Description of the Worksheets in this workbook

Sum of All Classes

Contains summary tables of message traffic for 2007 and 2015 for all classes of traffic. Calculations of data traffic are based on details in Class 1/2/3, Loading by Link, and Non-Flight Dependent worksheets (see below). Also contains calculations for voice traffic.

Class 1, Class 2, Class 3

These worksheets include several general elements. The main driver for all calculations are the results of Task 3, which are incorporated in the upper left corner of the worksheet; the Message IDs correspond to those in Tasks 5/6/7 reports. Immediately to the right, there is a work area to facilitate calculations by domain. The tables at the lower right perform the calculation of "bits per minute per flight" followed by K-bits per minute by domain. K-bits per minute is based on "bits per minute per flight" but also incorporates the projected traffic volume (See Flight Activity 2007 & 2015) and expected percentage of equipage (see % application). Finally, for two-way communications, the ATN overhead factors are applied.

Non-Flight Dependent

This sheet is similar to Class 1/2/3, but only deals with messages that are likely to be broadcast and where the volume of messages is not likely to be affected by the number of aircraft. Consequently, traffic estimates and equipage factors are not relevant.

Oceanic

This worksheet is comparable to those for Class 1/2/3. Although many Class 2 aircraft fly in oceanic airspace, the characteristics of any aircraft flying oceanic routes is sufficiently similar that there was no benefit to considering them separately.

Flight Activity 2007 & 2015

This worksheet takes traffic statistics for 1998 and extrapolates to 2007 and 2015 based on FAA projections of estimated operations Other spreadsheets in this workbook link to these values.

# of aircraft 1996

These FAA statistics were used to develop estimates of likely equipage rates.

% Applications

For each of the application areas described in Tasks 5/6/7, there are estimated levels of equipage by class of aircraft (using the subdivided classes used in "# of aircraft 1996"). These estimates were done by the SAIC team; no validated data were available. The number of aircraft in each subclass is then used to develop estimated equipage levels for each of the three aircraft classes used throughout the RTO 24 work.

9 APAX-CREW thru 1 FIS

These tables correspond to the Task 3 report data. Data needed for calculations is replicated in the Class 1/2/3, Non-Flight Dependent, and Oceanic tables. There are no automatic linkages to these tables.

Data Message Traffic for All Classes of Aircraft (K-bits per second)						
2015	**Airport Uplink**	**Airport Downlink**	**Terminal Uplink**	**Terminal Downlink**	**En Route Uplink**	**En Route Downlink**
FIS	0.2	0.0	0.9	0.0	6.9	0.0
TIS	23.7	0.0	7.0	0.0	20.5	0.0
CPDLC	3.4	2.9	1.3	0.9	1.1	1.3
DSSDL	0.2	0.3	0.1	0.2	0.1	0.1
AOCDL	0.4	8.4	0.6	8.5	0.2	3.5
ADS Reporting	0.0	16.1	0.0	3.3	0.0	1.5
AUTOMET	0.0	0.0	0.0	4.5	0.0	6.2
APAXS	0.0	0.0	0.0	0.0	131.7	115.5

Data Message Traffic for All Classes of Aircraft (K-bits per second)						
2007	**Airport Uplink**	**Airport Downlink**	**Terminal Uplink**	**Terminal Downlink**	**En Route Uplink**	**En Route Downlink**
FIS	0.2	0.0	0.9	0.0	6.9	0.0
TIS	21.3	0.0	6.4	0.0	18.5	0.0
CPDLC	0.9	0.8	0.4	0.2	0.3	0.3
DSSDL	0.0	0.1	0.0	0.0	0.0	0.0
AOCDL	0.4	7.0	0.5	7.1	0.2	2.9
ADS Reporting	0.0	4.3	0.0	0.9	0.0	0.4
AUTOMET	0.0	0.0	0.0	1.2	0.0	1.7
APAXS	0.0	0.0	0.0	0.0	33.1	29.0

FIS entry assumes all FIS products are broadcast.
TIS entry includes aircraft volumes.

