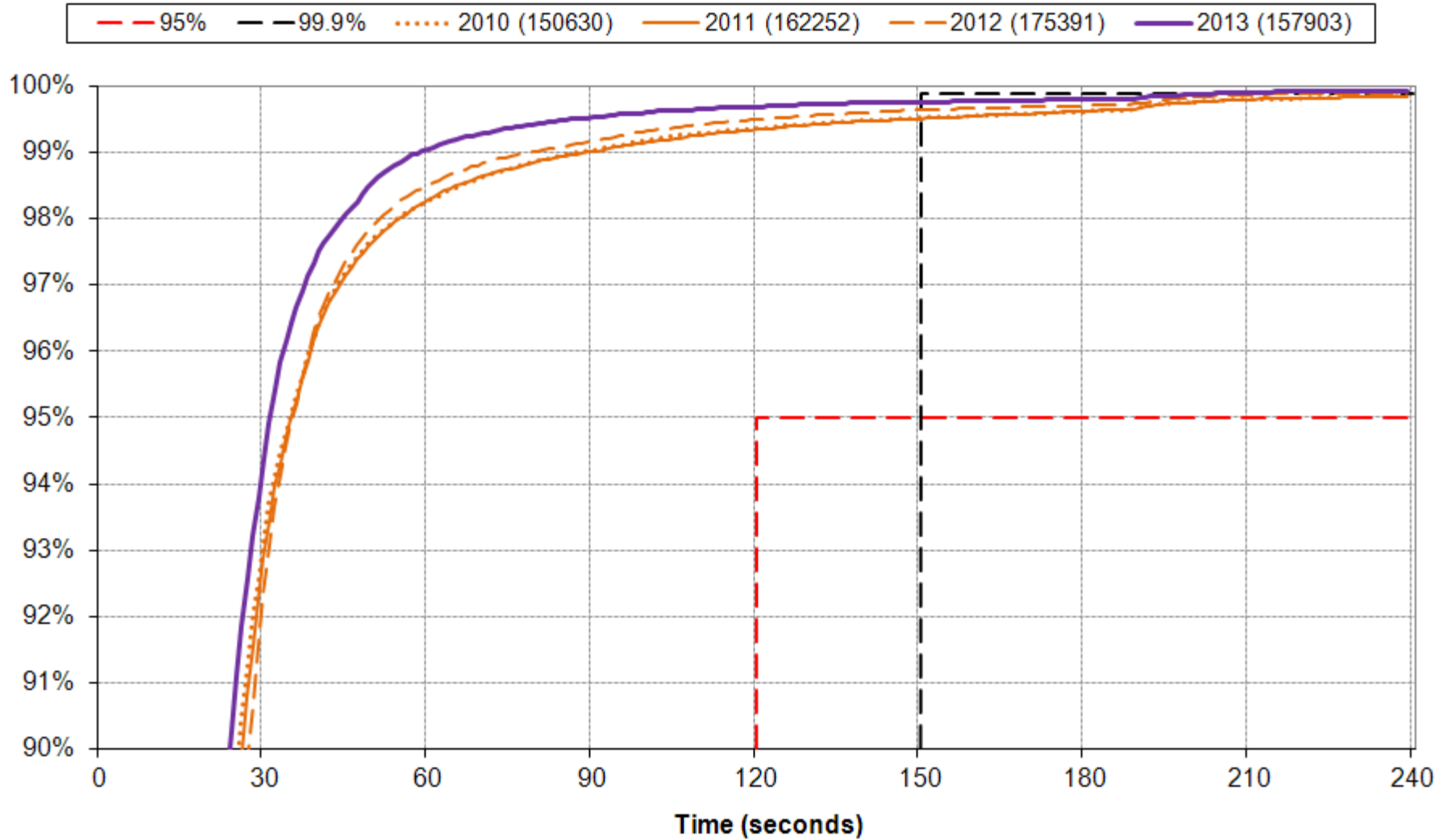


Actual Communication Performance (ACP) Oakland FIR Aggregate

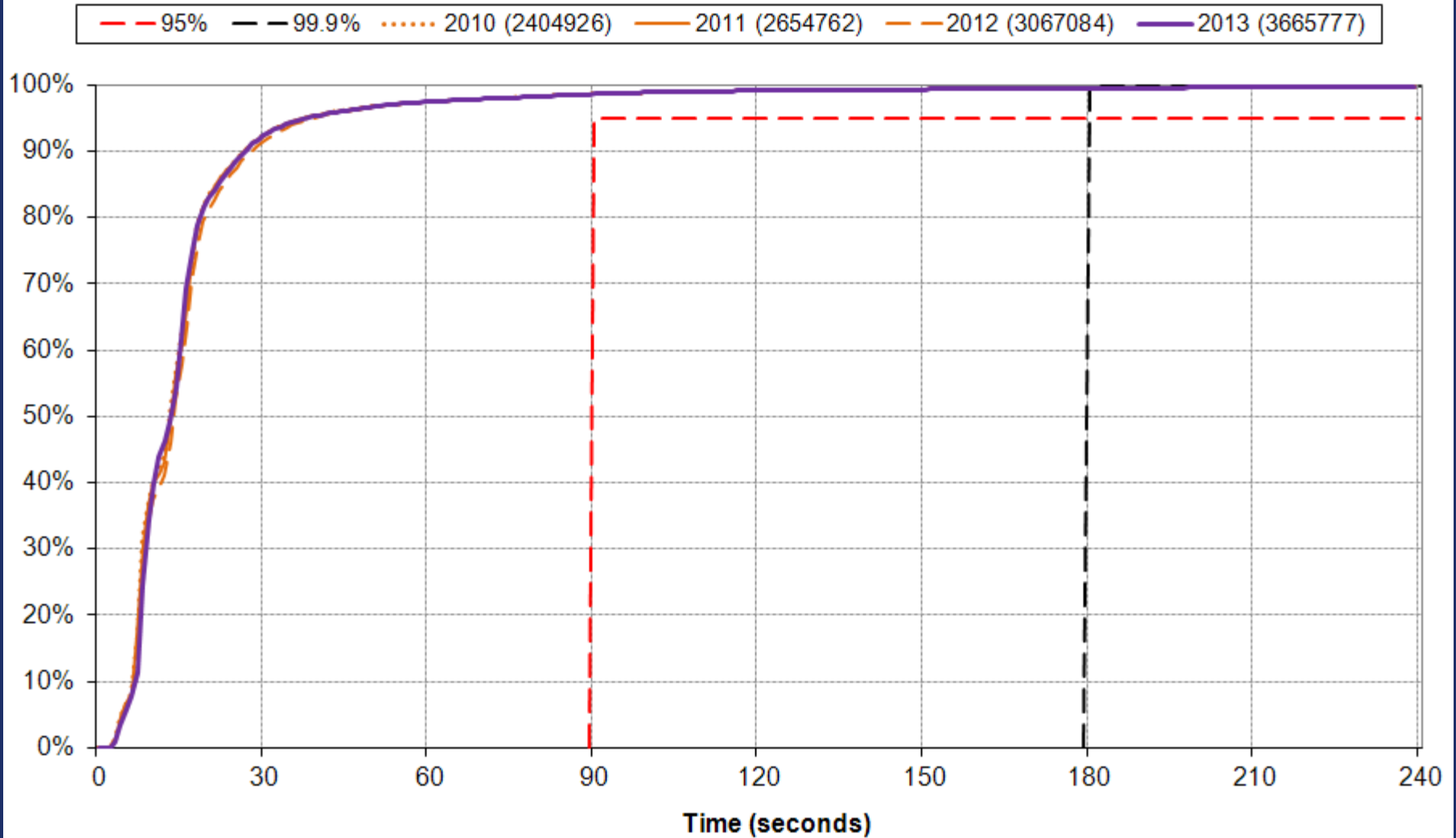
--- 95%
 --- 99.9%
 --- 2010 (150630)
 --- 2011 (162252)
 --- 2012 (175391)
 --- 2013 (157903)



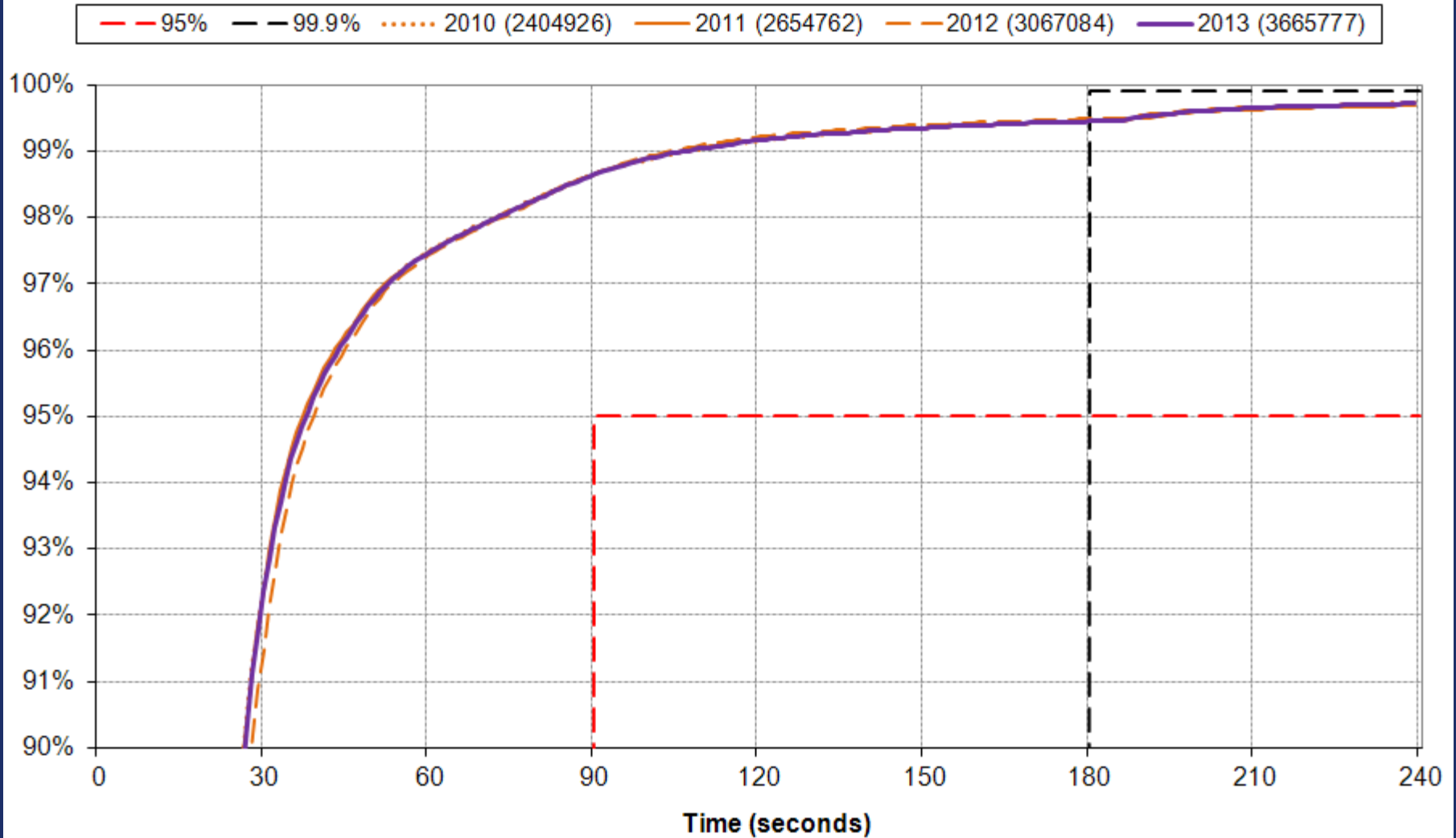
Actual Communication Technical Performance (ACTP) Oakland FIR Aggregate



Actual Surveillance Performance (ASP) Oakland FIR Aggregate

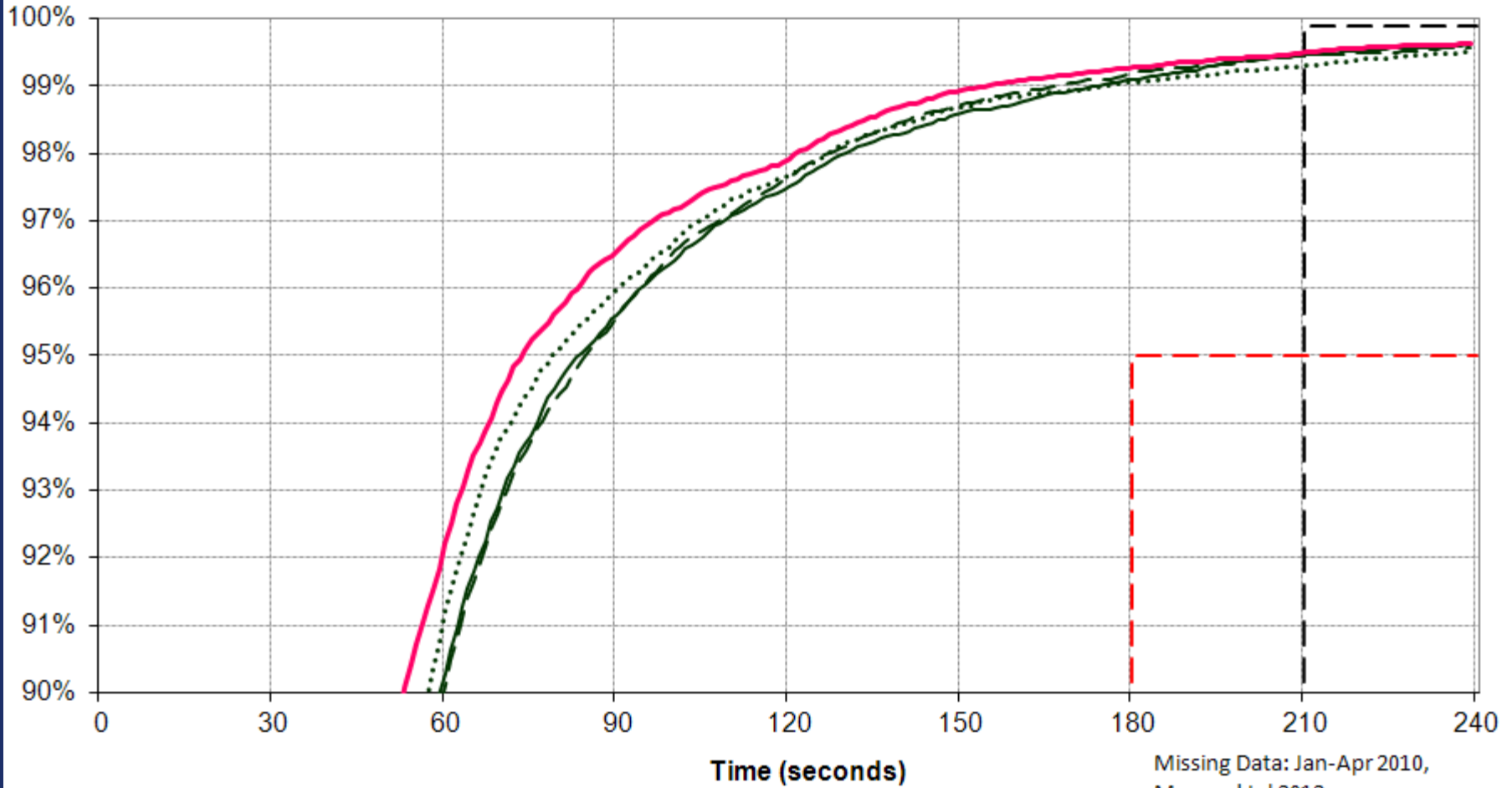


Actual Surveillance Performance (ASP) Oakland FIR Aggregate



Actual Communication Performance (ACP) Anchorage FIR Aggregate

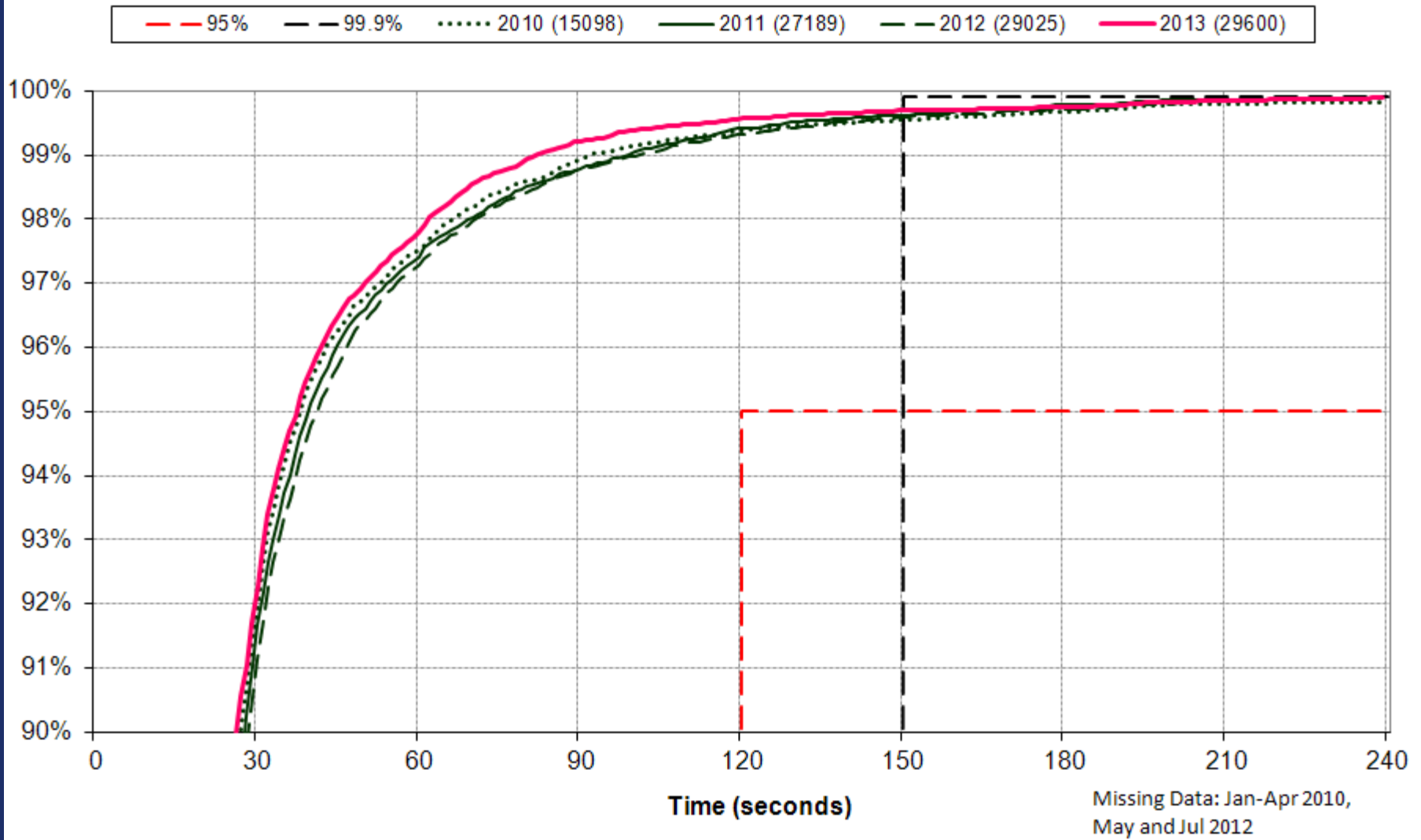
--- 95%
 --- 99.9%
 2010 (15098)
 --- 2011 (27189)
 --- 2012 (29025)
 --- 2013 (29600)



Missing Data: Jan-Apr 2010,
May and Jul 2012

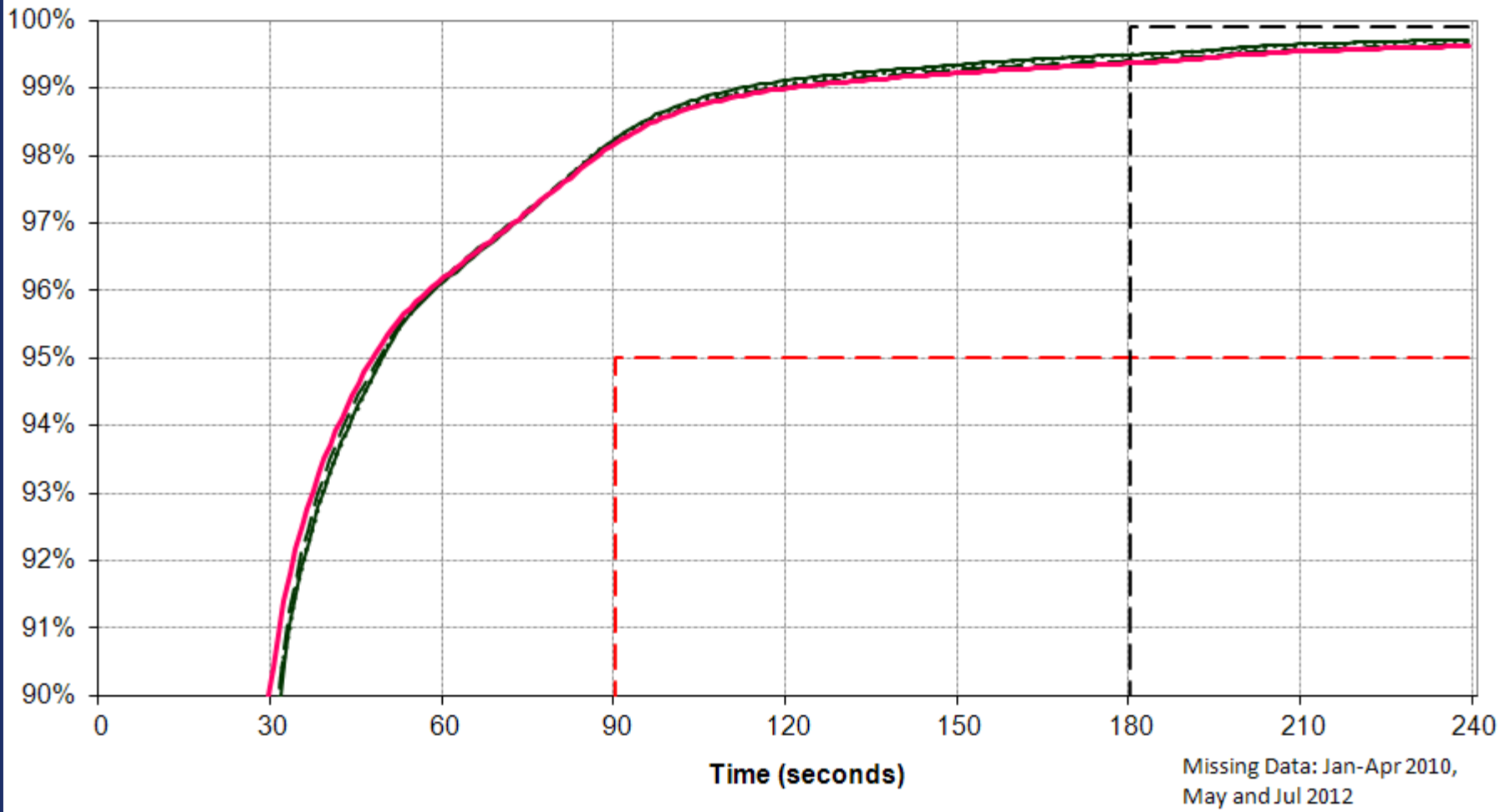


Actual Communication Technical Performance (ACTP) Anchorage FIR Aggregate



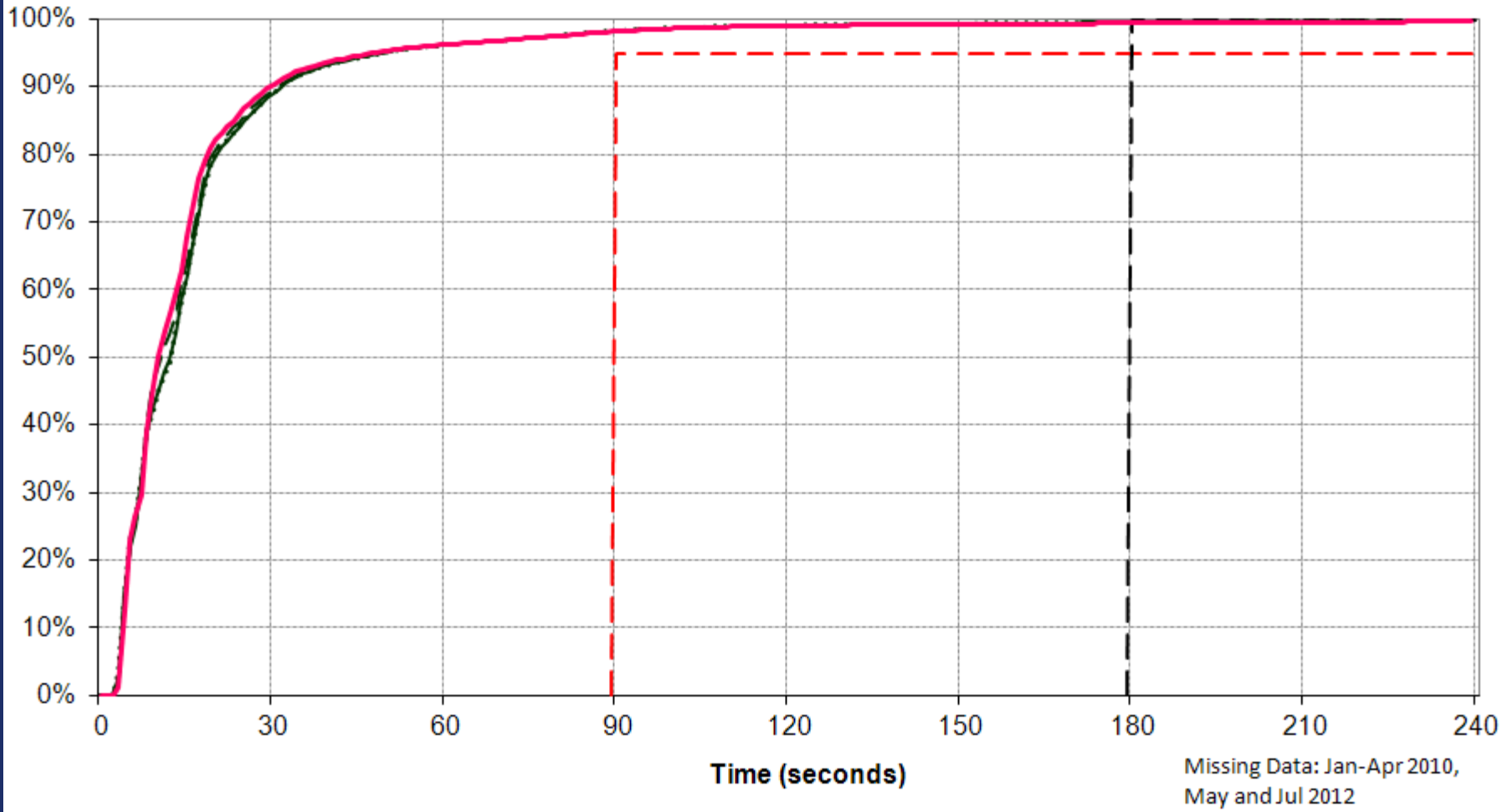
Actual Surveillance Performance (ASP) Anchorage FIR Aggregate

--- 95%
 --- 99.9%
 2010 (501976)
 --- 2011 (853616)
 --- 2012 (918343)
 --- 2013 (1406454)



Actual Surveillance Performance (ASP) Anchorage FIR Aggregate

--- 95%
 --- 99.9%
 2010 (501976)
 --- 2011 (853616)
 --- 2012 (918343)
 --- 2013 (1406454)



Overview

- Analysis period: July to December 2013
- 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 2013

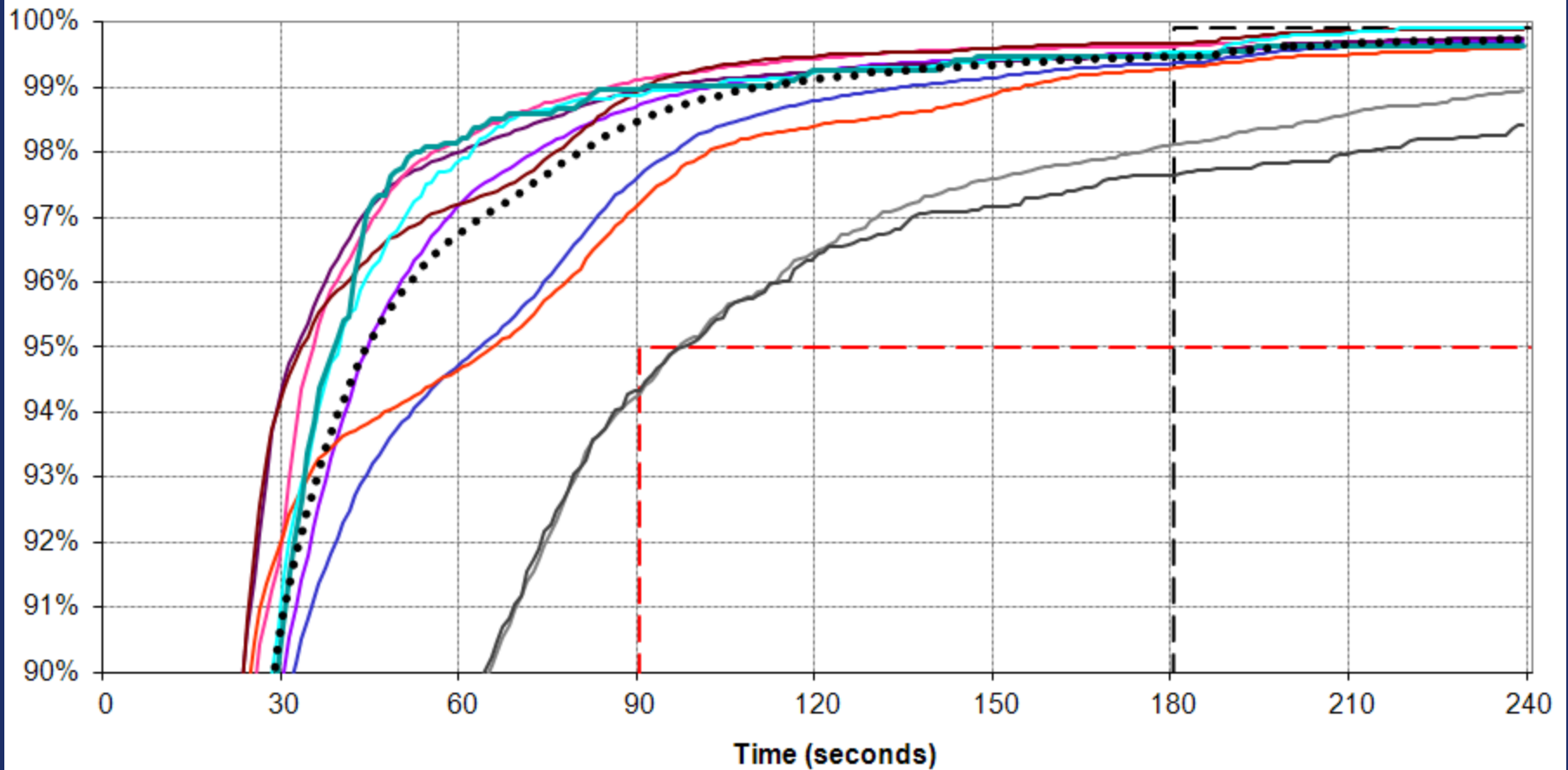
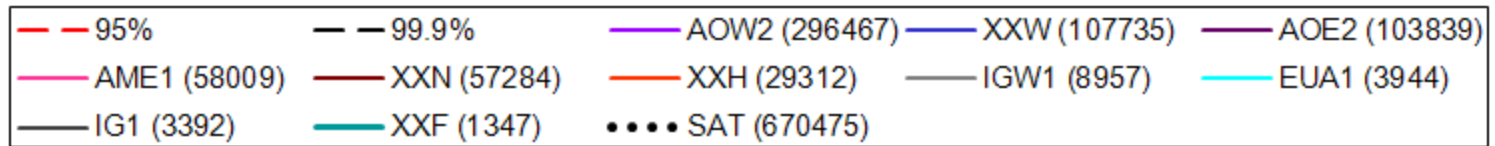
ADS-C PERFORMANCE BY STATION IDENTIFIER

Station/Gateway Identifiers

GES LOCATION(S)	SATELLITE/ REGION	SITA	ARINC
Borum, 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 2013 Actual Surveillance Performance (ASP)

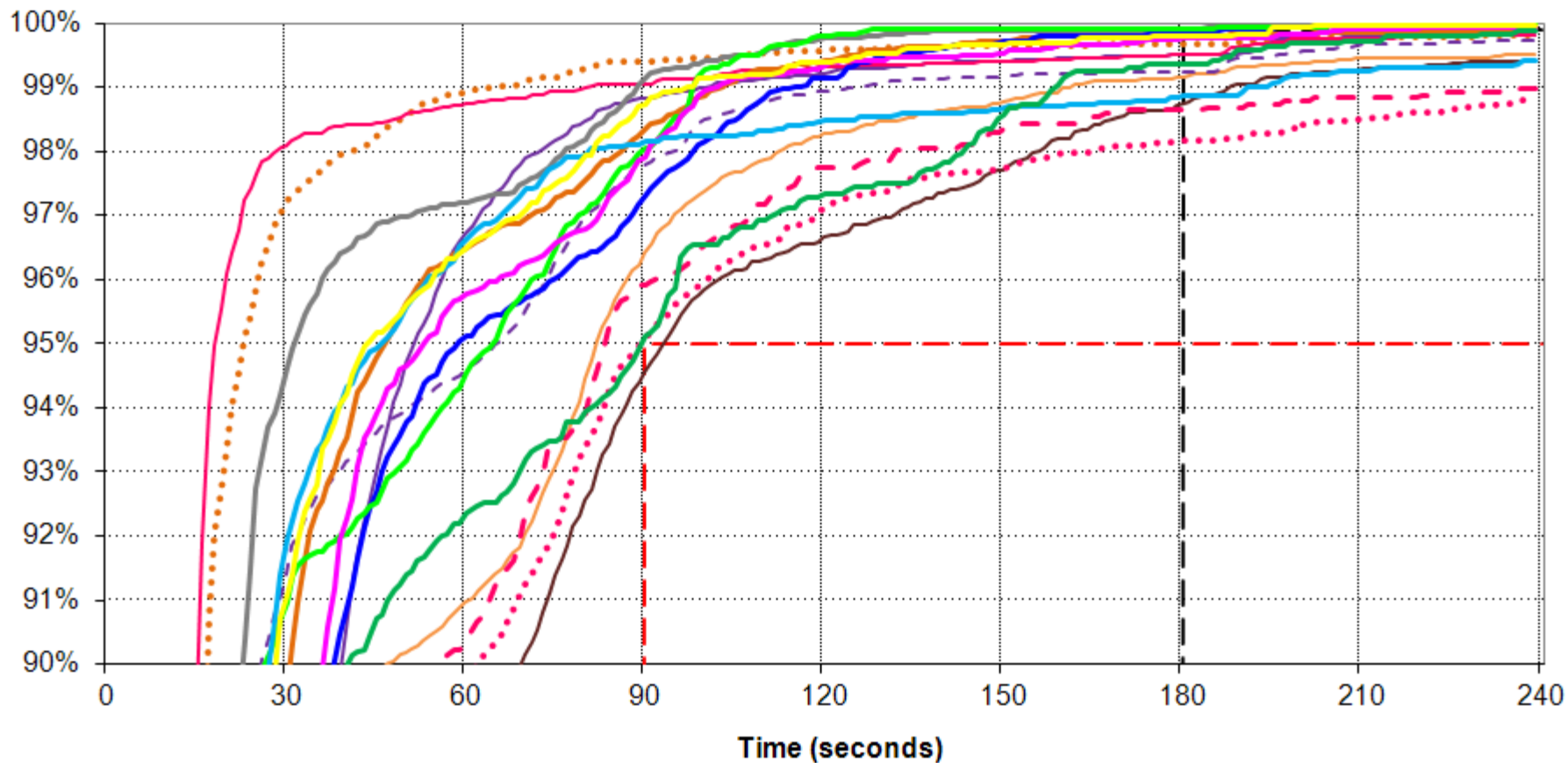
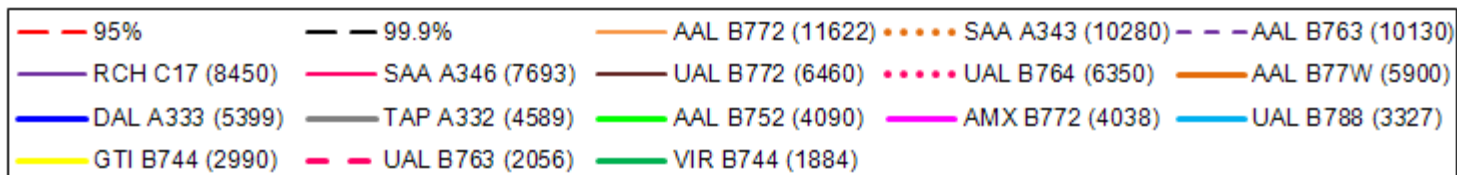


PR 1411-BC: Poor performance for AOR-E over I-3

- 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 (see chart on next slide)
- Still under investigation



New York FIR - XXW - December 2013 Actual Surveillance Performance (ASP)

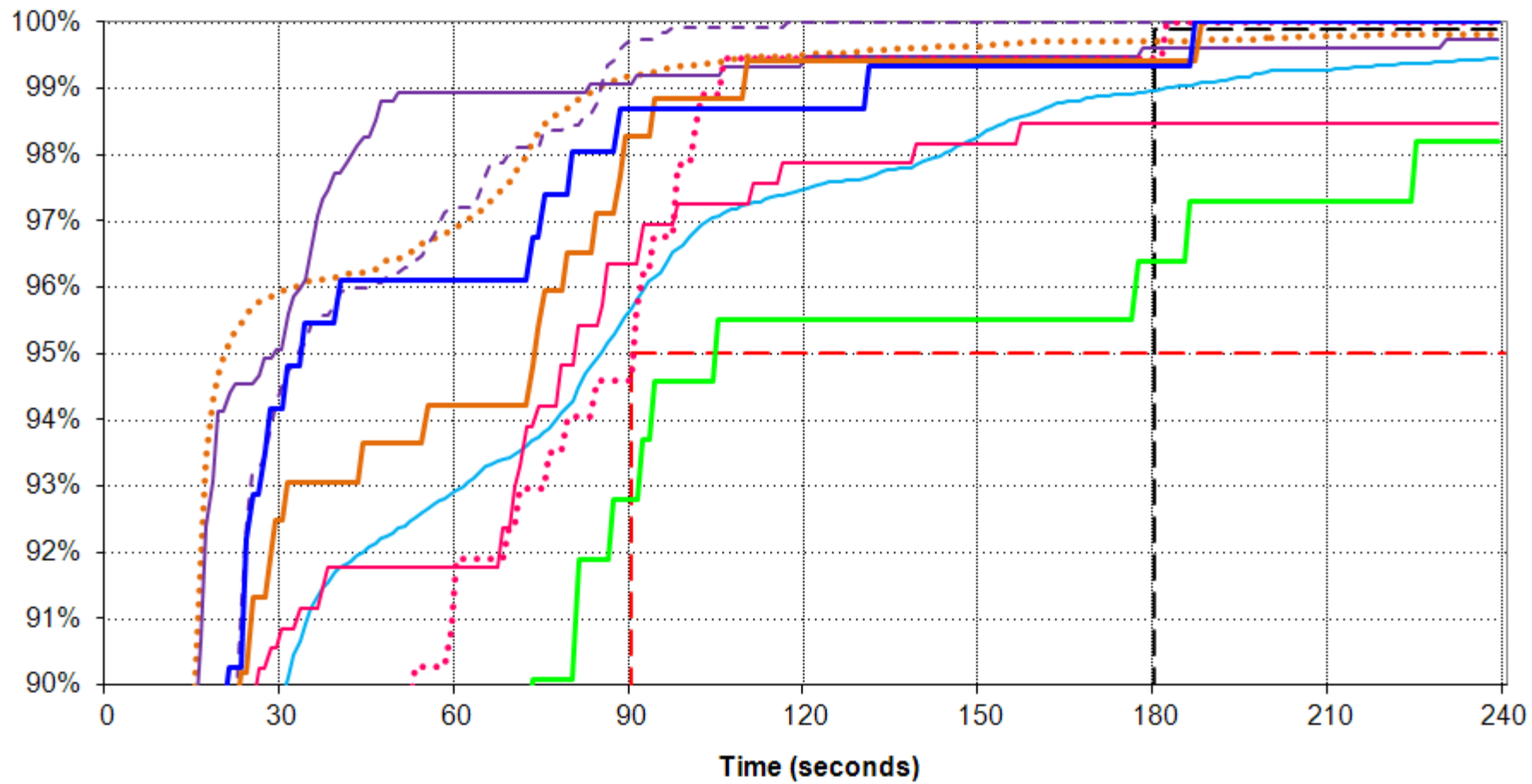
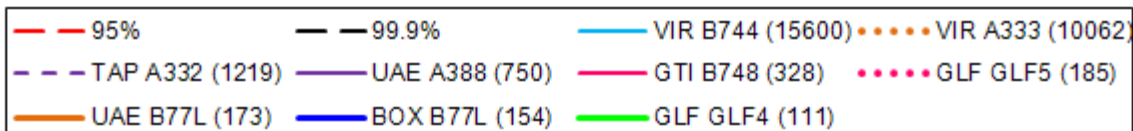


PR 1508-MM: Poor performance for AOR-E over I-4

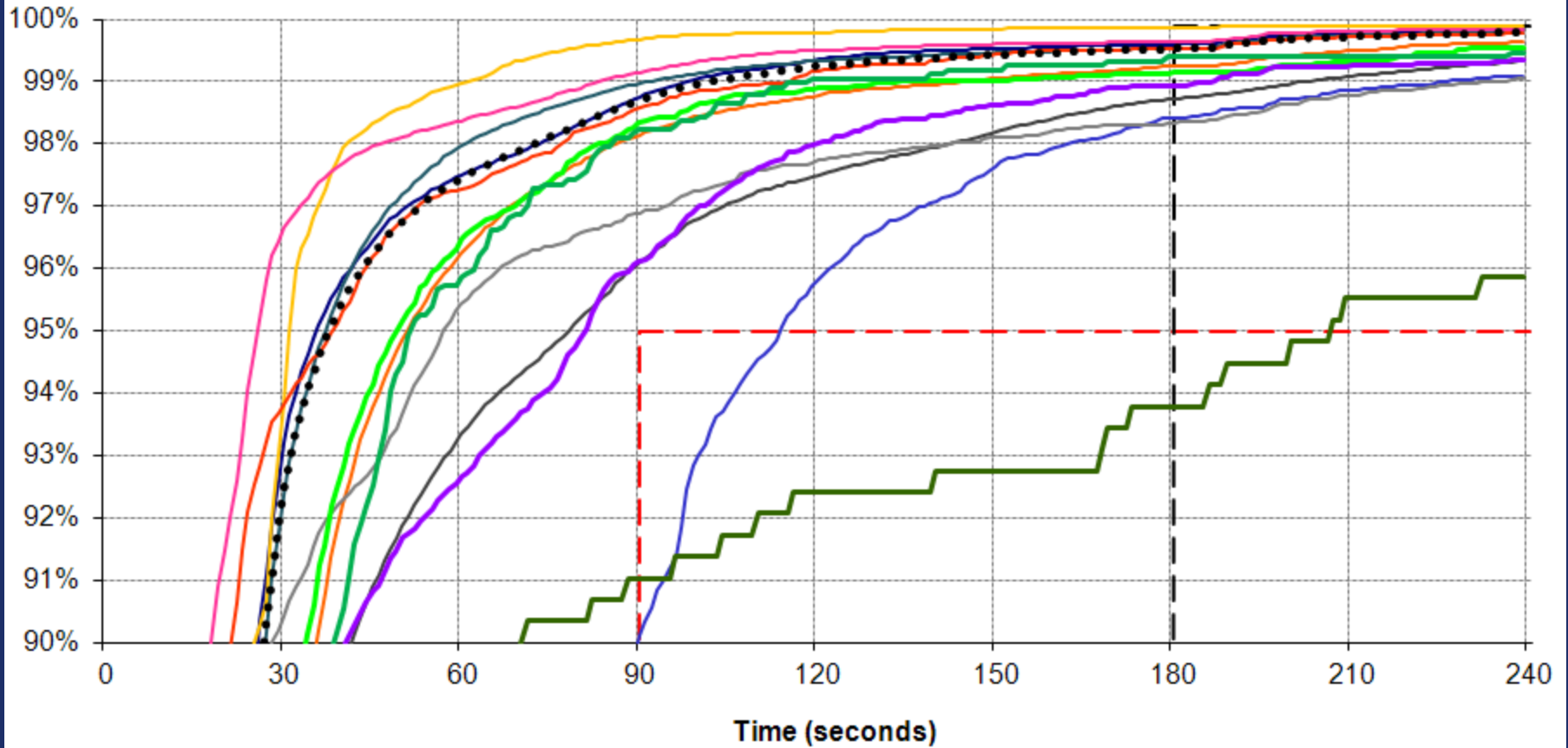
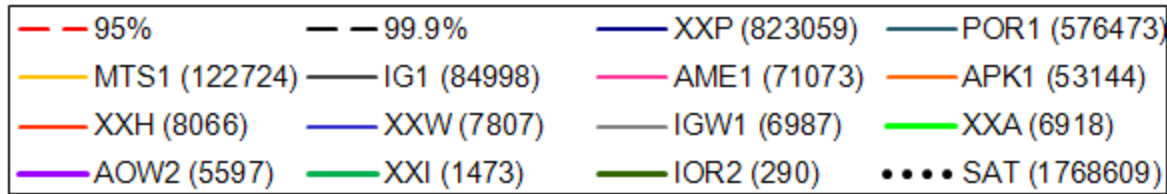
- Submitted PR to DLMA for performance over XXH – 2/5/2014
- Variation in performance by operator/aircraft type (see next slide)
- Still under investigation



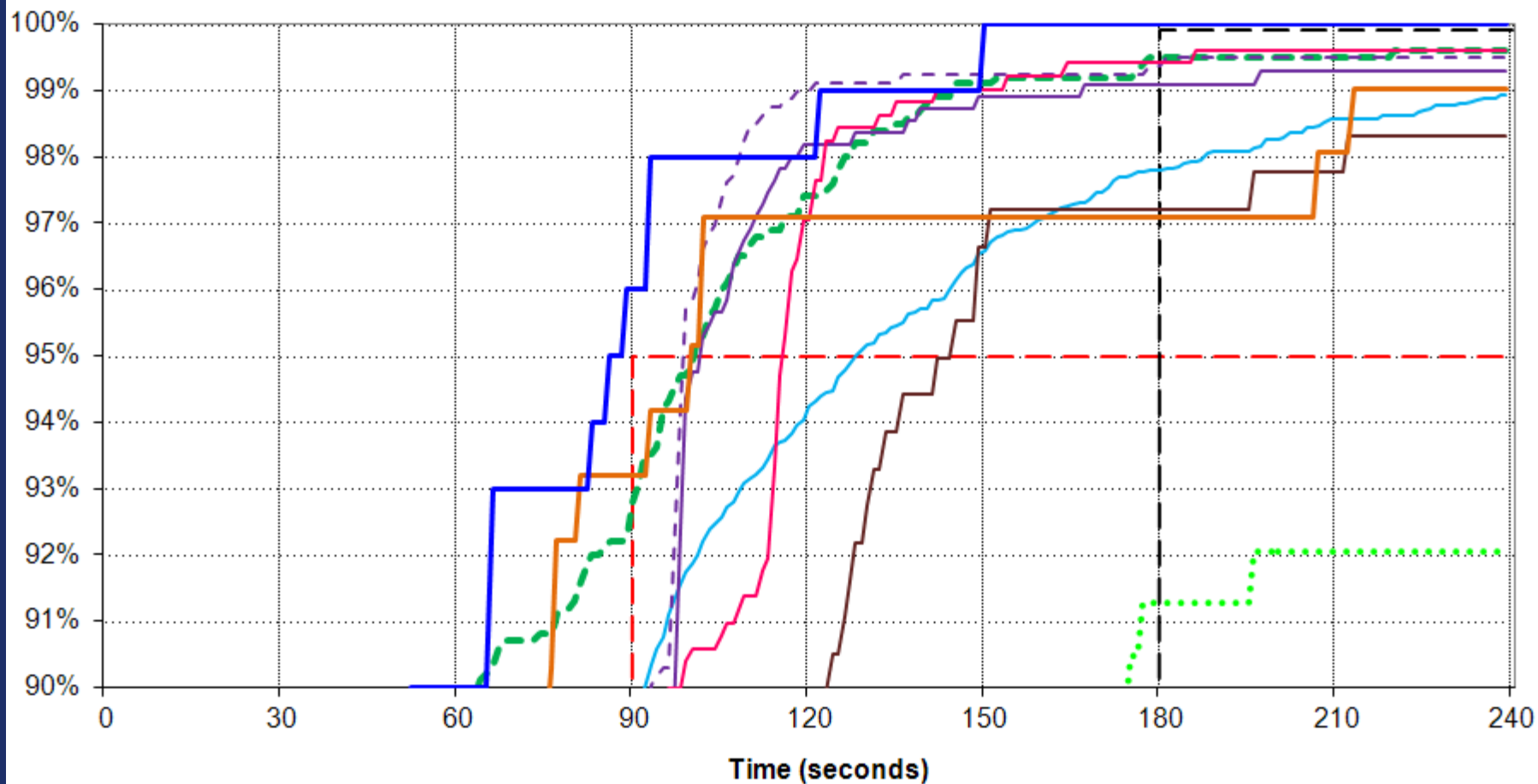
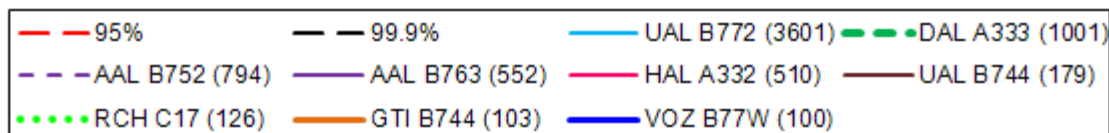
New York FIR - XXH - July to December 2013 Actual Surveillance Performance (ASP)



Oakland FIR - July to December 2013 Actual Surveillance Performance (ASP)

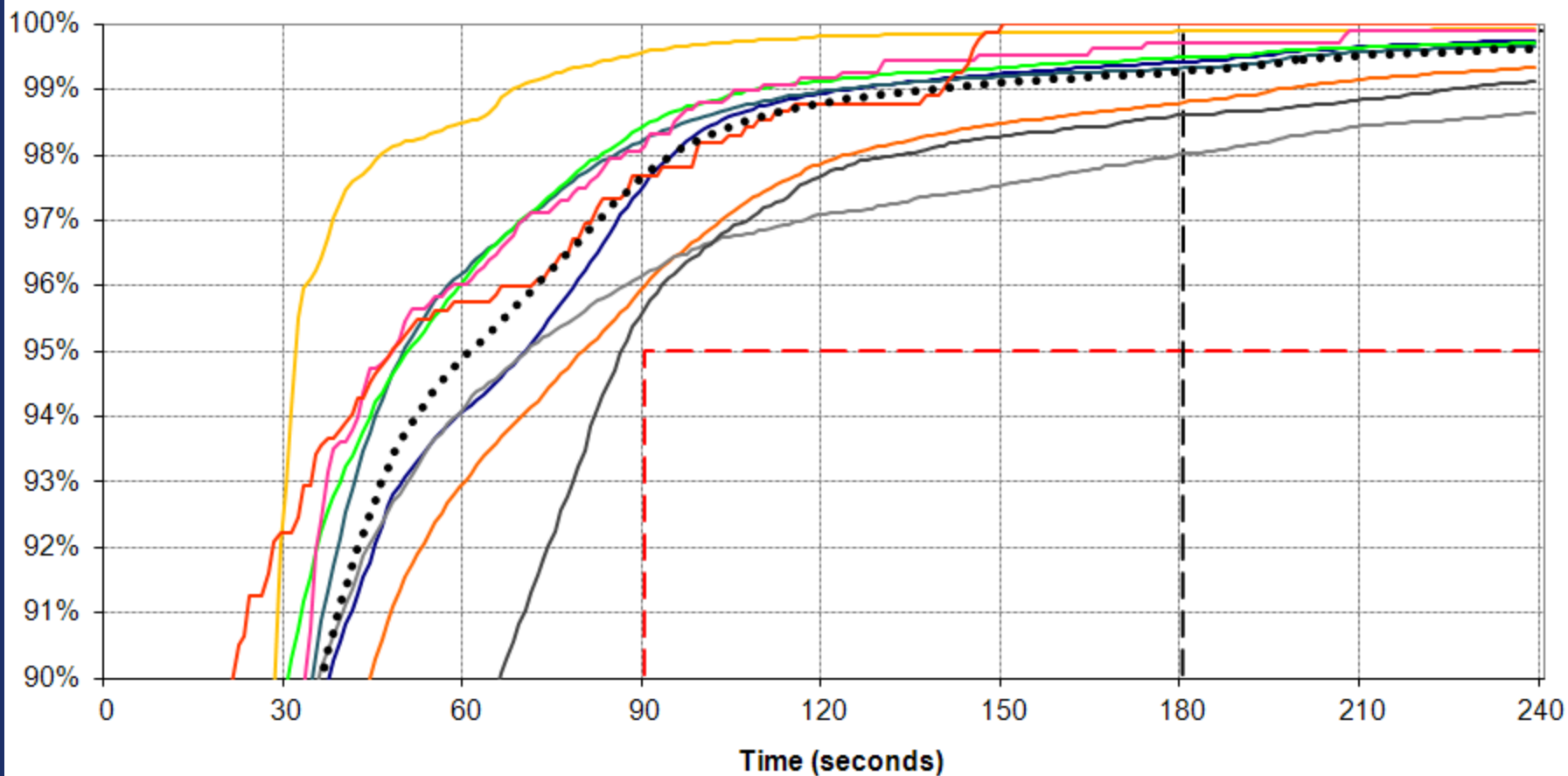


Oakland FIR - XXW - July to December 2013 Actual Surveillance Performance (ASP)



Anchorage FIR - July to December 2013

Actual Surveillance Performance (ASP)



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

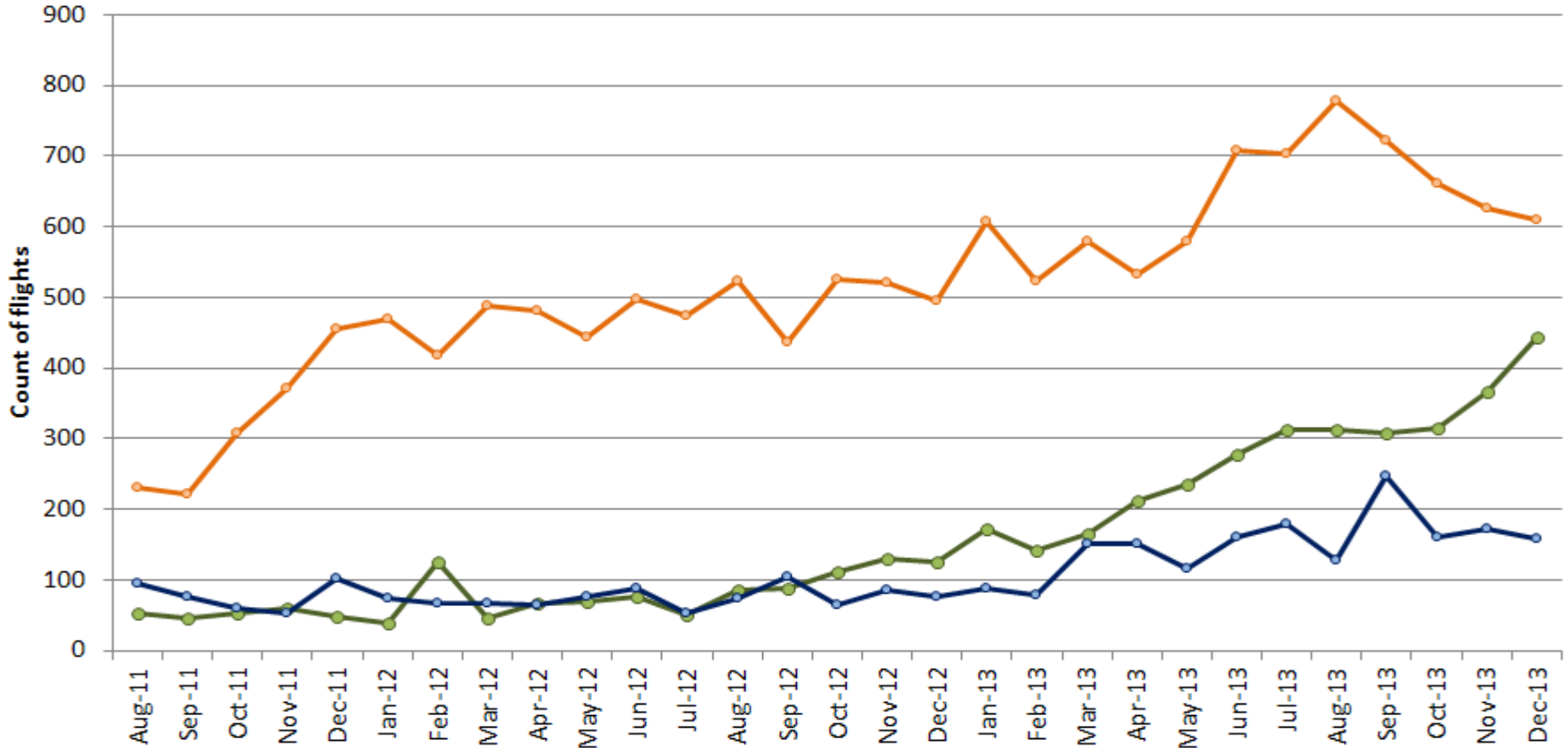
FANS OVER IRIDIUM (FOI)



Iridium Usage

Month	13-Jul	13-Dec
# Airframes	124	167

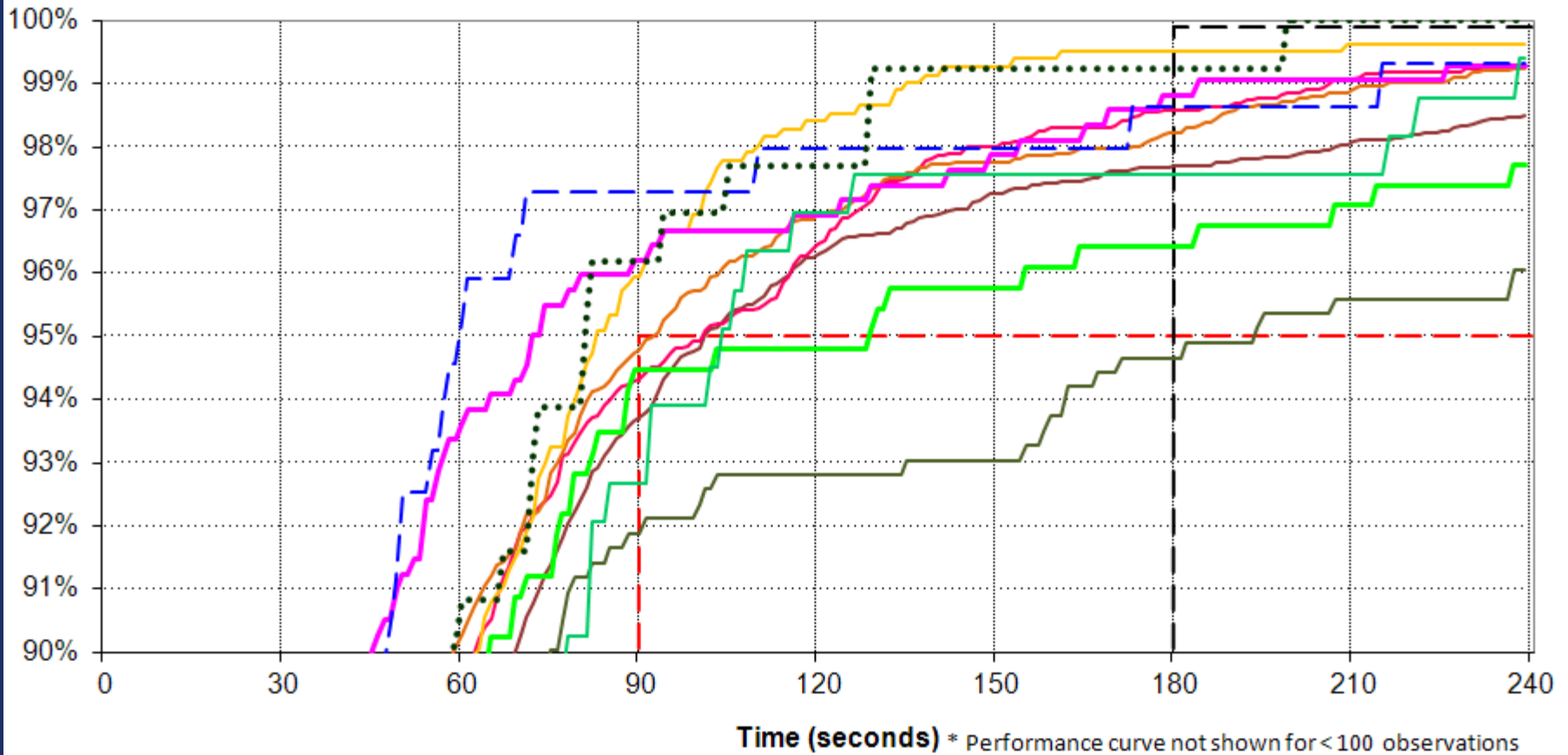
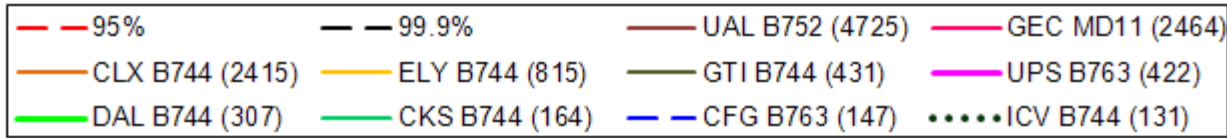
PAZA KZAK KZNY



	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
PAZA	54	45	52	59	49	39	125	47	67	68	77	50	87	87	112	130	125	173	141	164	213	236	277	312	312	307	315	367	443
KZAK	230	221	307	371	455	470	418	489	482	444	498	475	524	437	526	521	496	608	522	578	532	580	708	702	777	722	660	626	610
KZNY	95	76	61	53	103	75	67	66	64	77	89	54	75	105	64	85	76	89	79	151	151	115	160	180	127	246	161	172	159

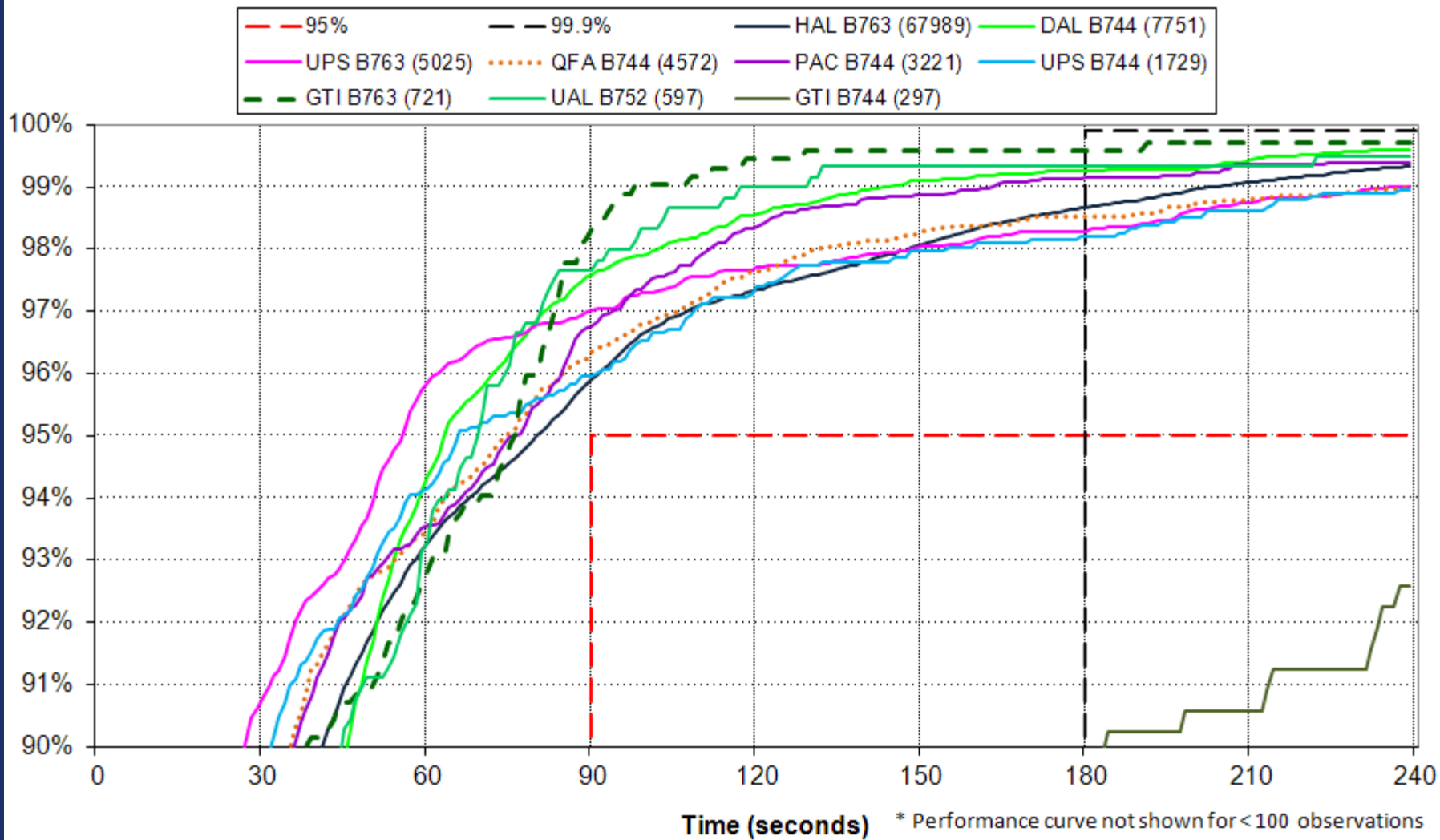


New York FIR - Iridium - July to December 2013 Actual Surveillance Performance (ASP)



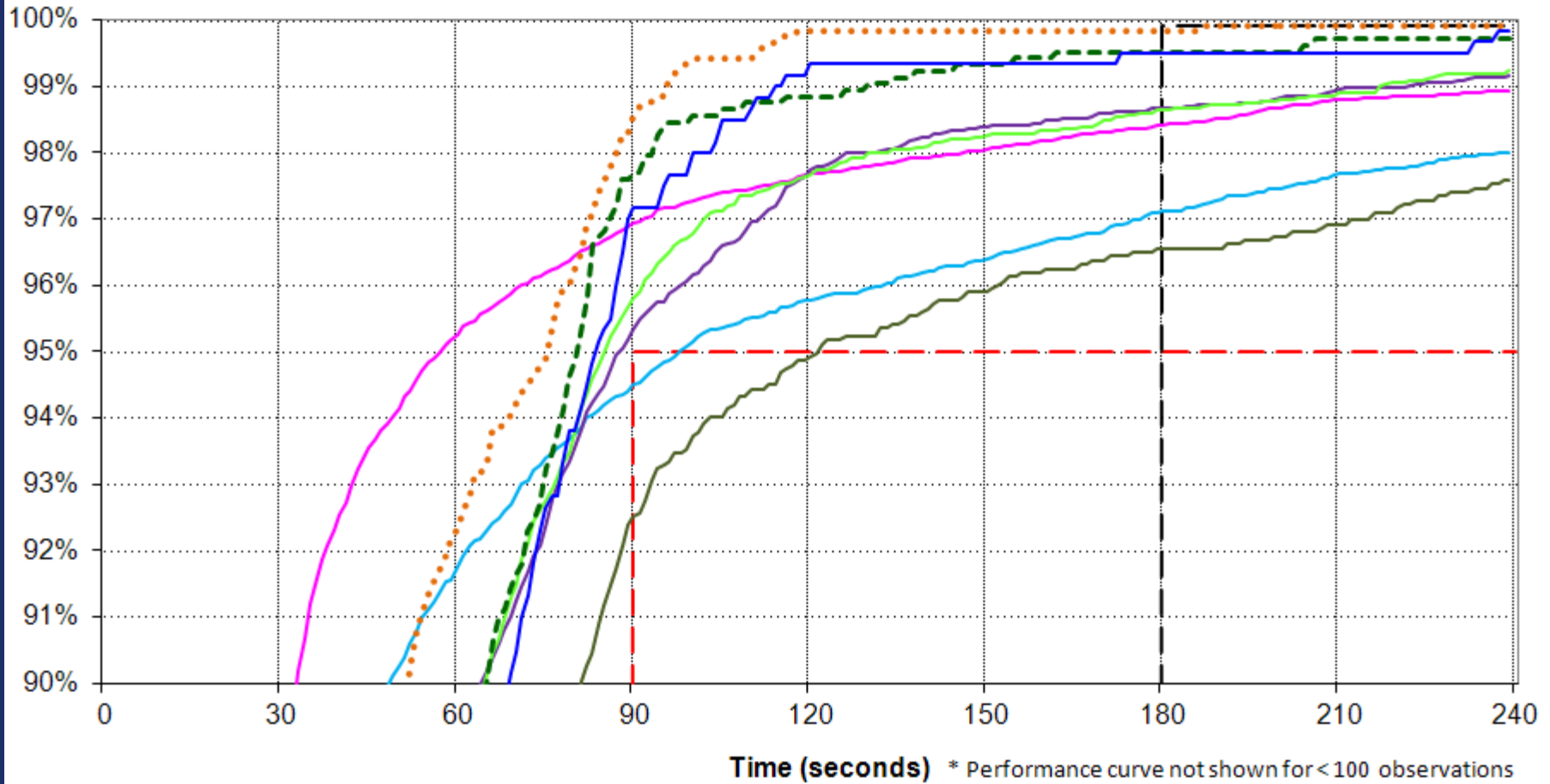
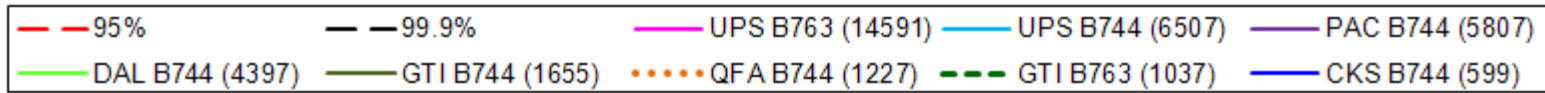
Oakland FIR - Iridium - July to December 2013

Actual Surveillance Performance (ASP)



Anchorage FIR - Iridium - July to December 2013

Actual Surveillance Performance (ASP)



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

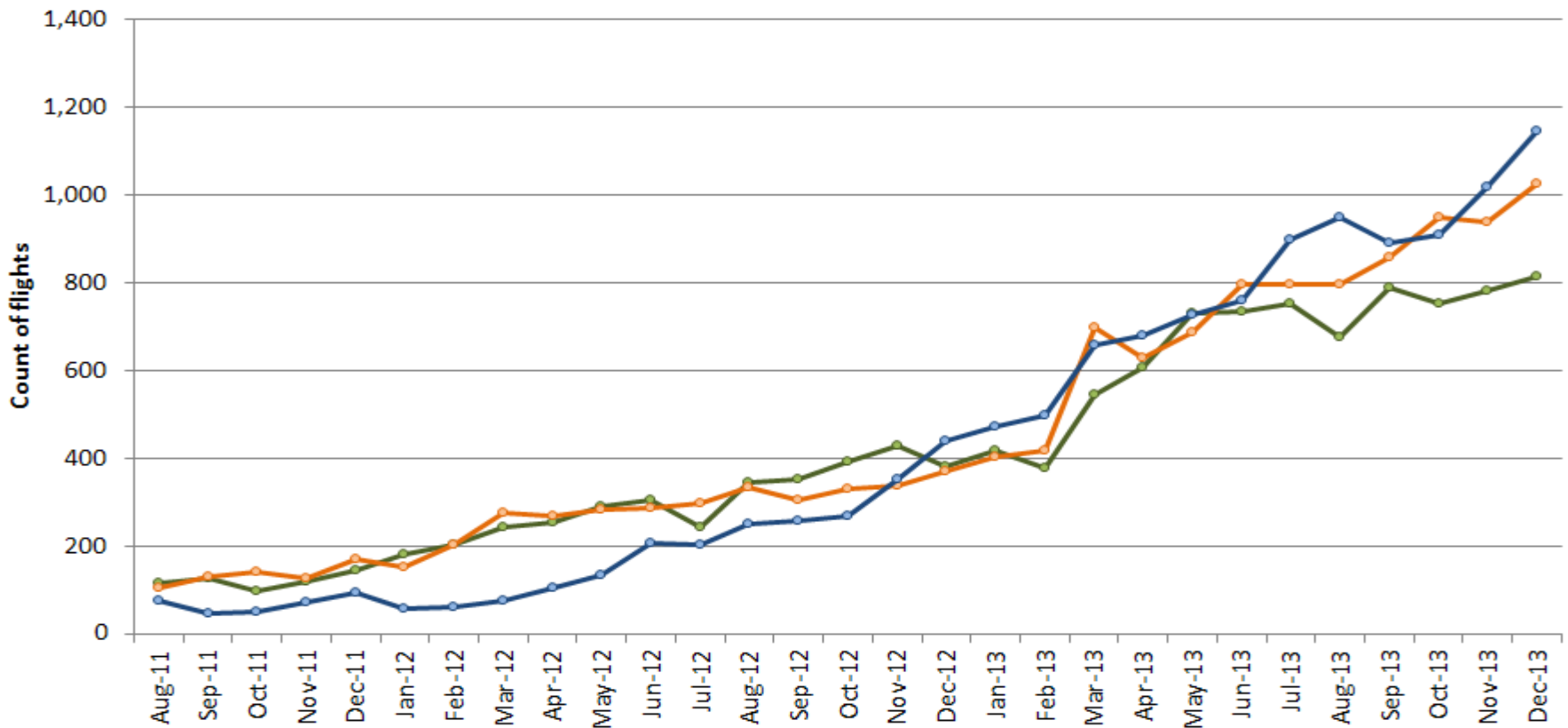
**FANS OVER INMARSAT CLASSIC AERO
(FOICA)**



FOICA Usage

Month	13-Jul	13-Dec
# Airframes	269	367

— PAZA — KZAK — KZNY



	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
PAZA	116	127	96	118	145	181	203	244	253	291	304	242	345	350	392	429	382	418	376	546	608	729	733	753	677	787	750	782	815
KZAK	104	131	140	127	171	151	202	274	267	282	287	296	332	306	328	336	371	401	418	698	627	688	796	794	796	859	949	937	1025
KZNY	75	45	49	73	93	55	61	76	105	135	206	202	248	257	267	350	438	470	496	658	680	728	758	898	949	891	908	1016	1145



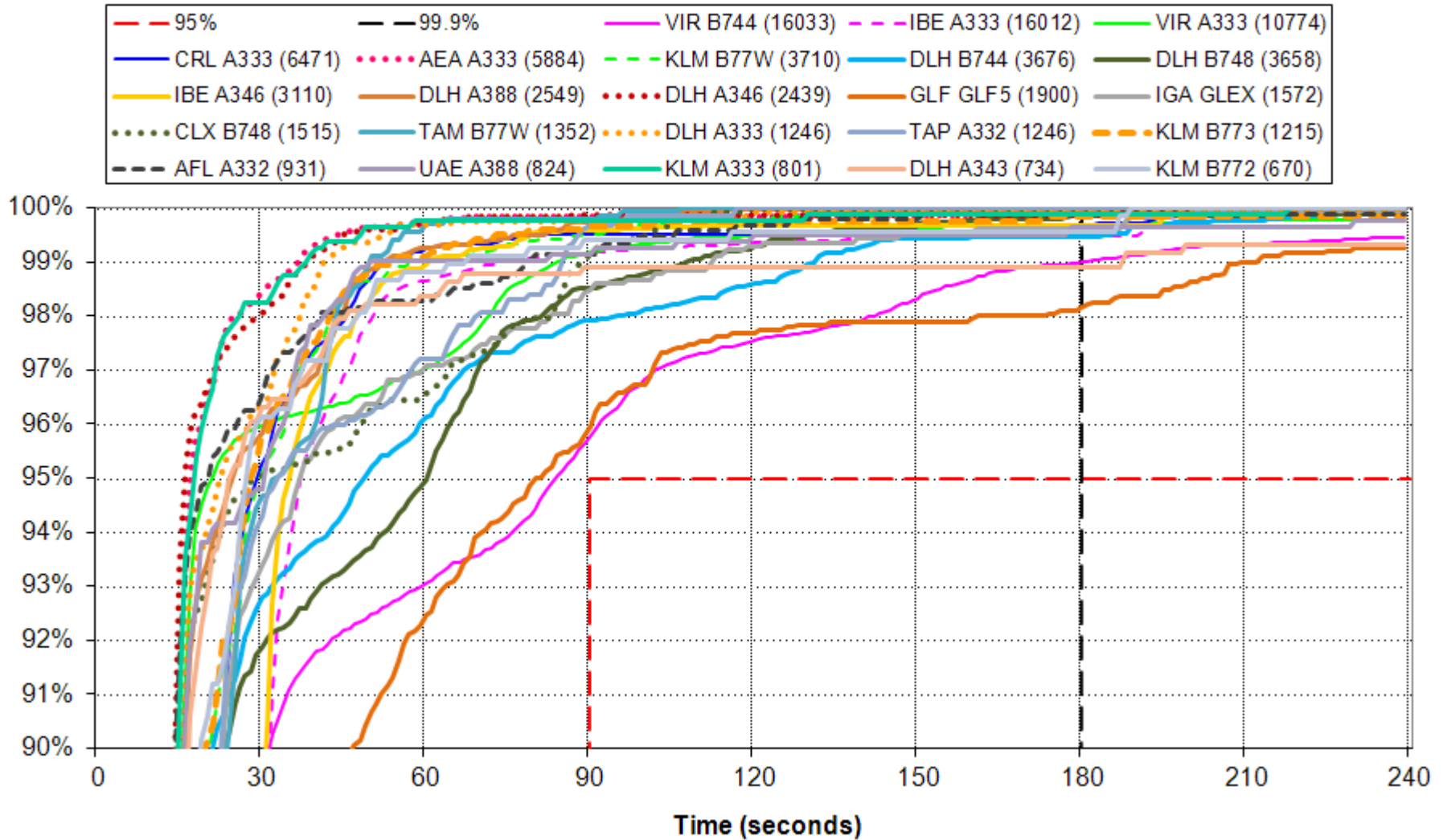
New York FIR – ASP

July – December 2013

- **36** operator/aircraft types observed with 100 or more ADS-C downlink reports during the 6-month period
- **All** meet the 95% criteria for RSP180 ASP
- **15** meet the 99.9% criteria for RSP180 ASP
- **4** do not meet the 99.9% criteria for RSP180 ASP at the rule-of-thumb 99.0%

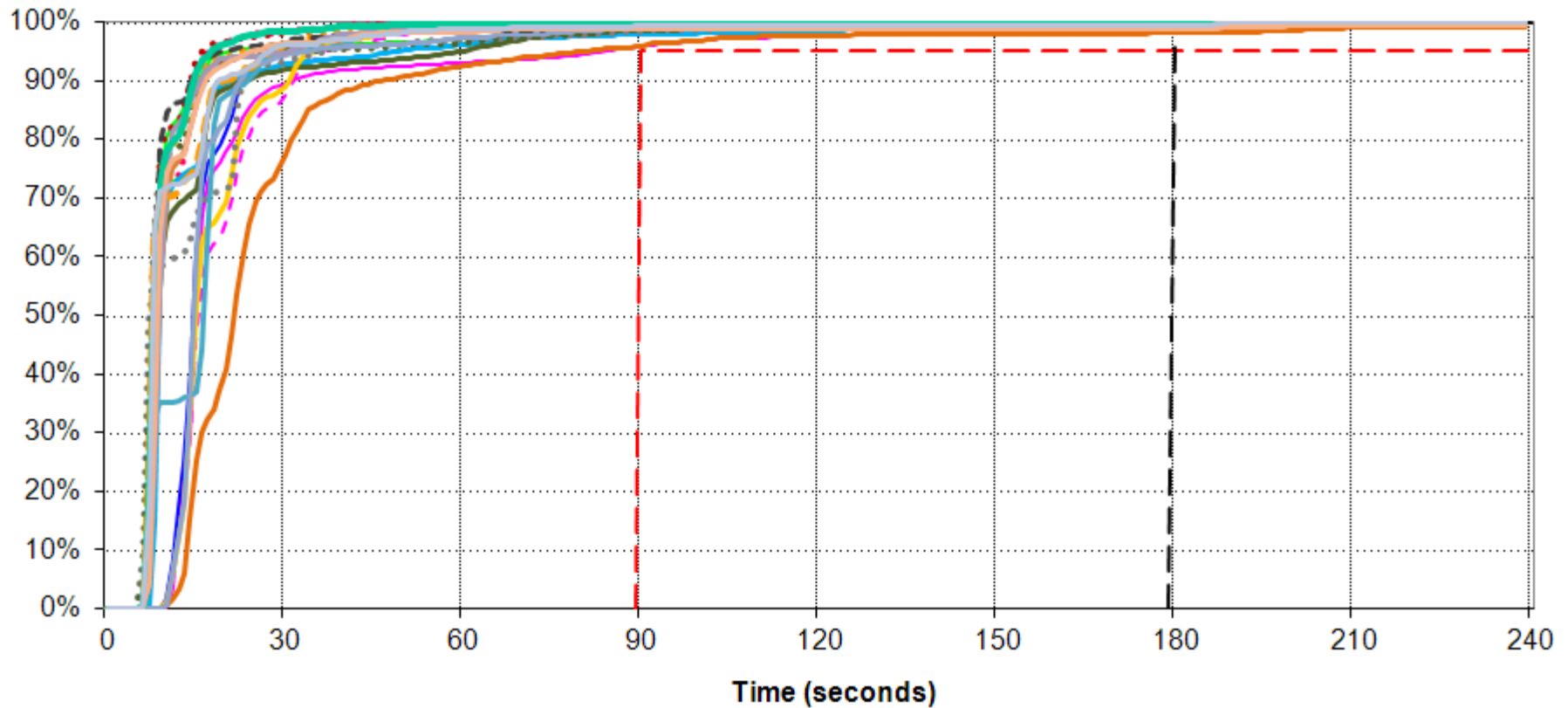
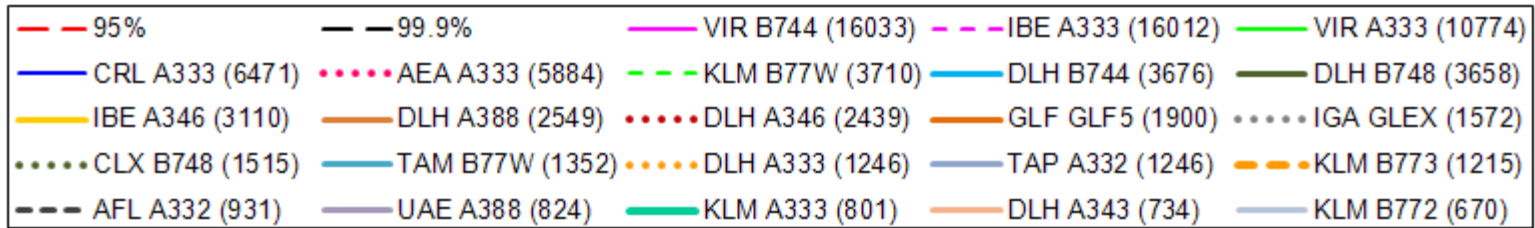


New York FIR - I4 - July to December 2013 Actual Surveillance Performance (ASP)



New York FIR - I4 - July to December 2013

Actual Surveillance Performance (ASP)



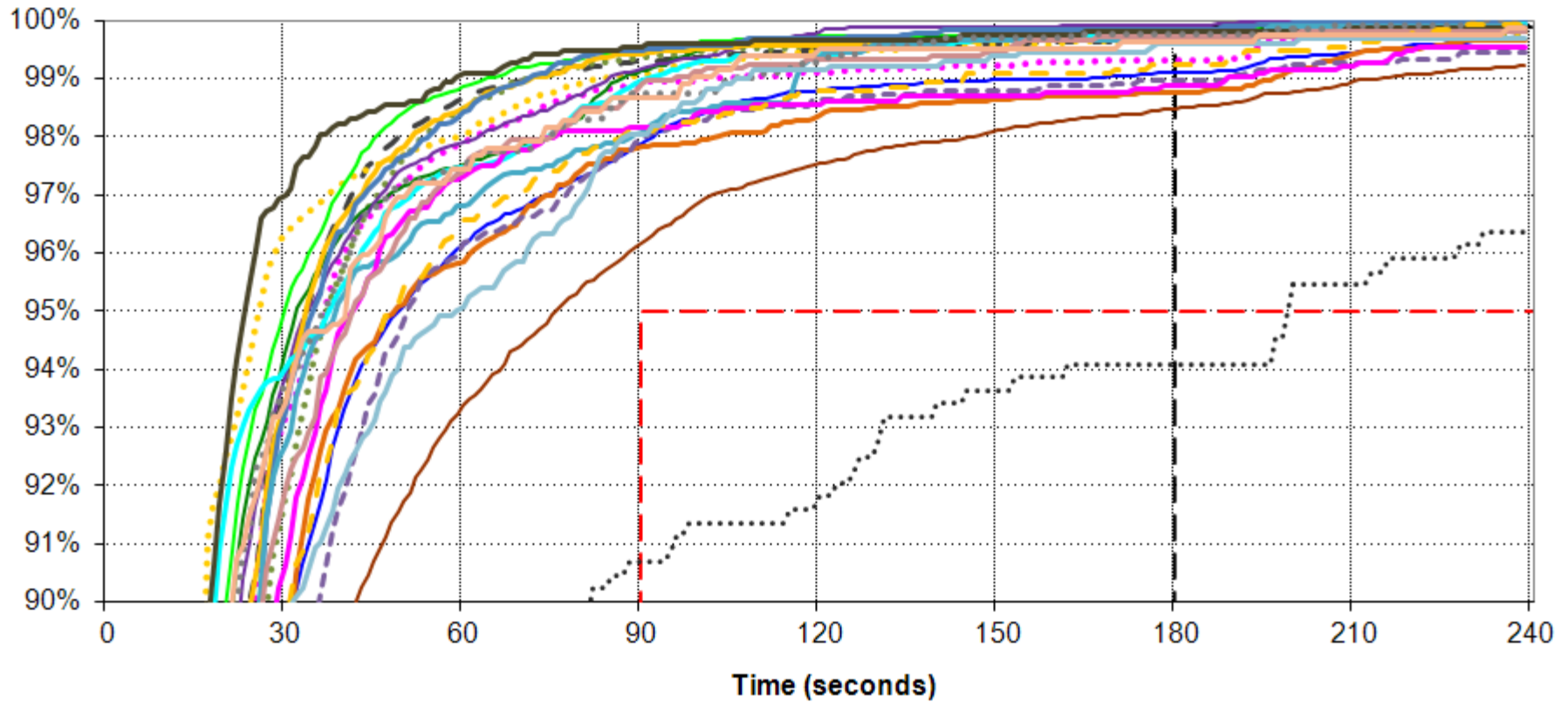
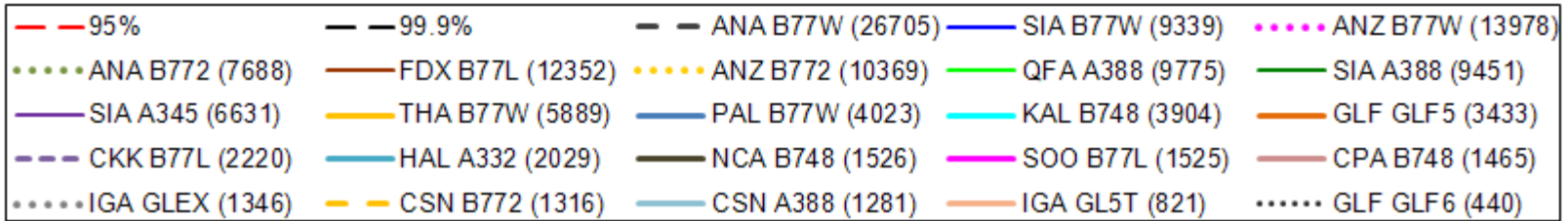
Oakland FIR – ASP

July – December 2013

- **29** operator/aircraft types observed with 100 or more ADS-C downlink reports during the 6-month period
- **2** do not meet the 95% criteria for RSP180 ASP
- **1** meets the 99.9% criteria for RSP180 ASP
- **6** do not meet the 99.9% criteria for RSP180 ASP at the rule-of-thumb 99.0%

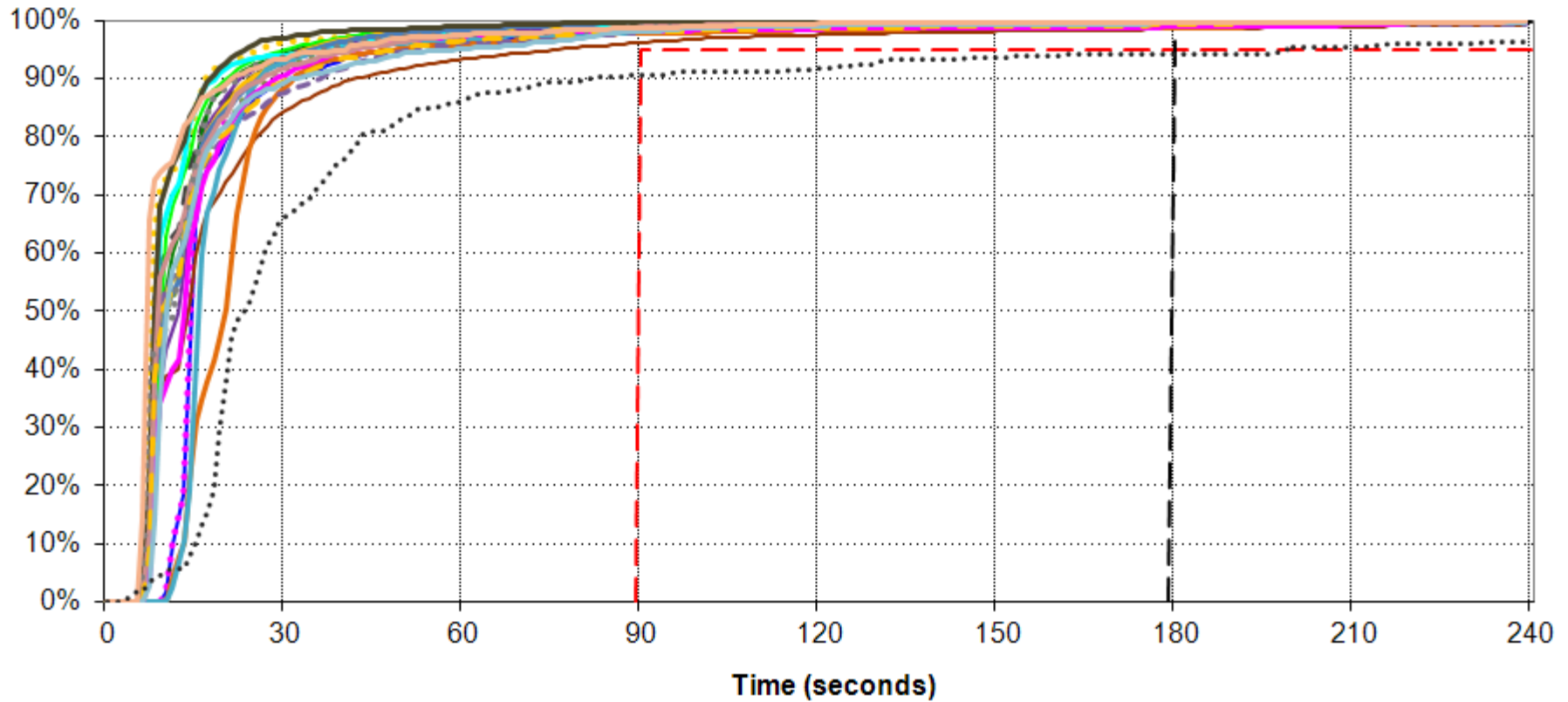
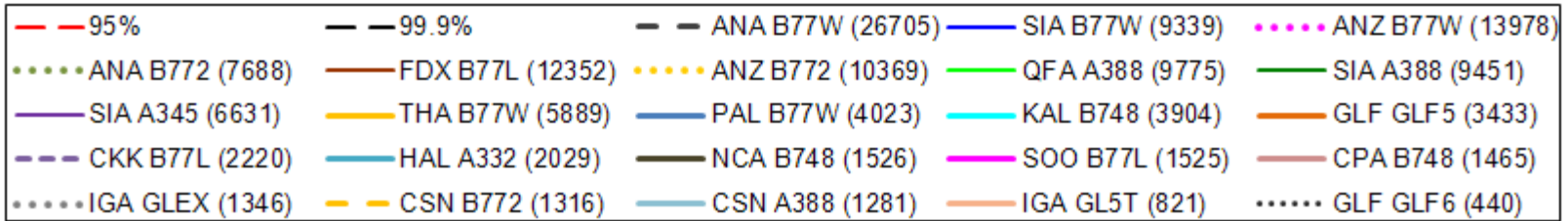


Oakland FIR - I4 - July to December 2013 Actual Surveillance Performance (ASP)



Oakland FIR - I4 - July to December 2013

Actual Surveillance Performance (ASP)



Anchorage – ASP

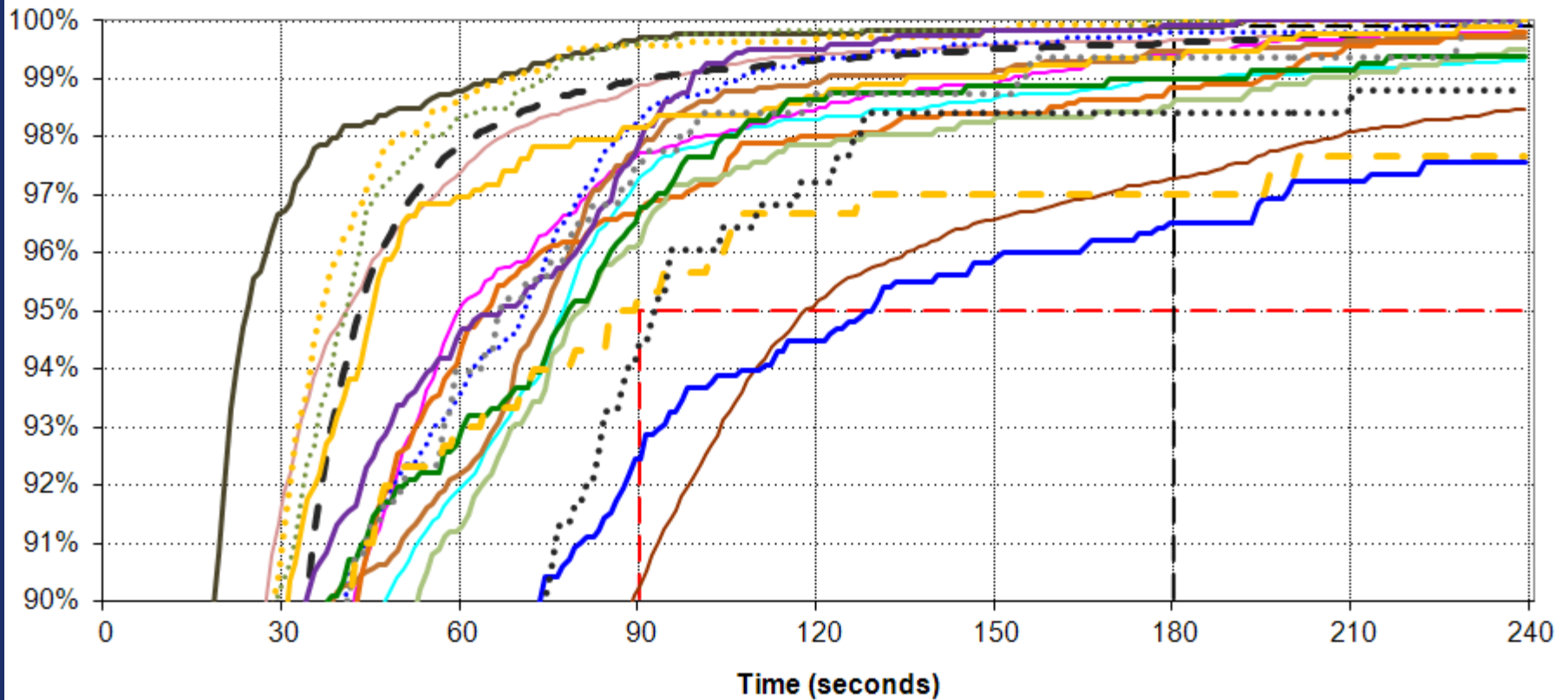
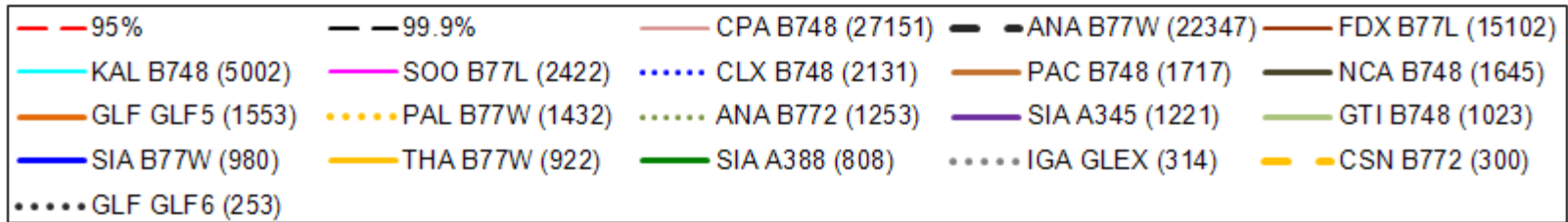
July – December 2013

- **24** operator/aircraft types observed with 100 or more ADS-C downlink reports during the 6-month period
- **5** do not meet the 95% criteria for RSP180 ASP
- **6** meet the 99.9% criteria for RSP180 ASP
- **7** do not meet the 99.9% criteria for RSP180 ASP at the rule-of-thumb 99.0%



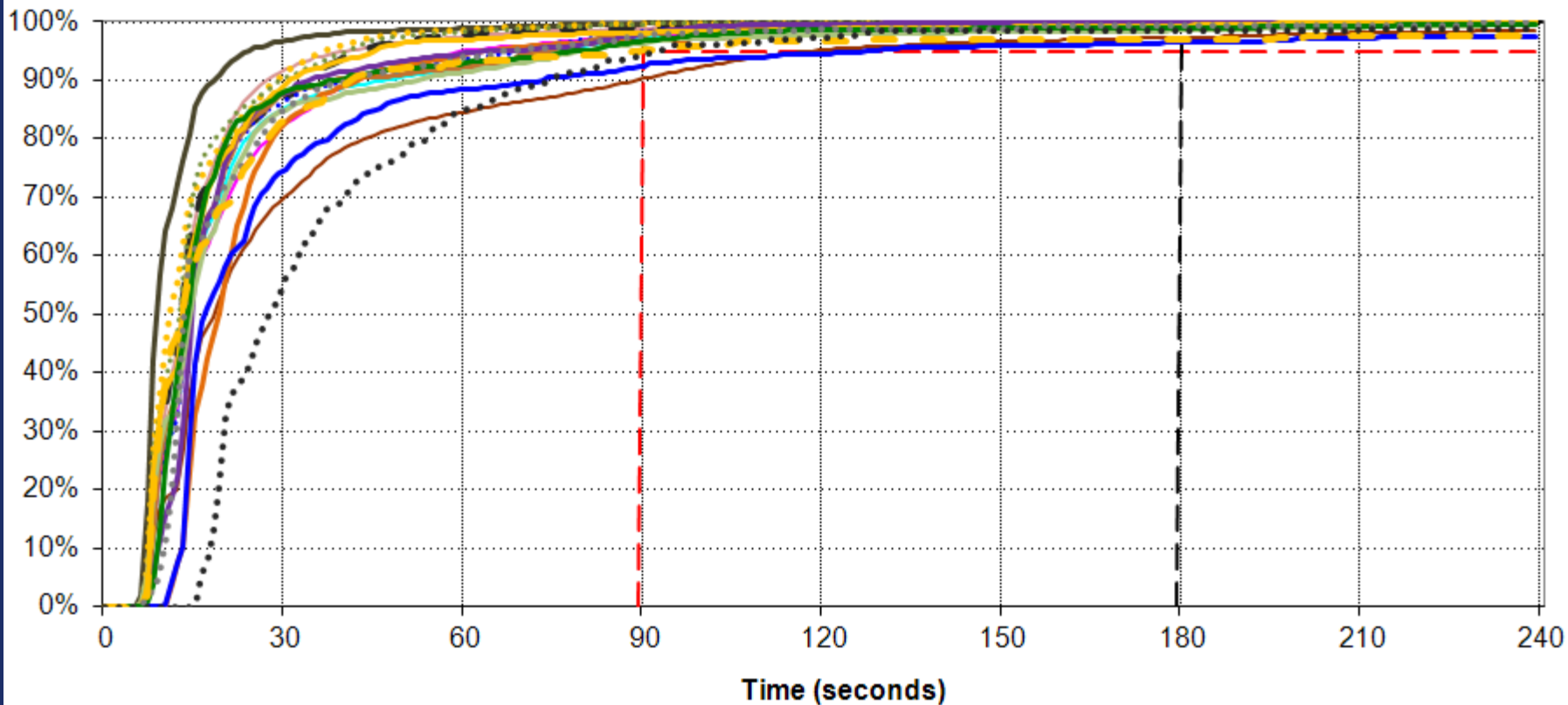
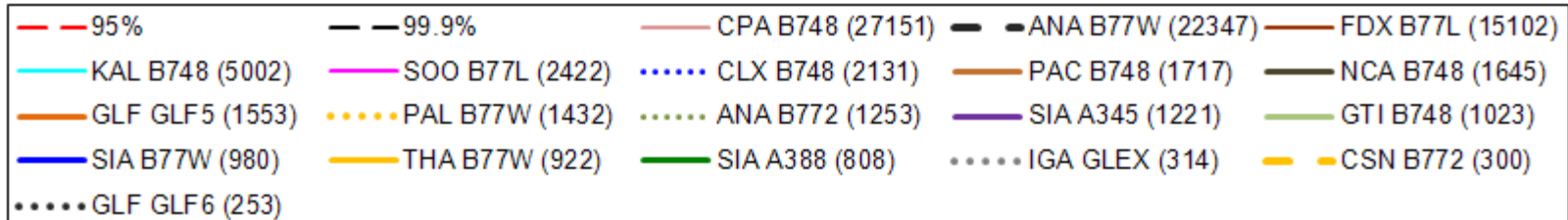
Anchorage FIR - I4 - July to December 2013

Actual Surveillance Performance (ASP)






Anchorage FIR - I4 - July to December 2013

Actual Surveillance Performance (ASP)



Overview

- Analysis period: July to December 2013
- 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 2013

DATA LINK PERFORMANCE BY OPERATOR

Summary of Performance by Operator **New York FIR**

- There were **80** 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	79	79	77	61
99.9% within 180 sec	18	59	48	
99.0% - 99.9% within 180 sec	51	19	23	
Less than 99.0% within 180 sec	11	2	9	

Observed Performance by Operator New York FIR

July - December 2013

Oper Code	ADS-C				CPDLC						
	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%
L	78,694	9.3%	98.4%	99.5%	2,945	8.3%	99.6%	99.8%	98.7%	99.2%	95.5%
AA	78,324	9.2%	99.2%	99.8%	5,270	14.9%	99.8%	99.8%	99.4%	99.6%	97.3%
R	66,114	7.8%	98.2%	99.5%	1,410	4.0%	99.6%	99.7%	98.6%	99.0%	96.0%
BB	63,707	7.5%	99.0%	99.3%	2,818	8.0%	99.7%	99.7%	99.4%	99.6%	97.9%
FF	48,611	5.7%	98.0%	99.4%	2,675	7.6%	99.4%	99.5%	99.0%	99.2%	96.9%
A	47,144	5.6%	96.2%	98.4%	1,200	3.4%	98.8%	99.1%	98.3%	98.9%	95.7%
II	46,933	5.5%	99.4%	99.8%	1,946	5.5%	99.9%	100.0%	99.2%	99.5%	96.9%
DD	42,208	5.0%	97.4%	99.3%	2,245	6.4%	99.7%	99.8%	98.3%	98.8%	92.7%
GG	36,912	4.4%	99.2%	99.8%	1,463	4.1%	99.7%	99.8%	99.3%	99.5%	97.0%
EE	32,597	3.8%	98.7%	99.3%	1,928	5.5%	99.6%	99.8%	99.2%	99.5%	96.2%
HH	31,362	3.7%	99.0%	99.4%	1,173	3.3%	99.9%	100.0%	99.3%	99.6%	96.9%
KKKK	22,041	2.6%	99.8%	99.8%	1,640	4.6%	99.8%	99.8%	99.8%	99.9%	98.0%
CC	21,703	2.6%	98.7%	99.3%	809	2.3%	99.8%	99.9%	99.3%	99.8%	97.0%
SS	18,522	2.2%	98.6%	99.7%	509	1.4%	99.6%	99.6%	99.2%	99.6%	93.3%
ZZ	18,256	2.2%	99.0%	99.5%	870	2.5%	99.7%	99.7%	99.2%	99.5%	95.8%
MM	16,794	2.0%	99.3%	99.9%	674	1.9%	99.7%	99.7%	98.4%	99.1%	95.0%
PP	15,371	1.8%	99.4%	99.8%	498	1.4%	99.6%	99.8%	98.8%	99.4%	96.0%
TT	14,665	1.7%	99.6%	99.8%	452	1.3%	100.0%	100.0%	99.6%	99.6%	96.0%
JJ	11,974	1.4%	99.8%	99.9%	195	0.6%	100.0%	100.0%	99.5%	99.5%	95.9%
LL	11,239	1.3%	99.6%	99.7%	748	2.1%	99.6%	99.6%	98.8%	99.5%	96.7%
ZZZZ	10,431	1.2%	98.8%	99.4%	287	0.8%	100.0%	100.0%	96.2%	96.9%	88.2%
WW	9,604	1.1%	98.5%	99.7%	302	0.9%	100.0%	100.0%	99.7%	100.0%	96.4%



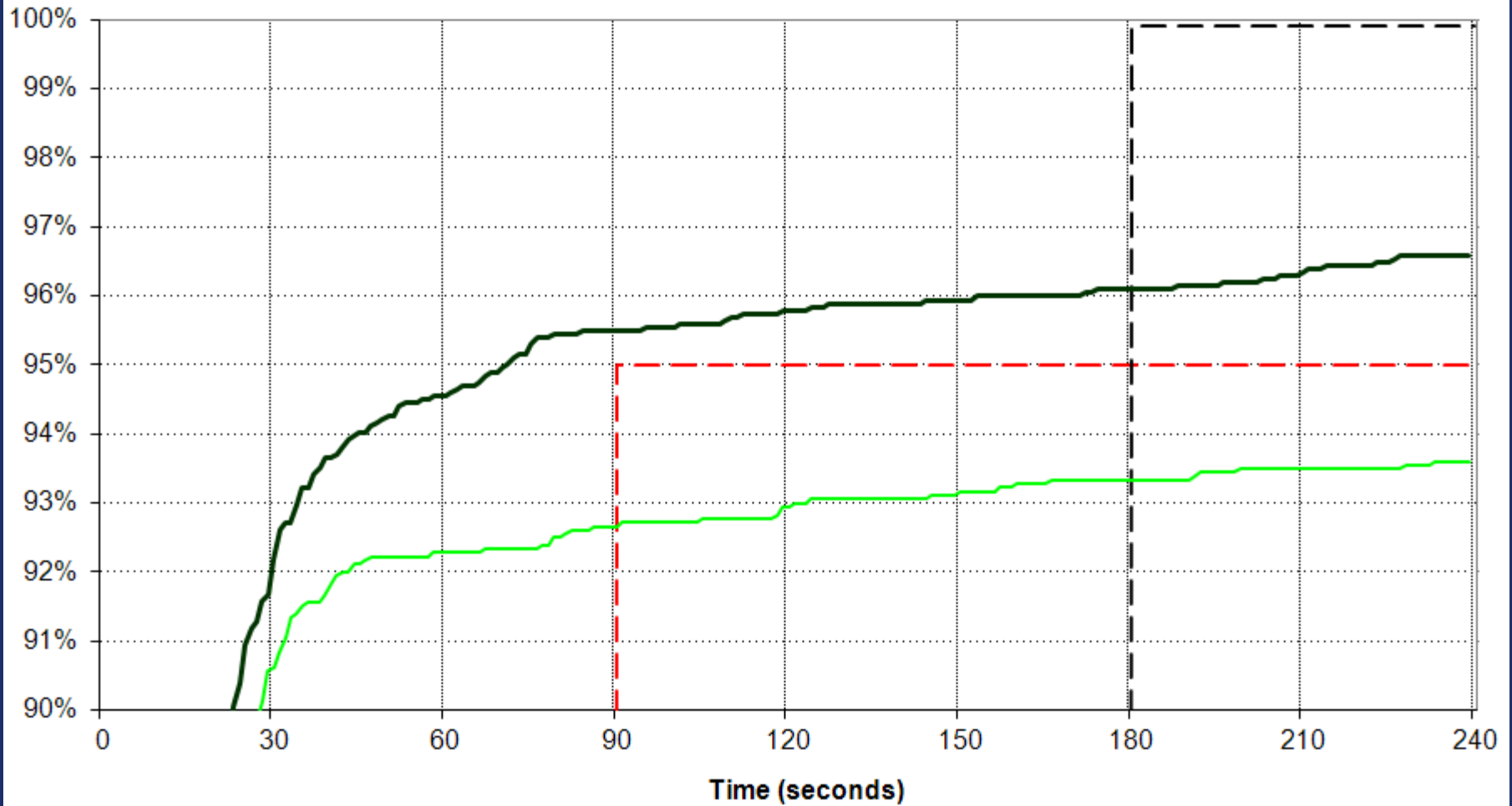
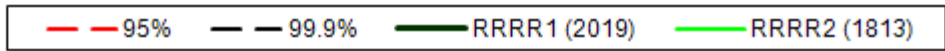
Observed Performance by Operator New York FIR

July - December (Continued)

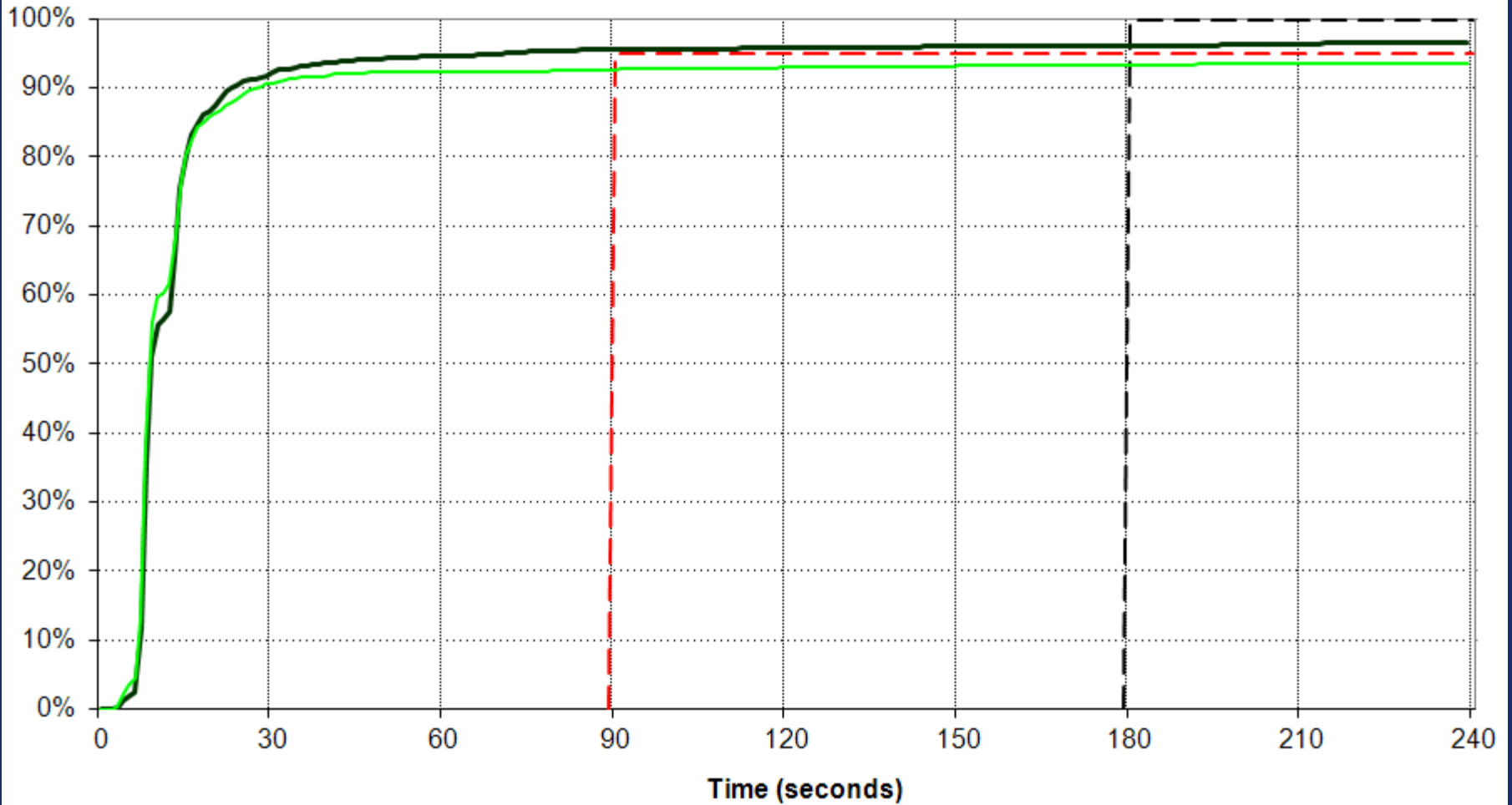
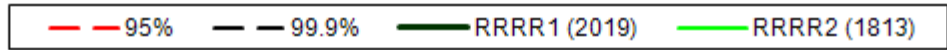
Oper Code	ADS-C				CPDLC						
	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
MMMM	7,968	0.9%	96.4%	98.4%	164	0.5%	98.8%	98.8%	97.0%	97.0%	89.6%
AQ	6,932	0.8%	97.7%	98.6%	309	0.9%	100.0%	100.0%	100.0%	100.0%	99.4%
CCCC	5,643	0.7%	97.6%	98.9%	219	0.6%	98.6%	99.1%	97.7%	97.7%	94.5%
AR	5,582	0.7%	99.8%	100.0%	228	0.6%	100.0%	100.0%	99.6%	100.0%	95.2%
FFF	5,532	0.7%	96.9%	99.0%	192	0.5%	99.5%	99.5%	97.9%	99.0%	92.2%
IGA	4,314	0.5%	98.0%	99.5%	104	0.3%	99.0%	99.0%	98.1%	98.1%	97.1%
TTTT	4,287	0.5%	96.1%	98.3%	142	0.4%	100.0%	100.0%	99.3%	99.3%	93.7%
RRRR	4,109	0.5%	92.4%	93.2%	117	0.3%	100.0%	100.0%	100.0%	100.0%	97.4%
ZZZ	3,958	0.5%	98.6%	99.6%	56	0.2%	100.0%	100.0%	98.2%	98.2%	91.1%
AS	3,352	0.4%	99.8%	99.8%	196	0.6%	100.0%	100.0%	98.0%	98.0%	95.9%
IGA	3,170	0.4%	99.5%	99.8%	59	0.2%	100.0%	100.0%	100.0%	100.0%	98.3%
AT	3,155	0.4%	95.4%	98.9%	99	0.3%	98.0%	100.0%	99.0%	99.0%	95.0%
QQ	3,087	0.4%	99.1%	99.7%	141	0.4%	100.0%	100.0%	98.6%	99.3%	95.7%
XX	3,032	0.4%	98.4%	99.6%	52	0.1%	100.0%	100.0%	100.0%	100.0%	100.0%
Y	2,982	0.4%	96.0%	98.3%	35	0.1%	100.0%	100.0%	97.1%	100.0%	94.3%
BBBB	2,700	0.3%	96.9%	98.1%	86	0.2%	100.0%	100.0%	100.0%	100.0%	100.0%
YY	2,509	0.3%	97.7%	99.6%	124	0.4%	100.0%	100.0%	100.0%	100.0%	96.8%
AU	2,508	0.3%	96.3%	99.1%	60	0.2%	100.0%	100.0%	100.0%	100.0%	98.3%
EEE	2,453	0.3%	98.9%	99.8%	51	0.1%	100.0%	100.0%	100.0%	100.0%	96.1%
P	1,924	0.2%	97.5%	99.2%	23	0.1%	95.7%	100.0%	100.0%	100.0%	100.0%
US MIL	1,901	0.2%	98.4%	99.4%	37	0.1%	100.0%	100.0%	97.3%	100.0%	86.5%
SSS	1,812	0.2%	97.0%	98.8%	28	0.1%	100.0%	100.0%	100.0%	100.0%	96.4%



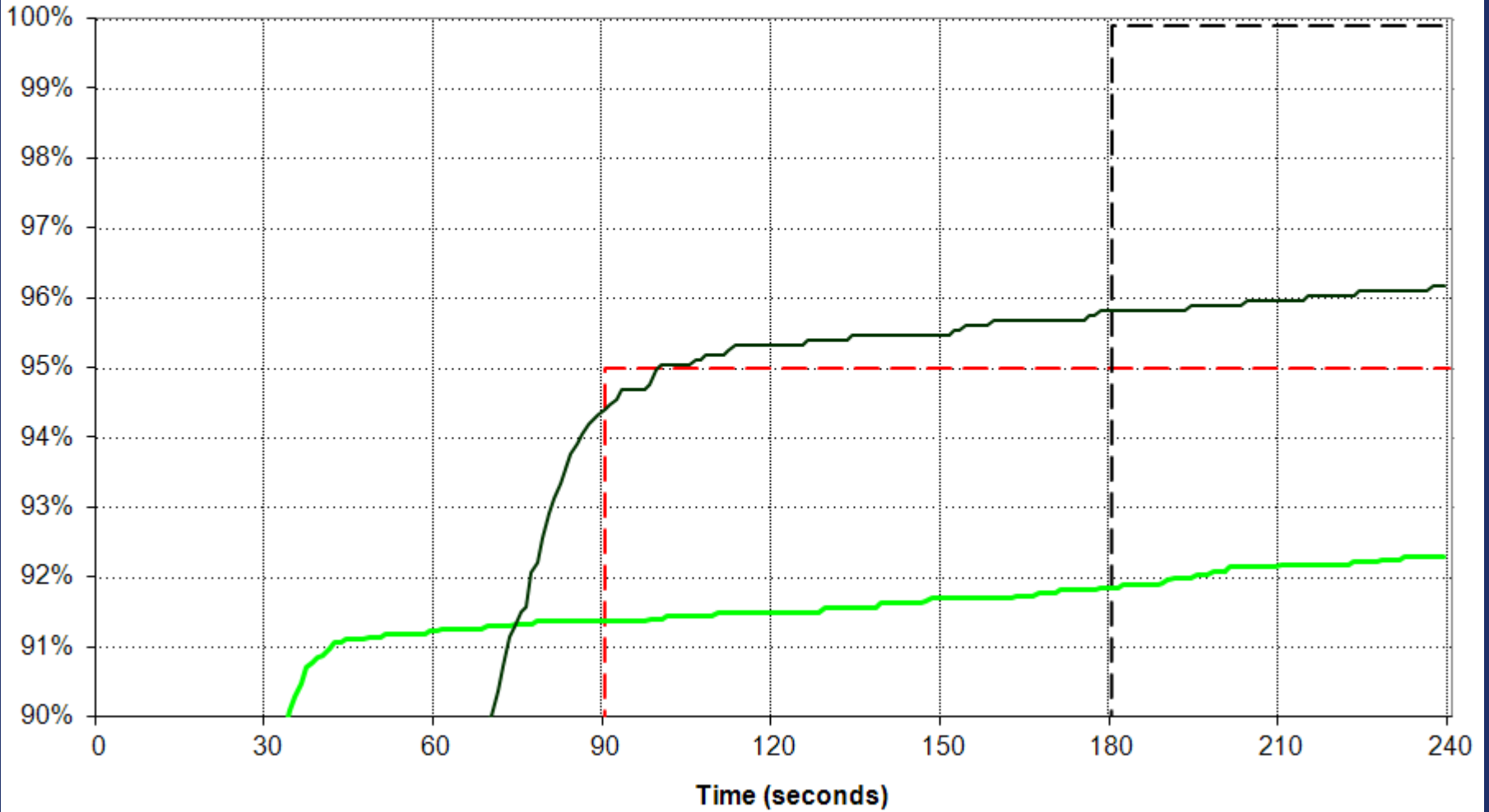
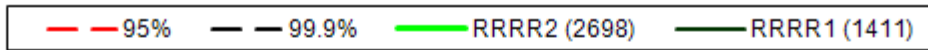
RRRR A345 - All Media - KZNY - Jan to Jun 2013 Actual Surveillance Performance (ASP)



RRRR A345 - All Media - KZNY - Jan to Jun 2013 Actual Surveillance Performance (ASP)

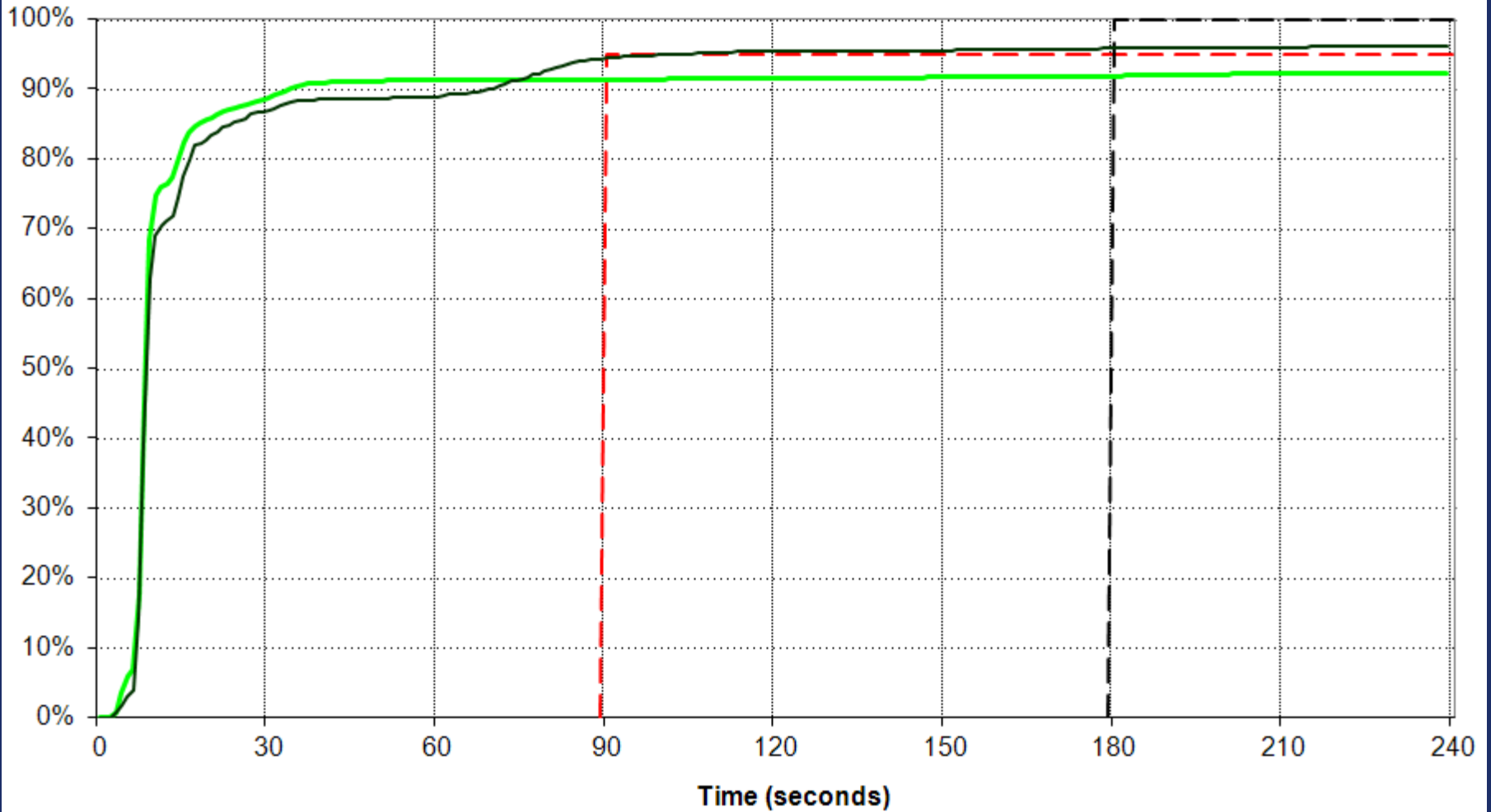


RRRR A345 - All Media - KZNY - Jul to Dec 2013 Actual Surveillance Performance (ASP)



RRRR A345 - All Media - KZNY - Jul to Dec 2013 Actual Surveillance Performance (ASP)

95% 99.9% RRRR2 (2698) RRRR1 (1411)



PR 1502-SN: Poor performance Operator RRRR

- Submitted PR to DLMA for performance of RRRR - 1/29/14
- Assigned to Airbus
- Still under investigation



Summary of Performance by Operator **Oakland FIR**

- There were **51** 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	51	51	50	44
99.9% within 180 sec	6	28	18	
99.0% - 99.9% within 180 sec	42	23	28	
Less than 99.0% within 180 sec	3	0	5	

Observed Performance by Operator **Oakland FIR**

July - December 2013

Oper Code	ADS-C				CPDLC						
	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	275,390	13.7%	98.2%	99.3%	13,049	15.3%	99.6%	99.6%	99.2%	99.4%	96.4%
NNN	206,257	10.3%	97.7%	99.5%	4,774	5.6%	99.6%	99.7%	99.1%	99.6%	97.2%
L	157,432	7.8%	98.8%	99.6%	7,995	9.4%	99.6%	99.7%	99.2%	99.4%	97.2%
G	137,588	6.9%	99.7%	99.9%	7,127	8.4%	99.9%	99.9%	99.9%	99.9%	99.6%
D	125,276	6.2%	99.0%	99.7%	4,069	4.8%	99.8%	99.8%	99.6%	99.7%	98.8%
B	107,887	5.4%	98.9%	99.4%	4,332	5.1%	99.6%	99.7%	99.4%	99.6%	98.6%
R	91,343	4.5%	98.6%	99.5%	3,293	3.9%	99.6%	99.6%	99.3%	99.5%	97.8%
Q	89,040	4.4%	98.6%	99.7%	4,644	5.4%	99.8%	99.9%	99.8%	99.8%	98.9%
E	69,845	3.5%	99.1%	99.6%	2,934	3.4%	99.8%	99.8%	99.5%	99.7%	98.5%
J	67,121	3.3%	99.3%	99.7%	4,490	5.3%	99.8%	99.9%	99.7%	99.8%	99.4%
T	57,847	2.9%	99.3%	99.7%	2,798	3.3%	99.8%	99.8%	99.6%	99.7%	99.1%
H	56,244	2.8%	99.6%	99.8%	2,595	3.0%	99.9%	99.9%	99.7%	99.8%	99.3%
S	52,800	2.6%	98.1%	99.3%	1,553	1.8%	99.2%	99.4%	99.2%	99.4%	99.0%
F	51,980	2.6%	99.0%	99.6%	4,943	5.8%	99.8%	99.8%	99.7%	99.8%	99.6%
N	48,226	2.4%	98.9%	99.2%	928	1.1%	99.3%	99.4%	99.0%	99.7%	98.3%
O	47,461	2.4%	98.7%	99.6%	2,090	2.4%	99.9%	99.9%	99.8%	99.8%	99.4%
Y	38,020	1.9%	97.2%	98.4%	712	0.8%	98.7%	98.9%	98.2%	98.6%	97.8%
NNNN	35,573	1.8%	98.4%	99.5%	881	1.0%	100.0%	100.0%	99.9%	99.9%	98.8%
PPPP	32,687	1.6%	99.3%	99.8%	1,851	2.2%	99.8%	99.8%	99.6%	99.8%	99.4%
ZZZZ	28,107	1.4%	99.2%	99.5%	942	1.1%	100.0%	100.0%	98.2%	98.5%	93.8%
V	22,646	1.1%	99.7%	99.8%	962	1.1%	99.7%	99.7%	99.7%	99.9%	99.4%
US MIL	20,908	1.0%	98.8%	99.4%	336	0.4%	100.0%	100.0%	97.6%	98.8%	94.4%



Observed Performance by Operator **Oakland FIR**

July - December 2013 (Continued)

Oper Code	ADS-C				CPDLC						
	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%
P	19,959	1.0%	99.2%	99.8%	1,041	1.2%	99.5%	99.5%	99.3%	99.4%	98.6%
W	16,255	0.8%	98.0%	99.9%	411	0.5%	100.0%	100.0%	99.8%	99.8%	99.0%
LLL	14,674	0.7%	98.9%	99.5%	713	0.8%	99.7%	99.7%	99.7%	99.7%	99.6%
X	14,229	0.7%	97.7%	98.6%	745	0.9%	99.7%	99.9%	98.9%	99.2%	96.2%
MMM	10,657	0.5%	98.6%	99.5%	579	0.7%	99.3%	99.7%	99.5%	99.5%	99.3%
MMMM	10,332	0.5%	97.6%	98.6%	261	0.3%	99.2%	99.2%	96.2%	96.6%	89.3%
QQQQ	10,262	0.5%	99.4%	99.7%	576	0.7%	99.8%	99.8%	97.9%	98.3%	94.6%
IGA	9,448	0.5%	98.6%	99.6%	221	0.3%	99.1%	100.0%	98.6%	98.6%	96.8%
QQQ	9,446	0.5%	99.5%	99.7%	901	1.1%	99.7%	99.7%	99.6%	99.9%	99.7%
JJJ	8,881	0.4%	98.2%	99.1%	219	0.3%	99.5%	99.5%	99.1%	99.5%	98.2%
OOOO	8,778	0.4%	98.3%	99.1%	264	0.3%	100.0%	100.0%	99.6%	100.0%	98.1%
AB	8,698	0.4%	99.1%	99.7%	536	0.6%	100.0%	100.0%	99.6%	99.8%	99.3%
RRR	8,376	0.4%	97.7%	99.2%	151	0.2%	100.0%	100.0%	97.4%	100.0%	90.7%
Z	6,599	0.3%	99.4%	99.8%	360	0.4%	100.0%	100.0%	99.7%	100.0%	99.7%
WW	6,069	0.3%	99.3%	99.8%	233	0.3%	99.6%	100.0%	99.6%	99.6%	97.4%
OOO	5,931	0.3%	99.1%	99.7%	138	0.2%	100.0%	100.0%	100.0%	100.0%	100.0%
AC	3,728	0.2%	98.4%	99.5%	37	0.0%	100.0%	100.0%	94.6%	94.6%	89.2%
LLLL	3,555	0.2%	99.2%	99.7%	103	0.1%	100.0%	100.0%	99.0%	100.0%	98.1%
AA	3,397	0.2%	99.5%	99.8%	226	0.3%	99.6%	99.6%	99.6%	99.6%	99.1%
CCCC	2,630	0.1%	96.2%	98.1%	64	0.1%	100.0%	100.0%	100.0%	100.0%	93.8%
AD	2,323	0.1%	99.5%	99.7%	70	0.1%	100.0%	100.0%	98.6%	100.0%	92.9%
III	1,164	0.0%	98.7%	99.6%	86	0.1%	100.0%	100.0%	100.0%	100.0%	96.5%



Summary of Performance by Operator Anchorage FIR

- There were **38** 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	38	38	37	30
99.9% within 180 sec	4	26	17	
99.0% - 99.9% within 180 sec	33	10	14	
Less than 99.0% within 180 sec	1	2	7	



Observed Performance by Operator Anchorage FIR

July – December 2013

Oper	ADS-C				CPDLC						
	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	83,950	11.1%	98.4%	99.6%	1,292	8.0%	99.6%	99.7%	99.2%	99.5%	98.0%
A	76,383	10.1%	98.5%	99.5%	1,602	9.9%	99.8%	99.8%	99.4%	99.6%	95.6%
Q	75,955	10.0%	97.8%	99.4%	1,555	9.6%	99.9%	99.9%	99.6%	99.6%	98.4%
Y	59,603	7.9%	95.8%	97.8%	631	3.9%	95.6%	96.4%	95.7%	96.7%	94.8%
L	58,356	7.7%	98.7%	99.7%	1,446	8.9%	99.5%	99.7%	98.4%	98.9%	95.2%
S	51,128	6.7%	96.3%	98.9%	867	5.4%	99.4%	99.5%	99.3%	99.7%	98.5%
H	42,356	5.6%	99.0%	99.6%	1,267	7.8%	99.9%	100.0%	99.8%	99.8%	97.9%
J	41,684	5.5%	99.1%	99.7%	1,383	8.6%	99.7%	99.8%	99.6%	99.8%	99.5%
G	39,402	5.2%	99.2%	99.7%	954	5.9%	100.0%	100.0%	100.0%	100.0%	99.4%
R	32,638	4.3%	98.6%	99.6%	533	3.3%	99.3%	99.3%	99.1%	99.6%	99.1%
F	32,114	4.2%	98.8%	99.7%	1,444	8.9%	99.8%	99.9%	99.7%	99.7%	99.3%
NNNN	26,193	3.5%	98.3%	99.4%	294	1.8%	100.0%	100.0%	99.7%	99.7%	97.6%
T	23,435	3.1%	99.1%	99.7%	568	3.5%	99.3%	99.7%	99.5%	99.7%	98.2%
RRR	19,199	2.5%	97.7%	99.3%	175	1.1%	100.0%	100.0%	100.0%	100.0%	92.6%
P	11,838	1.6%	98.5%	99.5%	352	2.2%	99.7%	99.7%	99.7%	99.7%	99.4%
LLL	11,357	1.5%	98.7%	99.7%	212	1.3%	100.0%	100.0%	100.0%	100.0%	98.6%
CCCC	10,627	1.4%	97.4%	98.8%	119	0.7%	97.5%	99.2%	98.3%	98.3%	93.3%
QQQ	9,919	1.3%	99.1%	99.4%	449	2.8%	99.1%	99.1%	98.4%	98.9%	98.4%
O	9,764	1.3%	97.9%	99.4%	212	1.3%	99.5%	100.0%	98.6%	99.5%	98.6%



Observed Performance by Operator Anchorage FIR

July – December 2013 (Continued)

Oper Code	ADS-C				CPDLC						
	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%
OOOO	6,202	0.8%	97.6%	99.1%	61	0.4%	100.0%	100.0%	100.0%	100.0%	96.7%
FFF	4,535	0.6%	99.1%	99.9%	108	0.7%	100.0%	100.0%	100.0%	100.0%	98.2%
US MIL	3,900	0.5%	97.5%	99.0%	37	0.2%	97.3%	97.3%	97.3%	97.3%	97.3%
GGG	3,615	0.5%	98.8%	99.8%	79	0.5%	100.0%	100.0%	98.7%	100.0%	98.7%
ZZZZ	3,493	0.5%	99.3%	99.6%	73	0.5%	100.0%	100.0%	100.0%	100.0%	94.5%
MMM	3,223	0.4%	97.8%	99.2%	110	0.7%	100.0%	100.0%	100.0%	100.0%	100.0%
B	3,167	0.4%	98.8%	99.6%	33	0.2%	100.0%	100.0%	97.0%	97.0%	93.9%
US MIL	2,664	0.4%	98.1%	99.7%	28	0.2%	100.0%	100.0%	100.0%	100.0%	92.9%
QQQQ	2,321	0.3%	99.4%	99.7%	89	0.6%	100.0%	100.0%	96.6%	96.6%	95.5%
III	1,952	0.3%	99.5%	99.7%	77	0.5%	100.0%	100.0%	100.0%	100.0%	100.0%
IGA	1,586	0.2%	99.4%	99.9%	11	0.1%	100.0%	100.0%	100.0%	100.0%	81.8%
OOO	1,493	0.2%	98.8%	99.7%	23	0.1%	100.0%	100.0%	100.0%	100.0%	100.0%
AM	1,351	0.2%	98.4%	99.6%	27	0.2%	96.3%	100.0%	96.3%	96.3%	92.6%
IGA	1,259	0.2%	97.6%	99.4%	16	0.1%	100.0%	100.0%	93.8%	93.8%	87.5%
Z	1,116	0.1%	98.5%	99.5%	22	0.1%	100.0%	100.0%	100.0%	100.0%	100.0%
LLLL	386	0.1%	99.5%	99.7%	8	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%
JJJ	189	0.0%	97.9%	99.5%	2	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%
XX	171	0.0%	98.8%	100.0%	4	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AG	112	0.0%	96.4%	100.0%	2	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%



July – December 2013

MEDIA TRANSITIONS



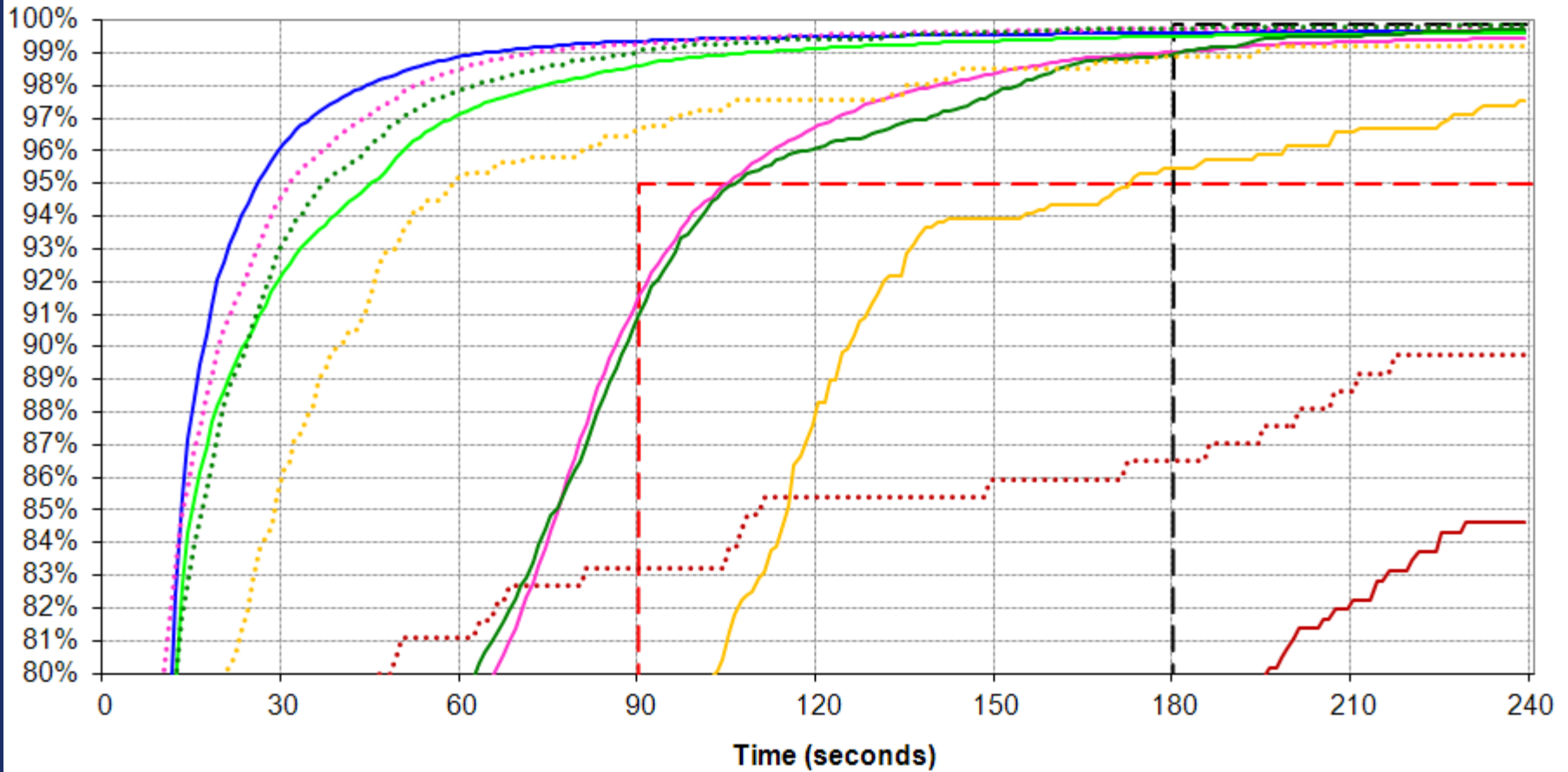
Preliminary ASP Analysis for Media Transitions

- **Analysis period:** July to December 2013
- **Analysis regions:** Oakland and New York
- **RSP180 criteria**
- **Analysis process:**
 - For each ADS-C downlink report, an attempt was made to match the most recently sent preceding ADS-C downlink report ,up to 30 minutes
 - A transition code is assigned if a match is found
 - The transition code is based on the media type of the current and preceding ADS-C downlink report
 - If the current and preceding report are the same media type, the respective station IDs are checked to determine whether or not they are the same



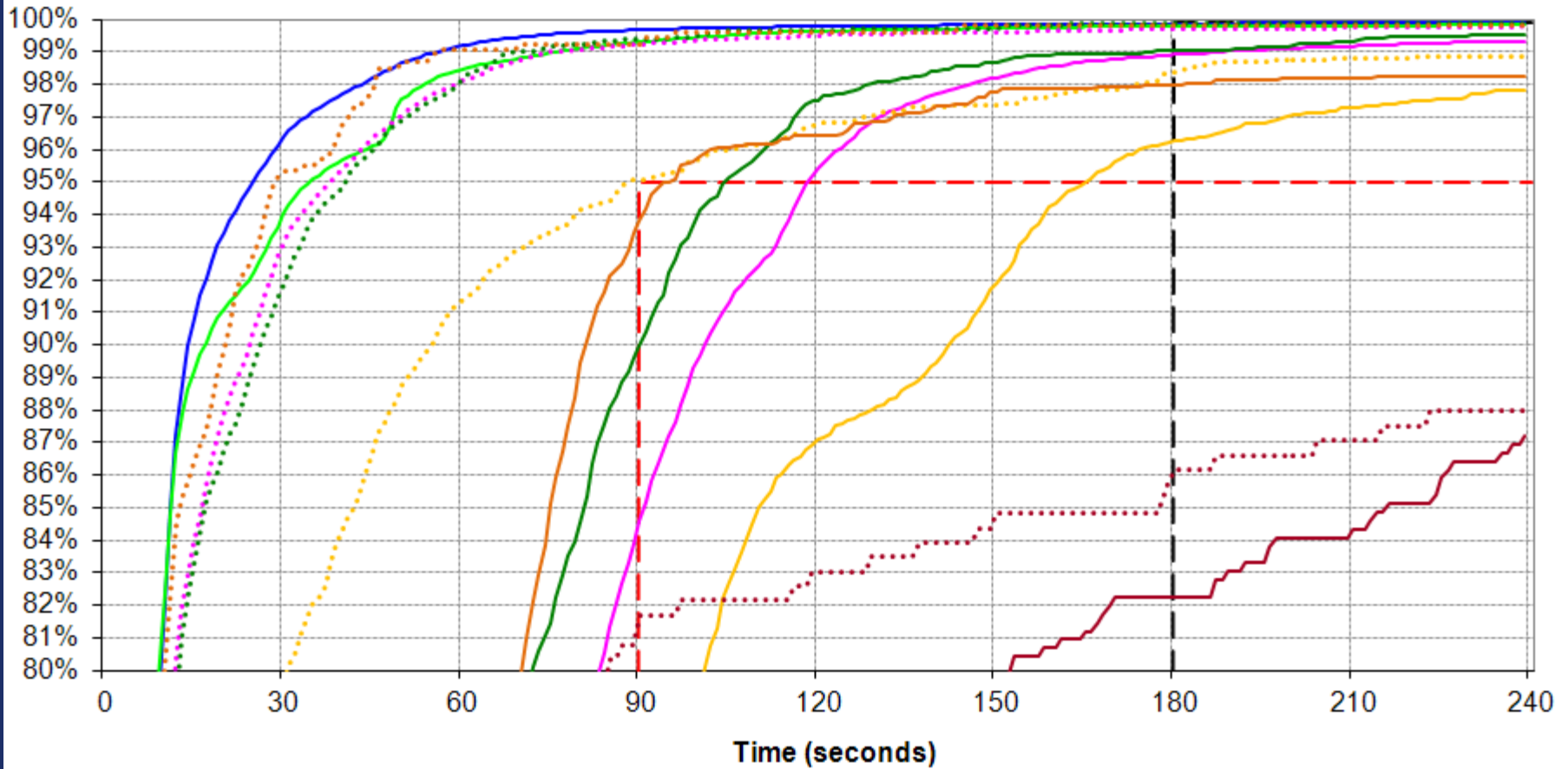
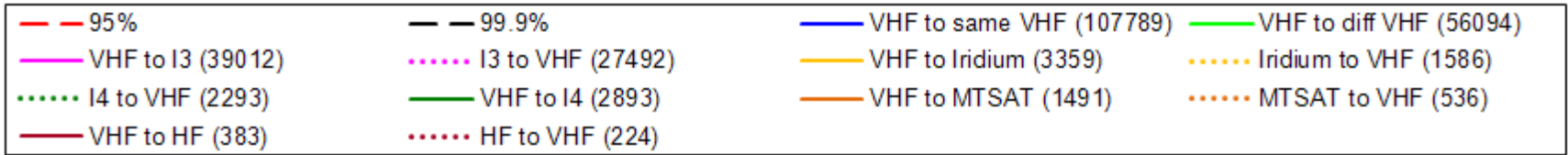
New York FIR - VHF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



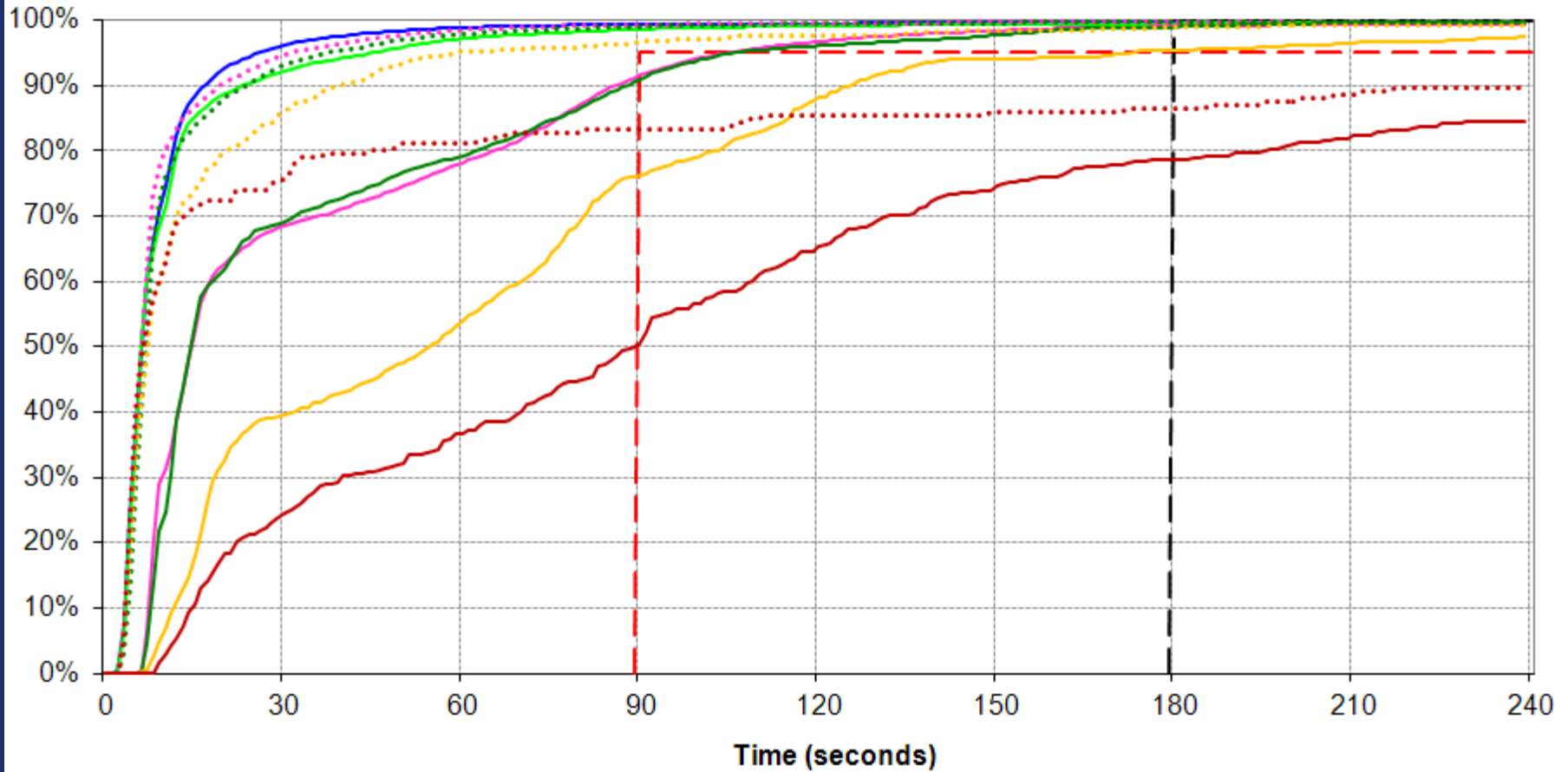
Oakland FIR - VHF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



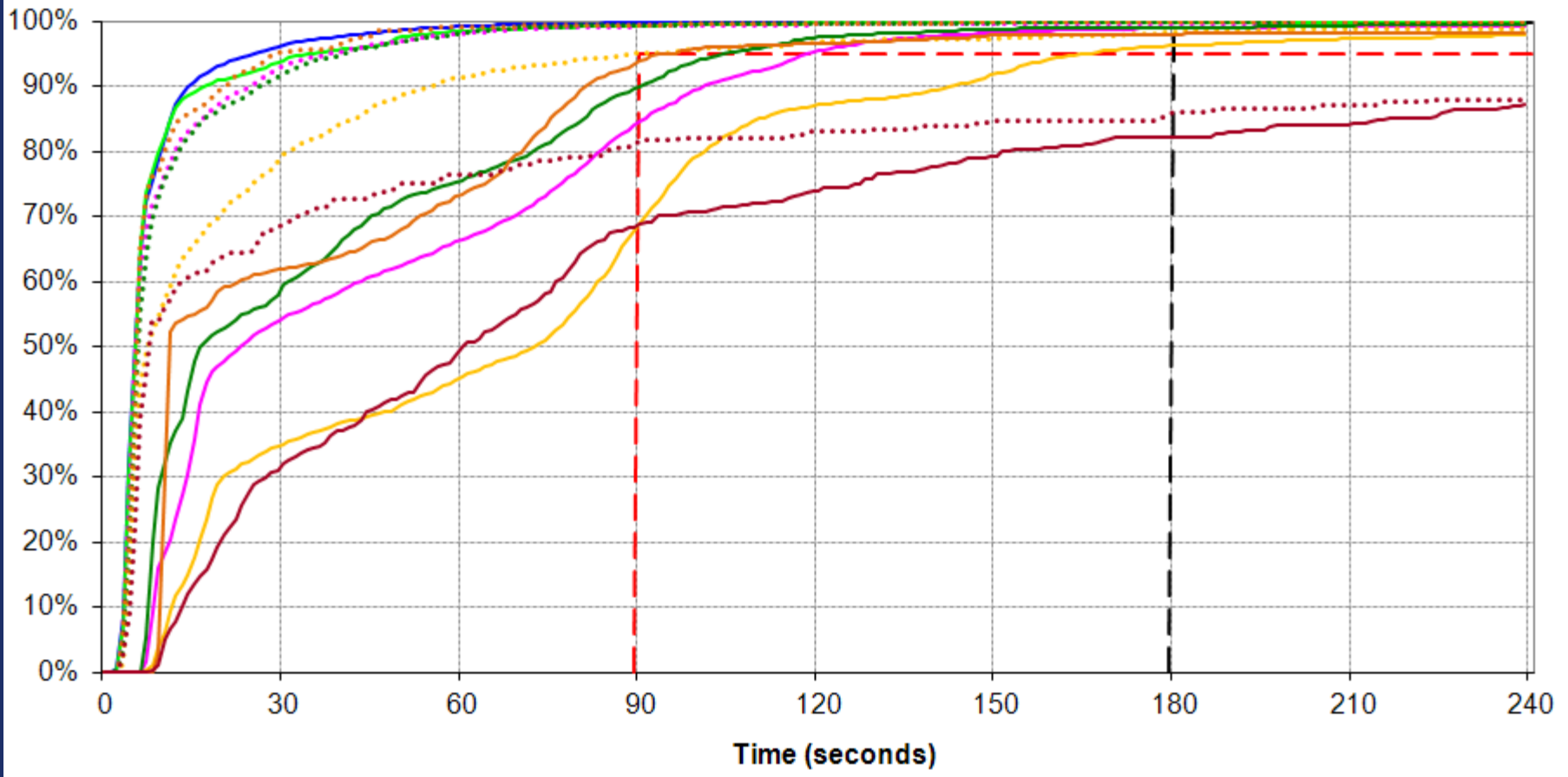
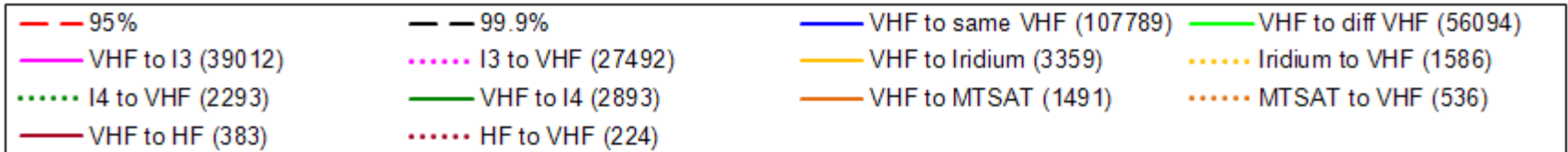
New York FIR - VHF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - VHF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



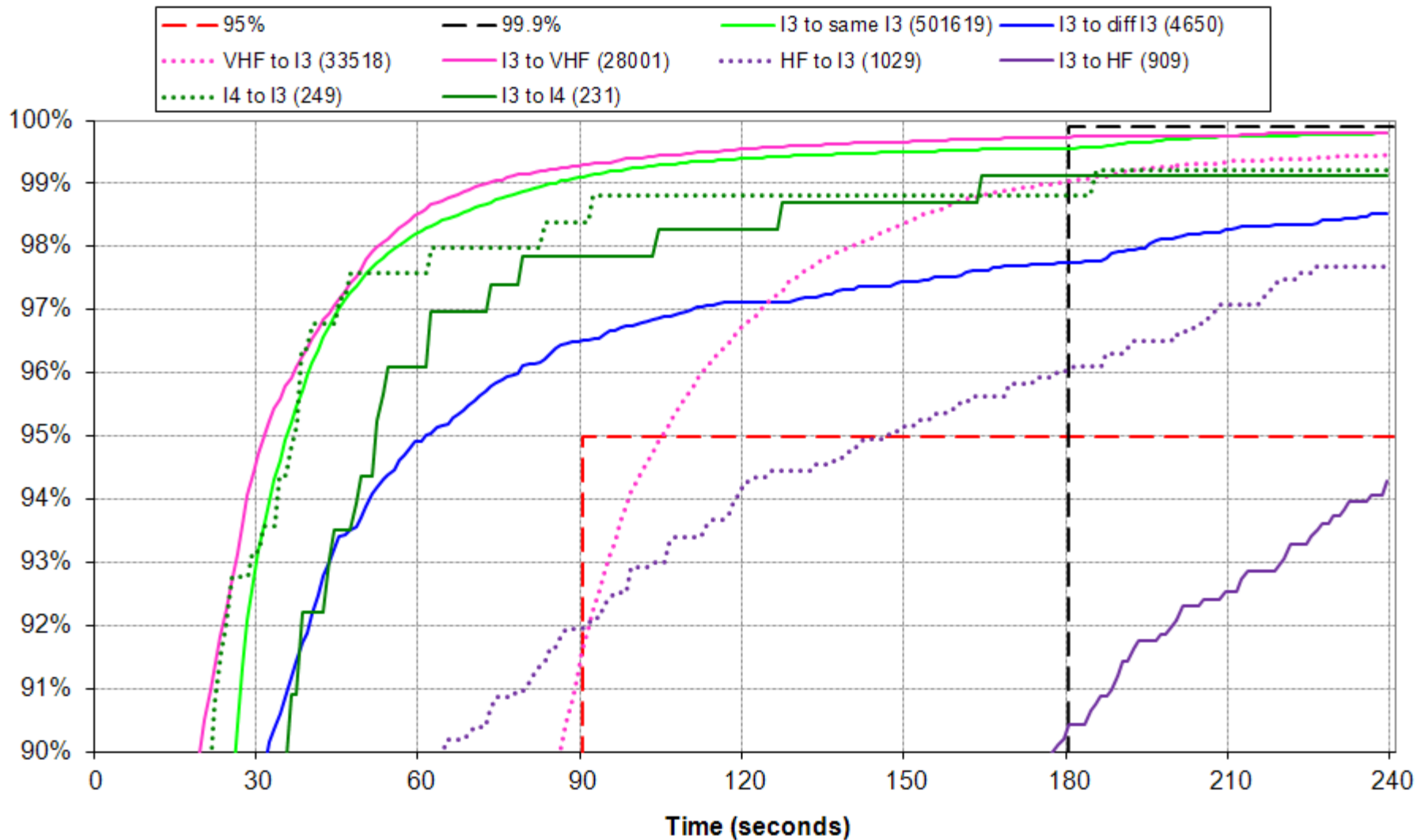
Observations for **VHF** Media Transitions

- Similar behavior observed for media transitions to and from VHF in New York and Oakland FIR
- All media transitions from VHF exhibit significantly lower ASP than transition to VHF
- Transitions between same VHF station slightly better than between different VHF stations
- Both I3 to VHF and I4 to VHF show better ASP than VHF to same VHF in New York



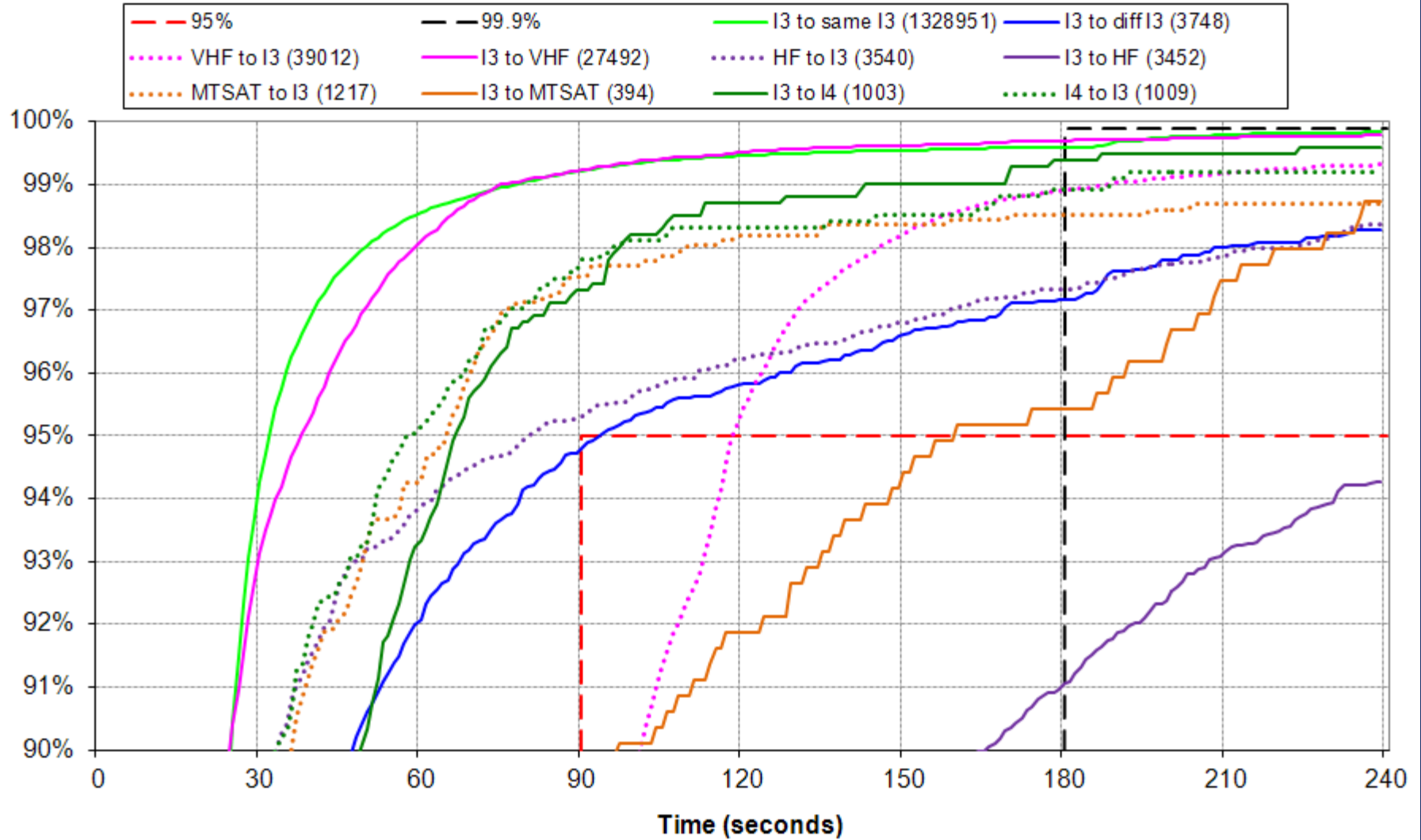
New York FIR - I3 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



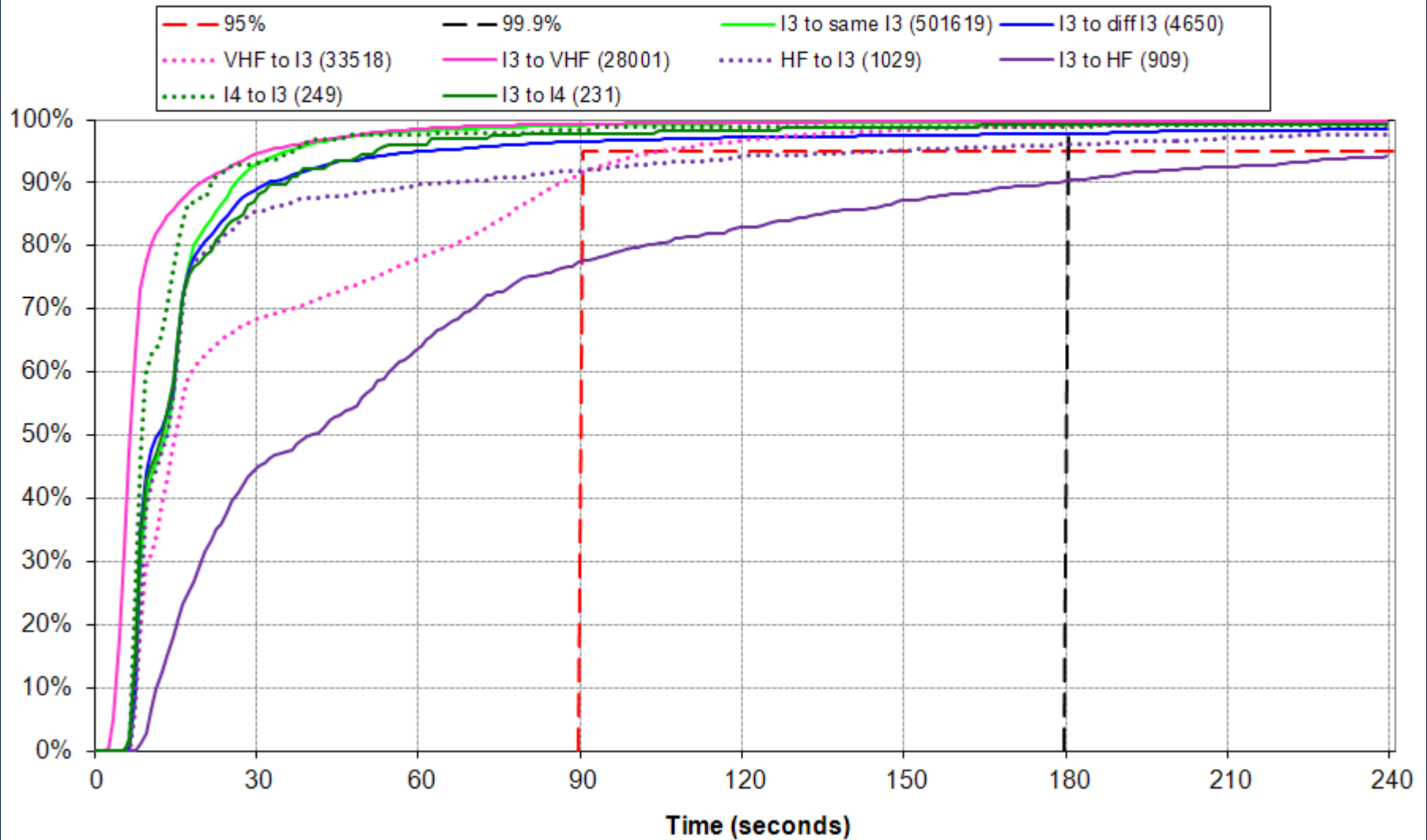
Oakland FIR - I3 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



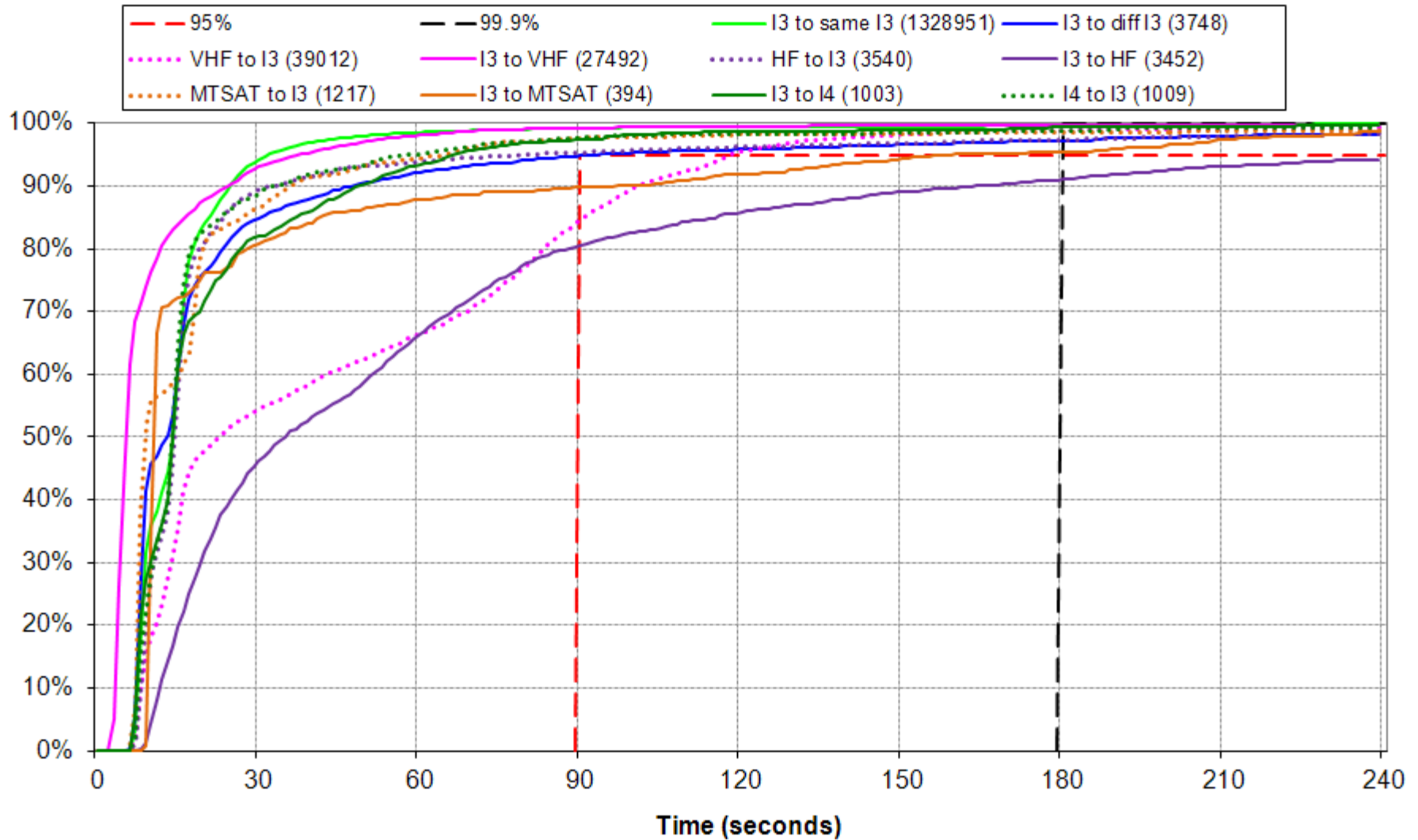
New York FIR - I3 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - I3 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



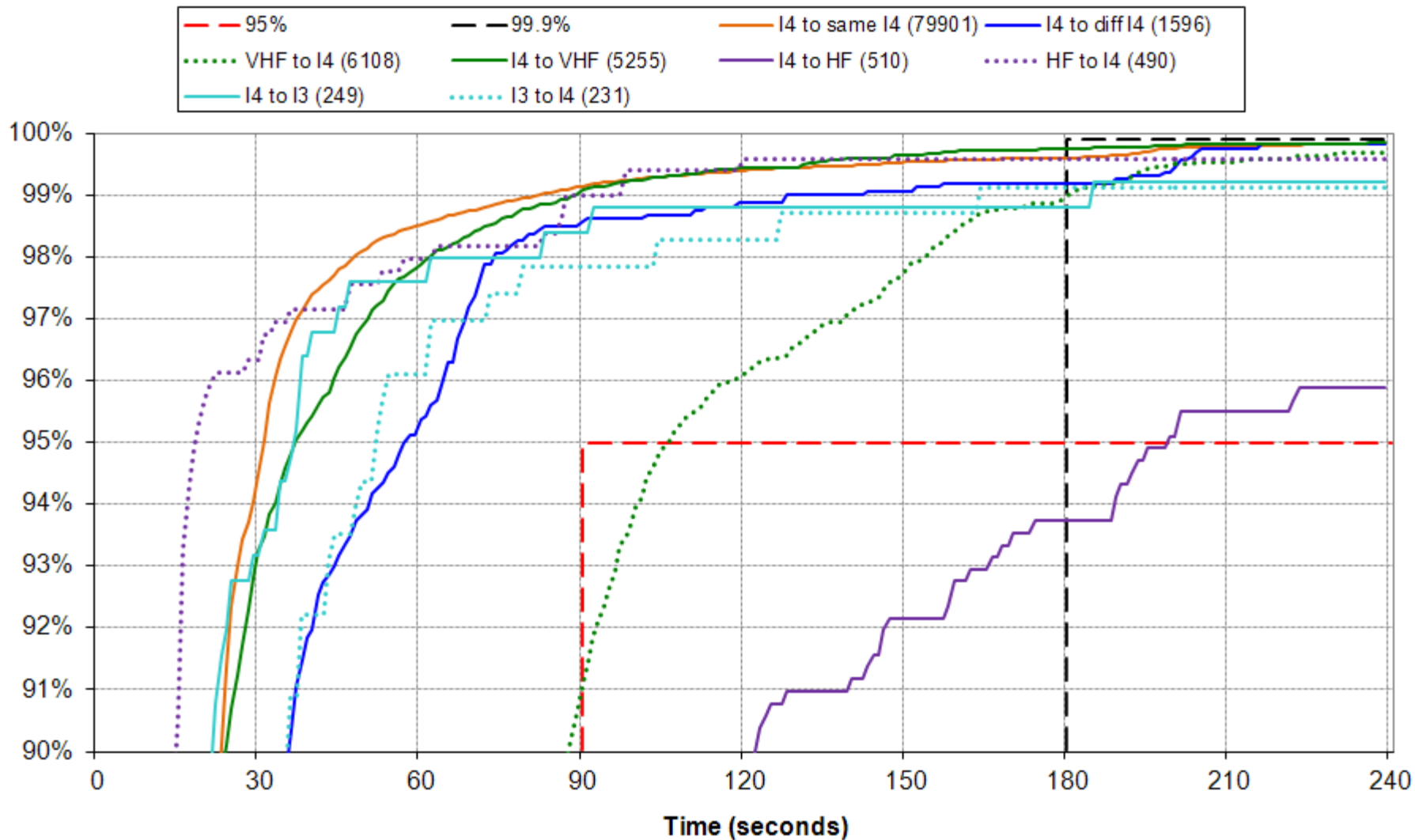
Observations for I3 Media Transitions

- Similar behavior observed for media transitions to and from I3 in New York and Oakland FIR
- Transitions between same I3 station better than between different I3 stations
- Transitions between I3 and I4 show similar performance both directions though I4 to I3 appears slightly better
- Transitions from I3 to VHF considerably better than VHF to I3 → VHF to I3 transitions adversely affect I3 ASP
- Transitions from I3 to HF considerably lower ASP than HF to I3 → I3 to HF transitions adversely affect HF ASP
- Transitions from I3 to MTSAT considerably lower ASP than MTSAT to I3 → I3 to MTSAT transitions adversely affect MTSAT ASP



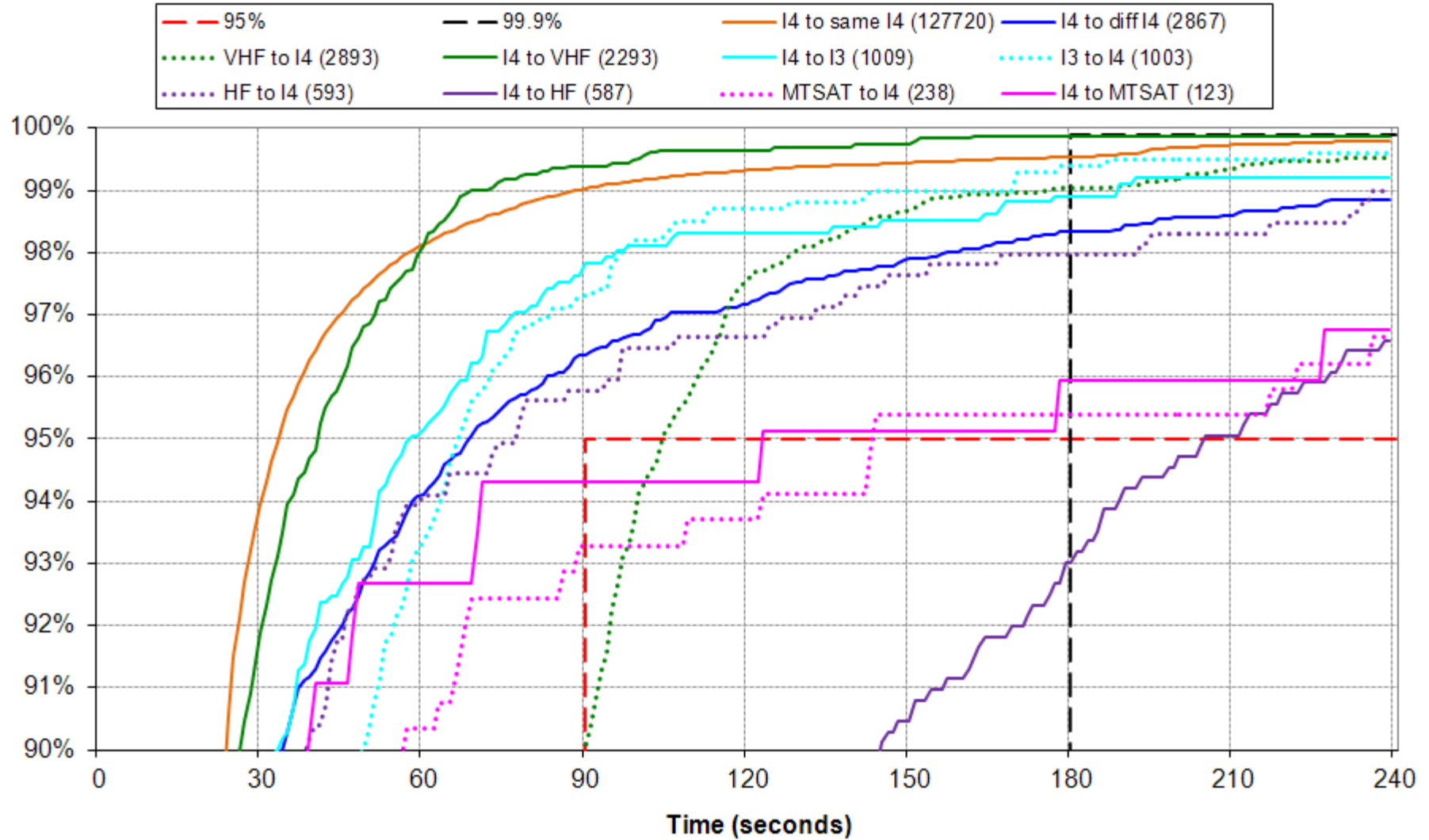
New York FIR - I4 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



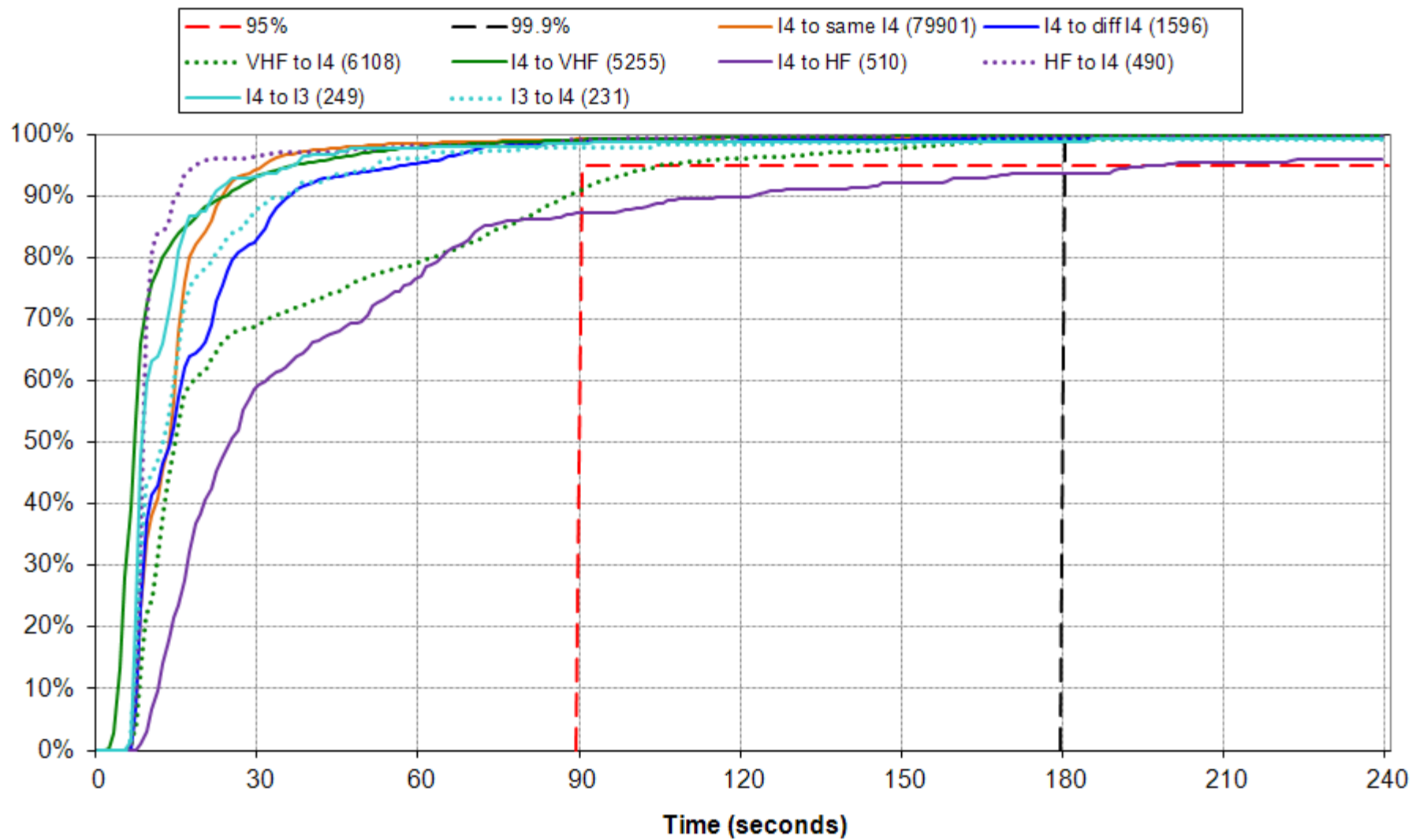
Oakland FIR - I4 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



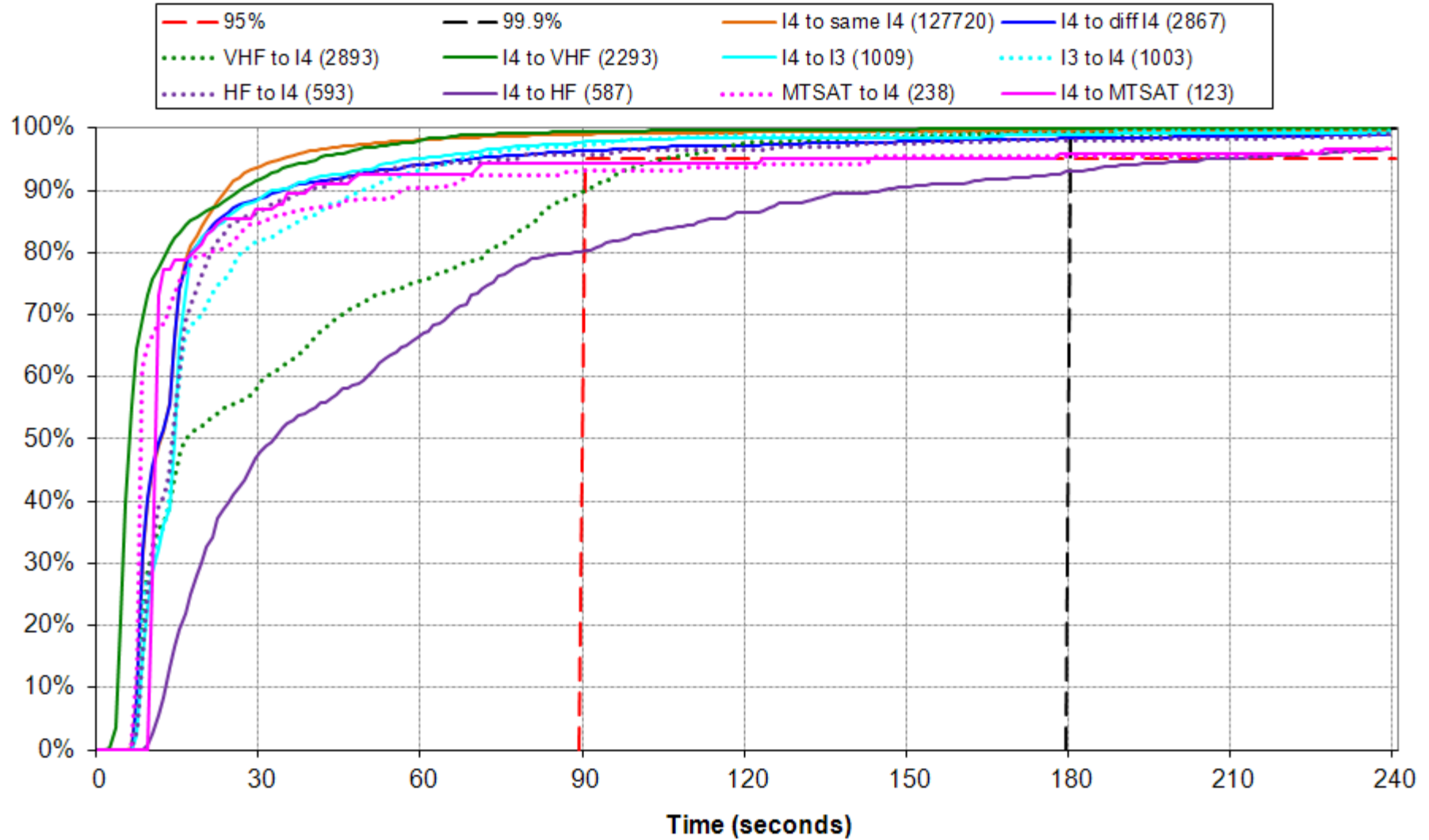
New York FIR - I4 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - I4 Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



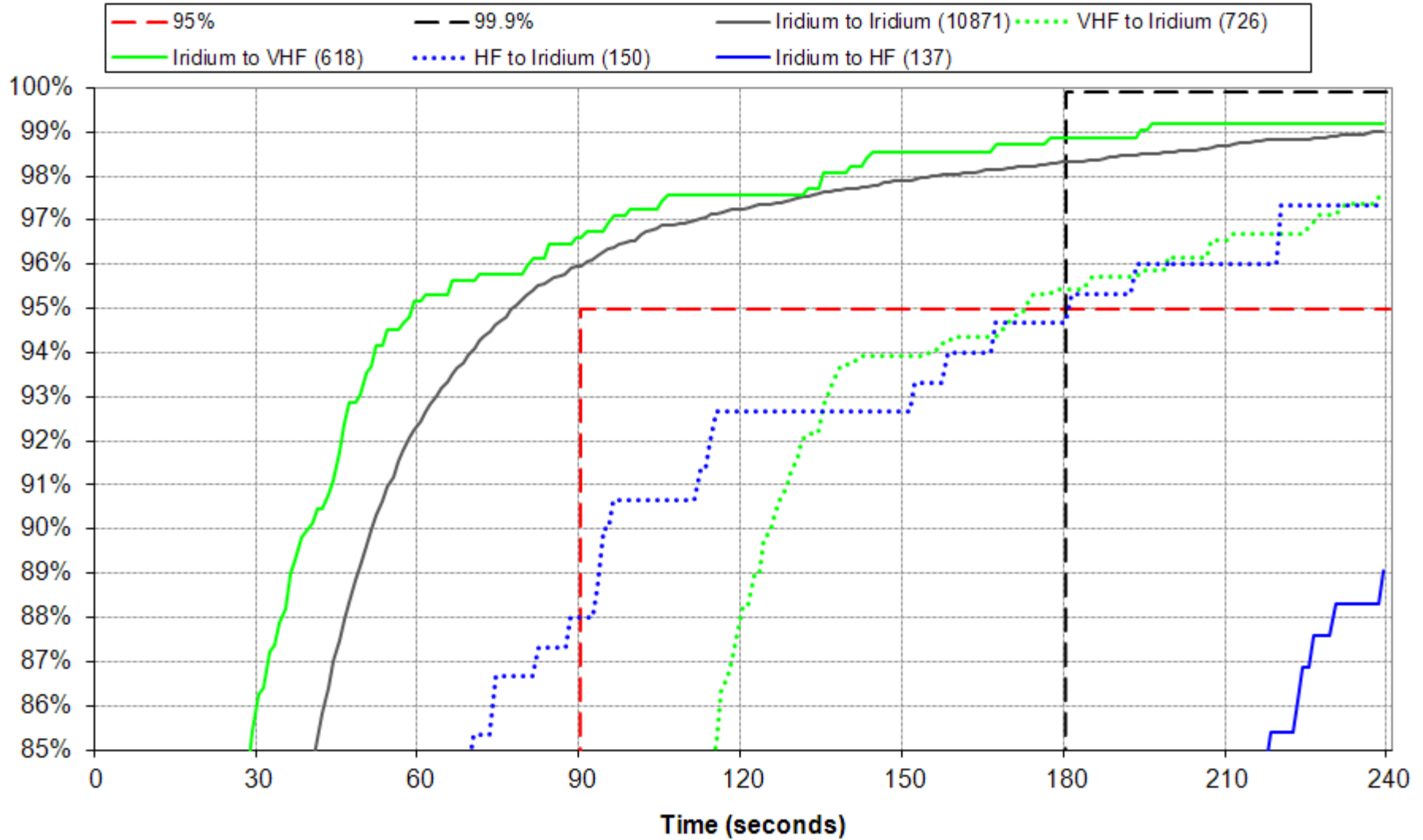
Observations for I4 Media Transitions

- Similar behavior observed for media transitions to and from I4 in New York and Oakland FIR
- Transitions between same I4 station better than between different I4 stations – more significant difference in Oakland
- Transitions between I3 and I4 show similar performance both directions though I4 to I3 appears slightly better
- Transitions from I4 to VHF considerably better than VHF to I4 → VHF to I4 transitions adversely affect I4 ASP (similar to I3)
- Transitions from I4 to HF considerably lower ASP than HF to I4 → I4 to HF transitions adversely affect HF ASP (similar to I3)
- Poor ASP for transitions between I4 and MTSAT but small data set



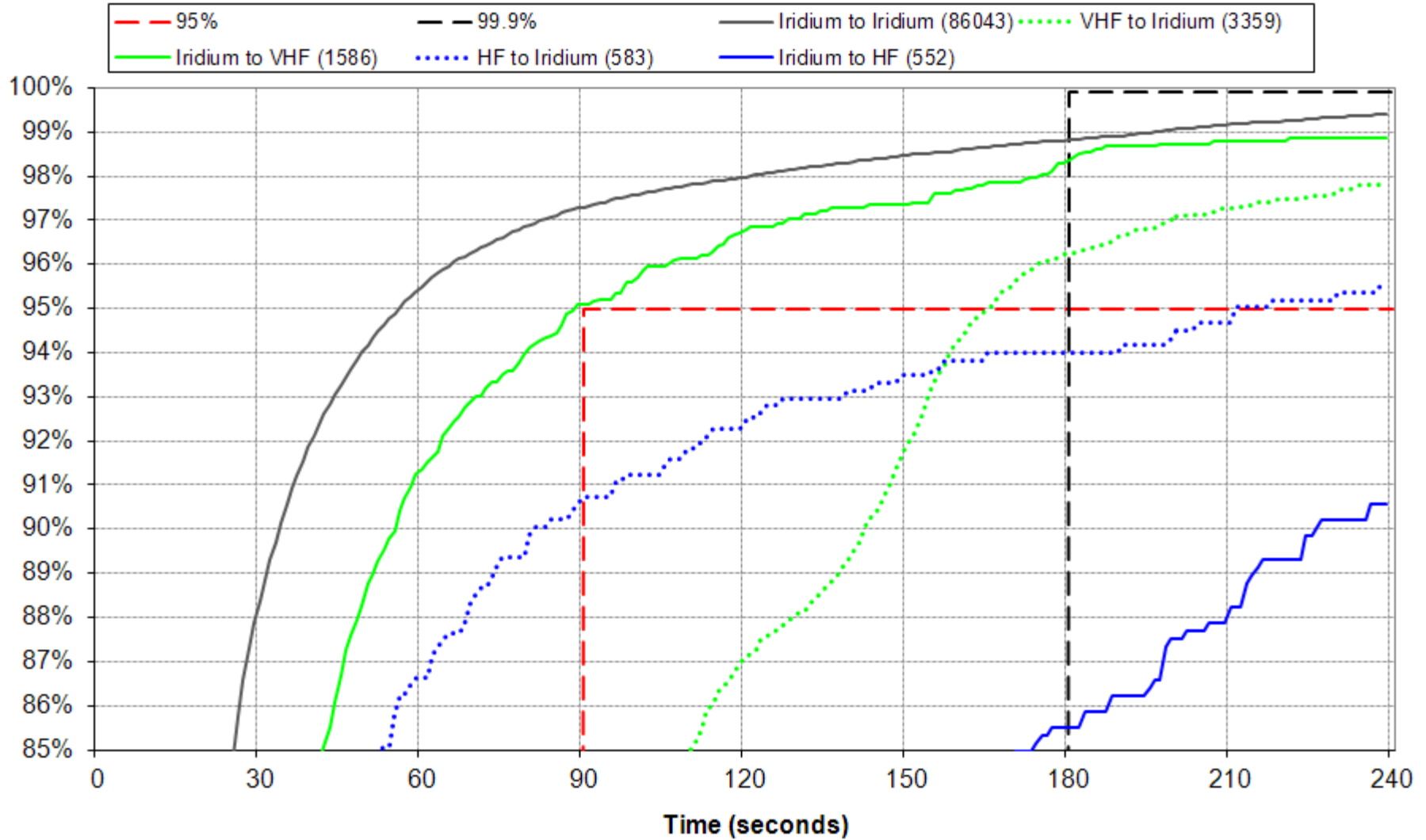
New York FIR - Iridium Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



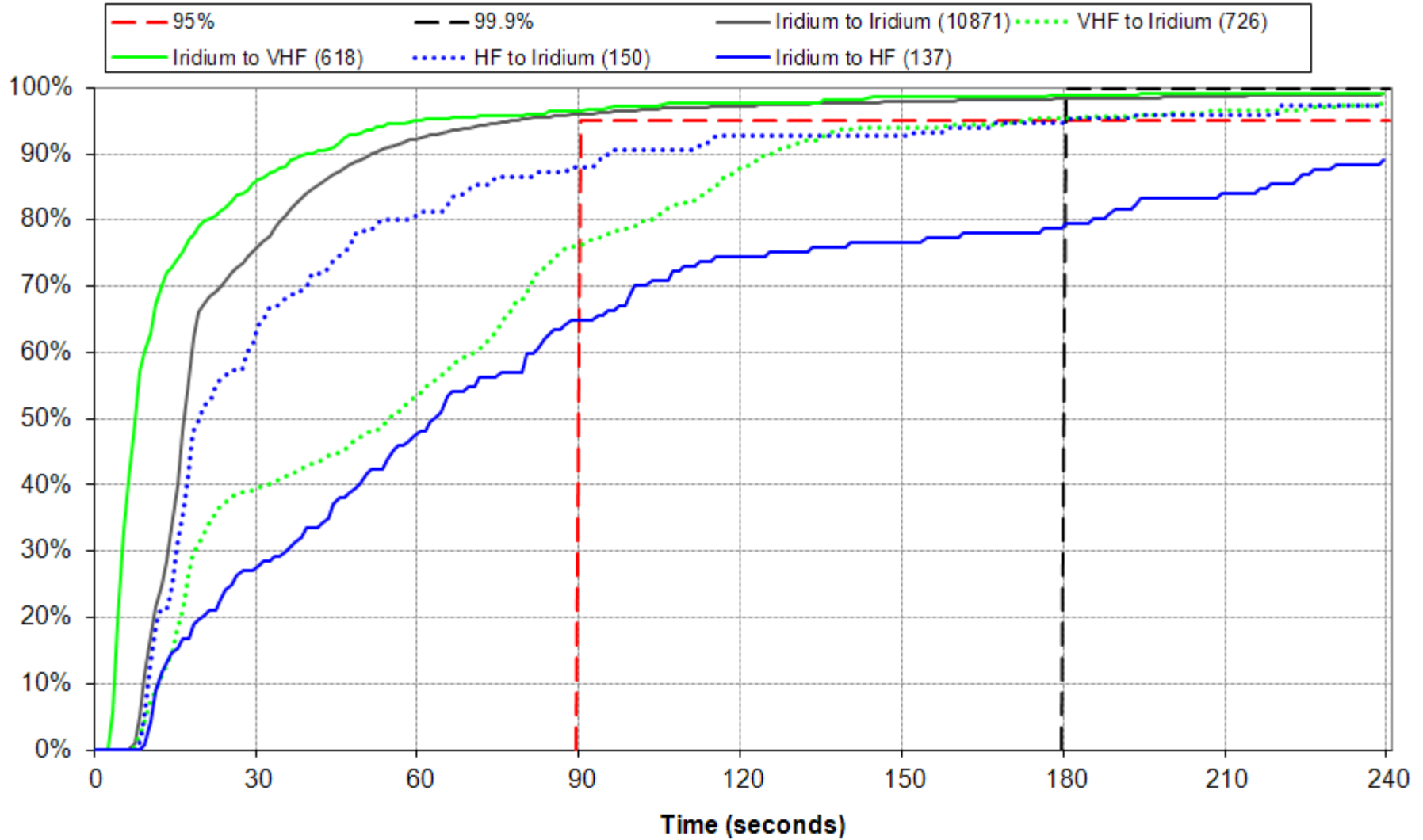
Oakland FIR - Iridium Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



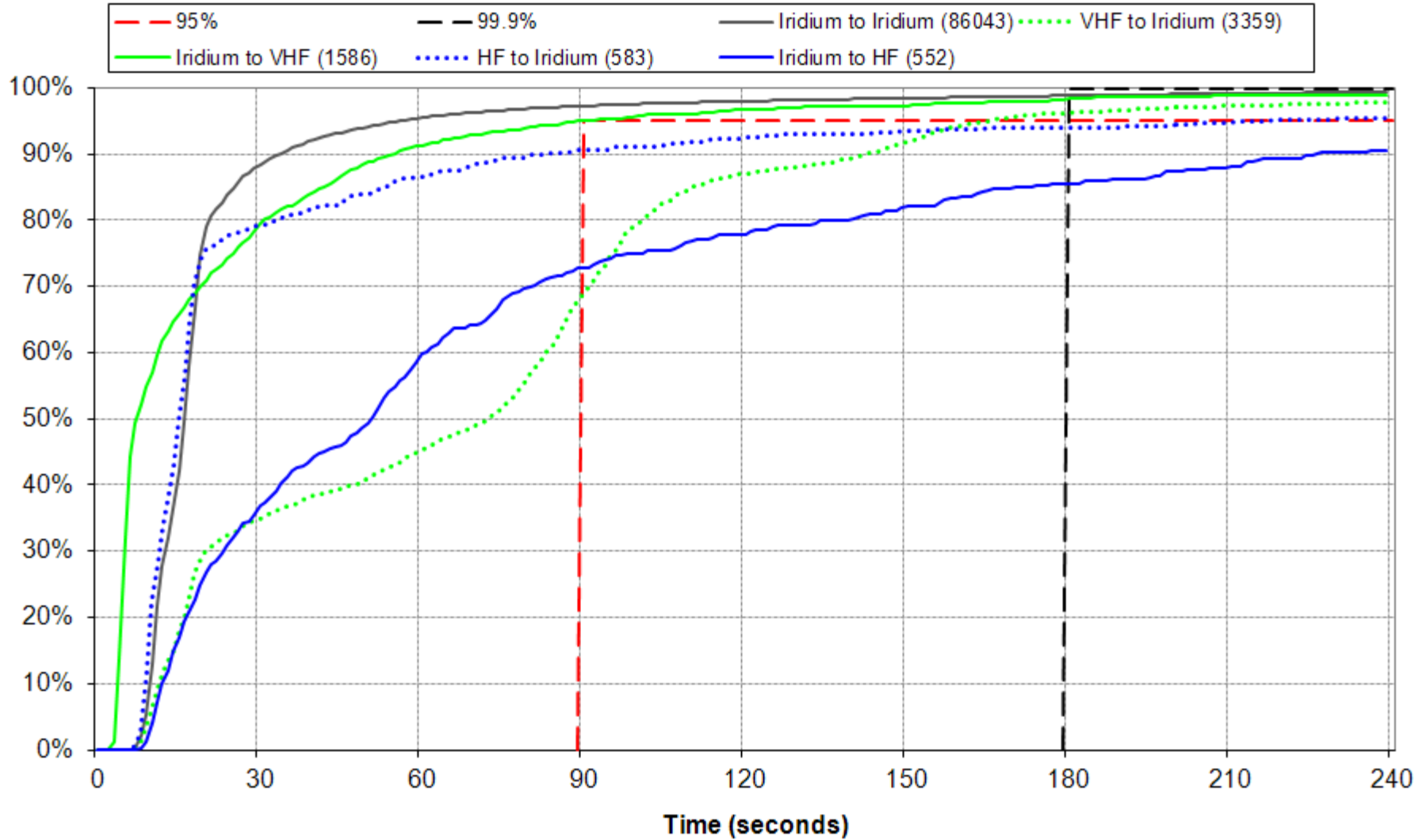
New York FIR - Iridium Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - Iridium Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



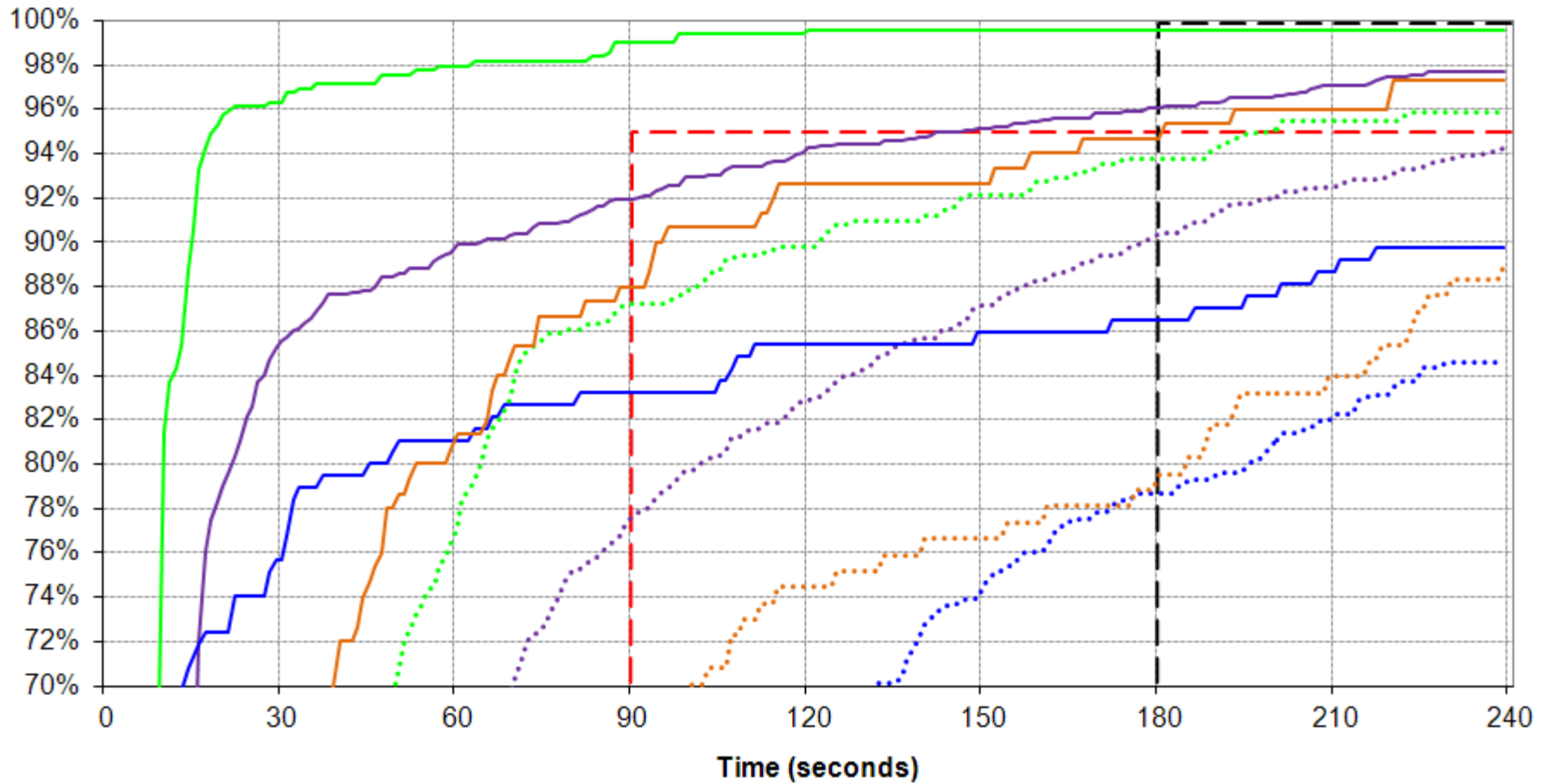
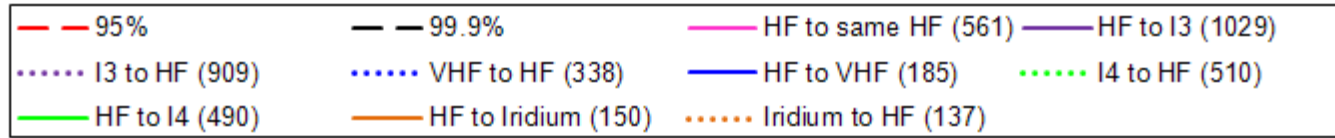
Observations for **Iridium** Media Transitions

- Similar behavior observed for media transitions to and from Iridium in New York and Oakland FIR
- Transitions from Iridium to VHF better than VHF to Iridium → VHF to Iridium transitions adversely affect Iridium ASP (similar to I3 and I4)
- Transitions from Iridium to VHF better in New York
- Transitions from Iridium to HF considerably lower than HF to Iridium → Iridium to HF transitions adversely affect HF ASP (similar to I3 and I4)



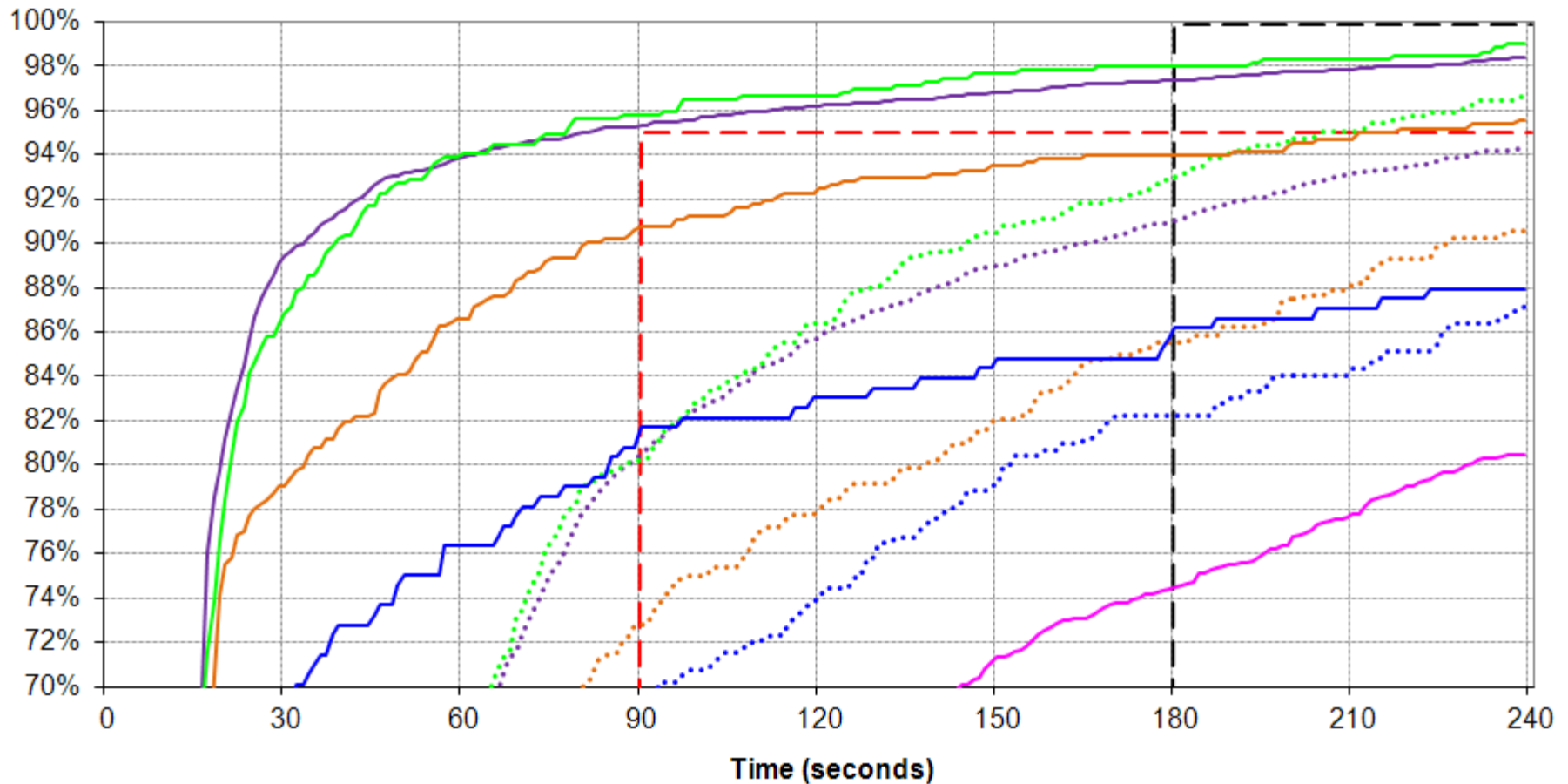
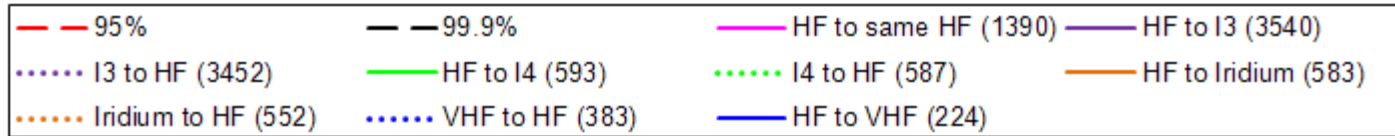
New York FIR - HF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



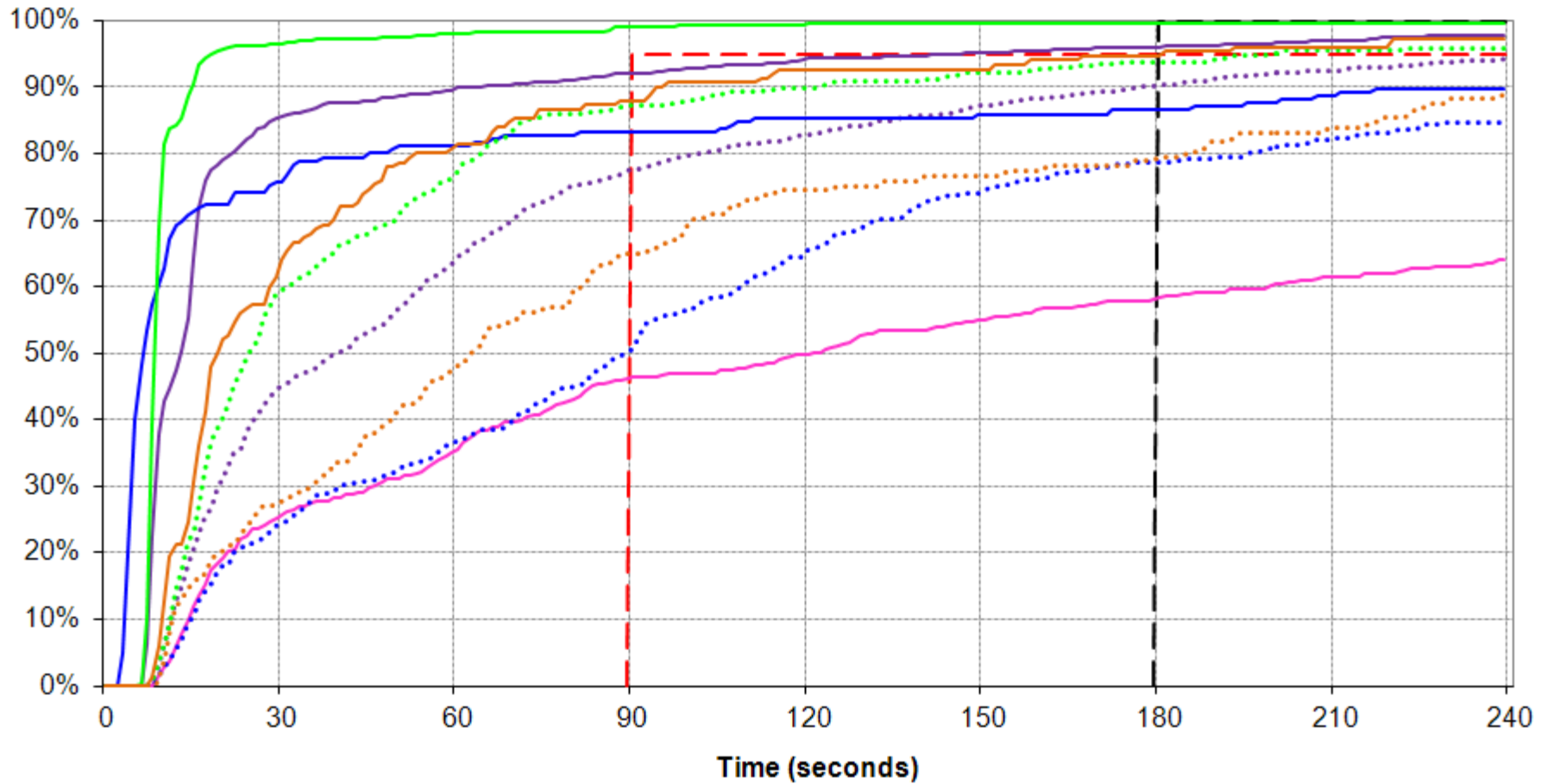
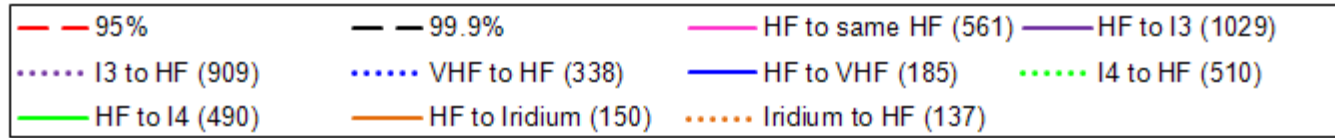
Oakland FIR - HF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



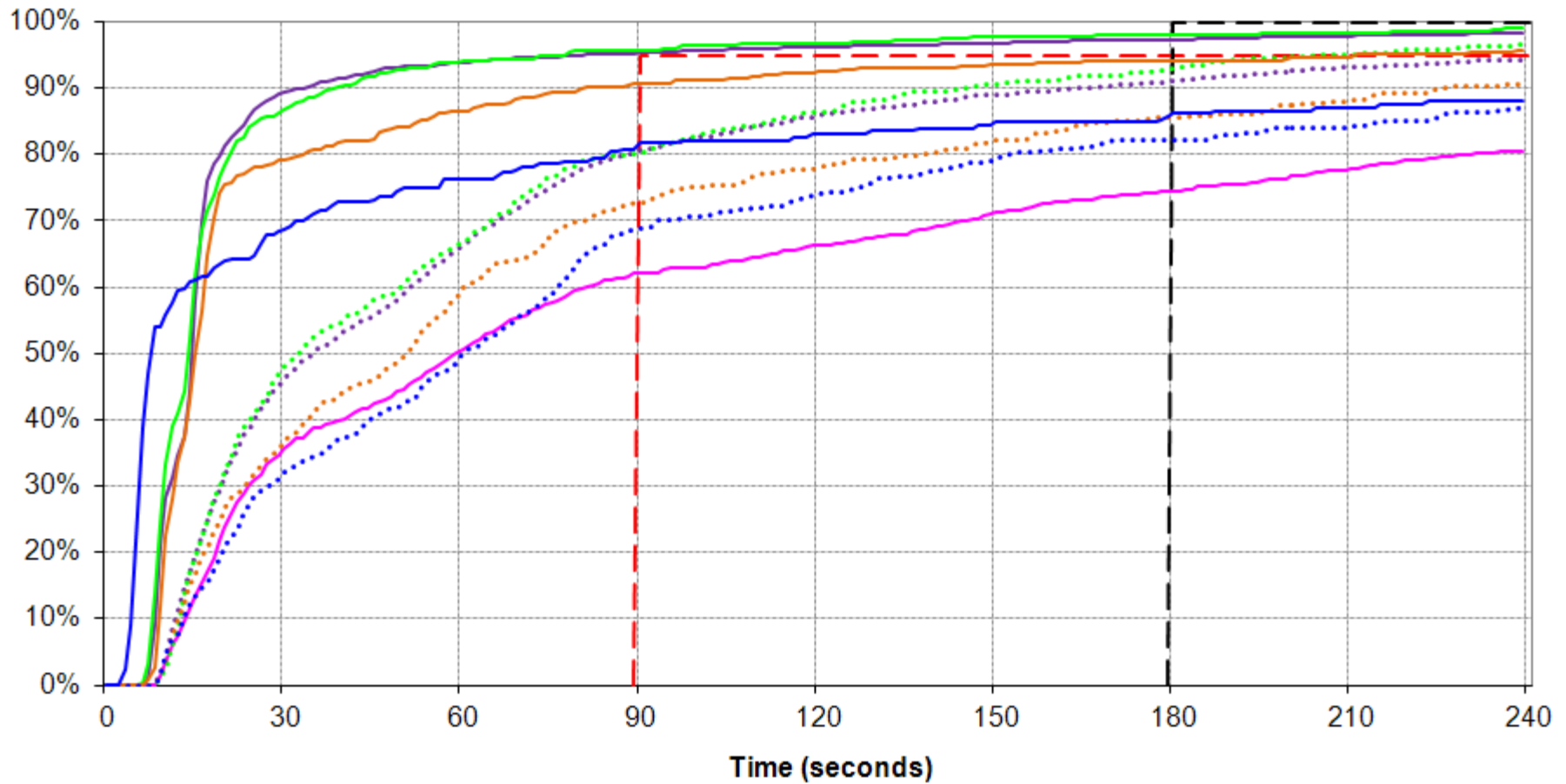
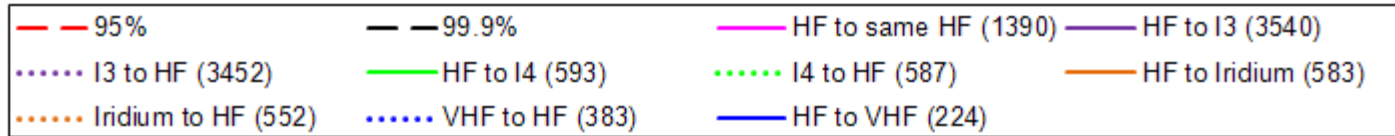
New York FIR - HF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - HF Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



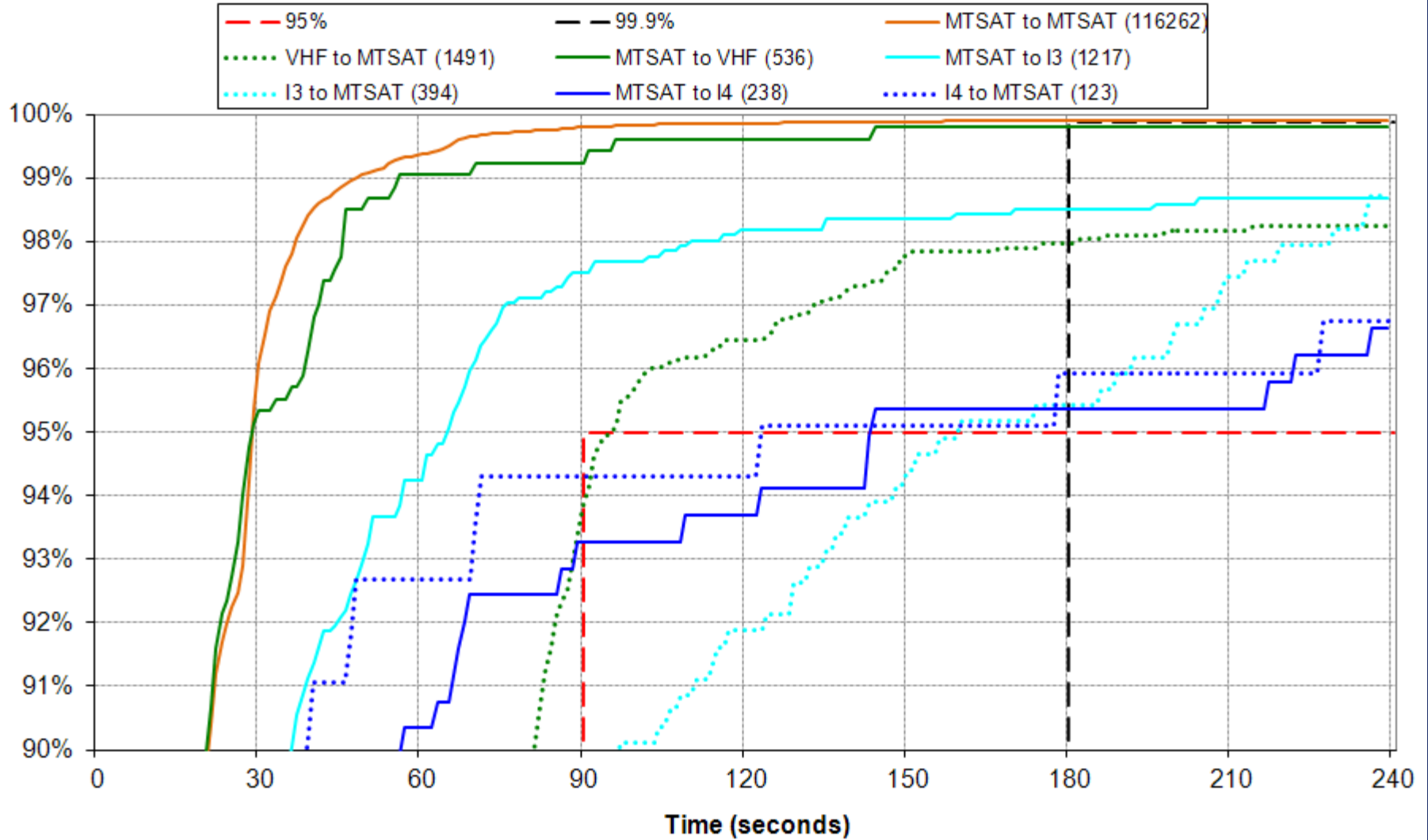
Observations for HF Media Transitions

- Transitions from HF to HF (same station) exhibit the lowest ASP
- Transitions from HF to all other media show better ASP than transitions to HF
- While transitions from all other media to HF are lowest they still appear to have better ASP than HF to HF transitions, therefore increasing the ASP for HF



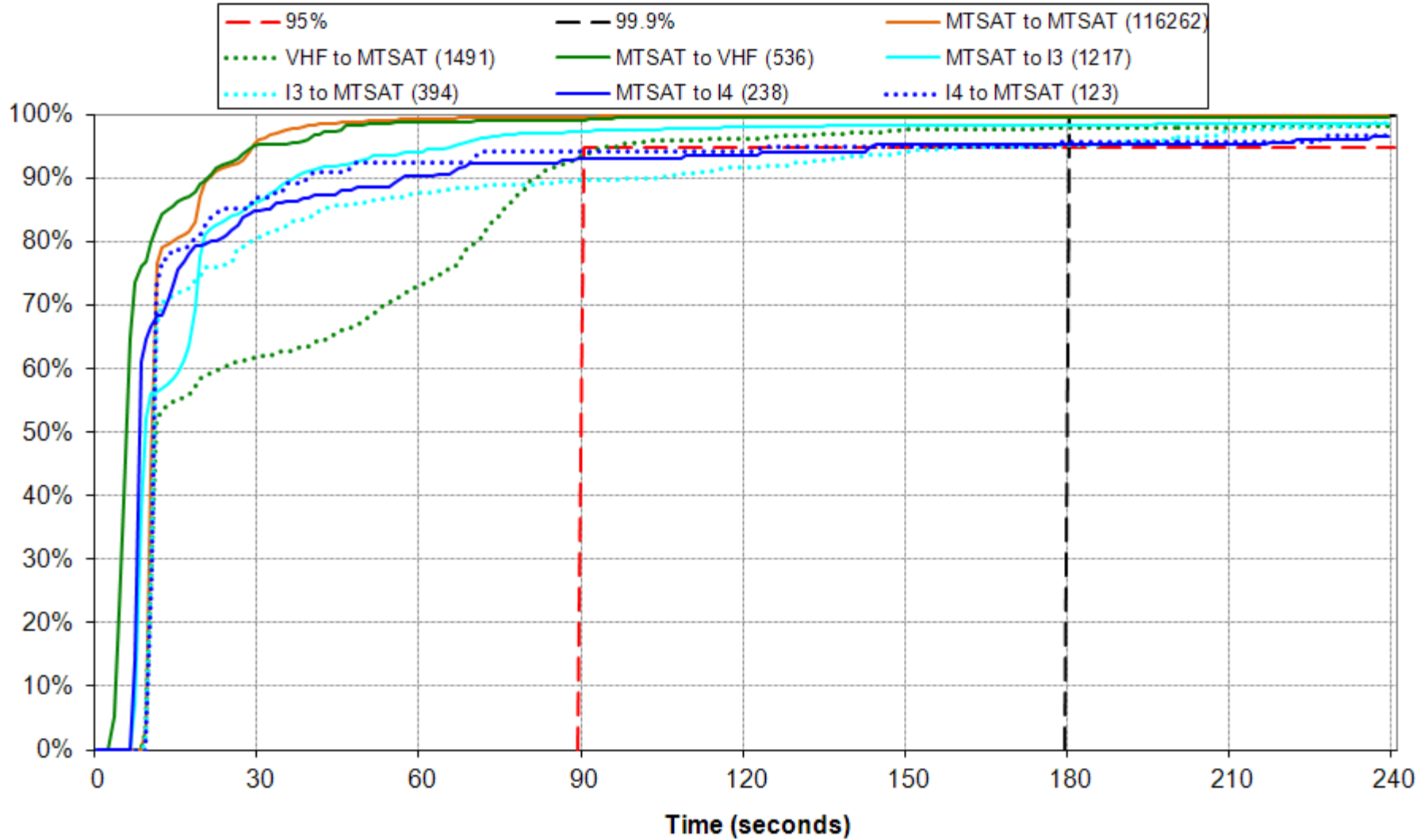
Oakland FIR - MTSAT Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Oakland FIR - MTSAT Media Transitions - Jul to Dec 2013

Actual Surveillance Performance (ASP)



Observations for **MTSAT** Media Transitions

- MTSAT to MTSAT – meets both 95% and 99.9% ASP
- Transitions from VHF to MTSAT considerably lower ASP than MTSAT to VHF → VHF to MTSAT transitions adversely affect MTSAT ASP
- Transitions from I3 to MTSAT considerably lower than MTSAT to I3 → I3 to MTSAT transitions adversely affect MTSAT ASP
- Poor ASP for transitions between I4 and MTSAT but small data set