VOICE TRAFFIC (seconds per flight)						
	Airport Uplink	**Airport Downlink**	**Terminal Uplink**	**Terminal Downlink**	**En Route Uplink**	**En Route Donwlink**
Class 1	15	7	10	10	20	5
Class 2	15	7	25	25	10	5
Class 3	15	7	25	25	10	5

It is assumed airport is always voice; voice traffic in other domains transitions to CPDLC if aircraft are equipped

CPDLC Equipped	Not CPDLC Equipped
0.48	0.52118084
0.76	0.23693974
0.98	0.01682516

VOICE TRAFFIC (call seconds per minute per flight)						
2015	**Airport Uplink**	**Airport Downlink**	**Terminal Uplink**	**Terminal Downlink**	**En Route Uplink**	**En Route Donwlink**
Class 1	1.5	0.7	0.5	0.5	0.4	0.1
Class 2	1.5	0.7	0.6	0.6	0.1	0.0
Class 3	1.5	0.7	0.0	0.0	0.0	0.0
VOICE TRAFFIC (call seconds per second)						
2015						
Class 1	2.7	1.3	0.7	0.7	2.0	0.5
Class 2	0.9	0.4	0.3	0.3	0.2	0.1
Class 3	1.2	0.5	0.0	0.0	0.0	0.0
Channels	**7.0**		**1.9**		**2.7**	

It is assumed airport is always voice; voice traffic in other domains transitions to CPDLC if aircraft are equipped

CPDLC Equipped	Not CPDLC Equipped
0.14	0.85635425
0.23	0.77108192
0.29	0.70504755

VOICE TRAFFIC (call seconds per minute per flight)						
2007	**Airport Uplink**	**Airport Downlink**	**Terminal Uplink**	**Terminal Downlink**	**En Route Uplink**	**En Route Donwlink**
Class 1	1.5	0.7	0.9	0.9	0.7	0.2
Class 2	1.5	0.7	1.9	1.9	0.3	0.2
Class 3	1.5	0.7	1.8	1.8	0.3	0.1
VOICE TRAFFIC (call seconds per second)						
2007						
Class 1	2.6	1.2	1.0	1.0	3.0	0.8
Class 2	0.8	0.4	0.8	0.8	0.4	0.2
Class 3	1.0	0.4	0.8	0.8	0.5	0.2
Channels	**6.3**		**5.3**		**5.1**	

Probablility of Blocked Call

P(x) is the probablility of a call being blocked given x channels and the load specified. With a traffic load of 6.3 call seconds per second, the probablility of a blocked call using 7 channels would would be 0.205. Assumptions: random call arrivals, exponentially distributed call durations, all channels are equally loaded, and no queuing.

Traffic Load (ρ call seconds per second)	**=**	**6.3**

n	**(ρ^n)/n!**	**Sum**	**P(x)**	**x**
0	1.00E+00	1.000	1.000	0
1	6.30E+00	7.300	0.863	1
2	1.98E+01	27.145	0.731	2
3	4.17E+01	68.820	0.606	3
4	6.56E+01	134.457	0.488	4
5	8.27E+01	217.160	0.381	5
6	8.68E+01	303.998	0.286	6
7	7.82E+01	382.152	0.205	7
8	6.15E+01	443.699	0.139	8
9	4.31E+01	486.782	0.089	9
10	2.71E+01	513.924	0.053	10
11	1.55E+01	529.469	0.029	11
12	8.16E+00	537.630	0.015	12
13	3.96E+00	541.585	0.007	13
14	1.78E+00	543.365	0.003	14
15	7.47E-01	544.112	0.001	15
16	2.94E-01	544.406	0.001	16
17	1.09E-01	544.515	0.000	17
18	3.82E-02	544.554	0.000	18
19	1.27E-02	544.566	0.000	19
20	3.99E-03	544.570	0.000	20
21	1.20E-03	544.571	0.000	21
22	3.43E-04	544.572	0.000	22
23	9.38E-05	544.572	0.000	23
24	2.46E-05	544.572	0.000	24
25	6.21E-06	544.572	0.000	25
26	1.50E-06	544.572	0.000	26
27	3.51E-07	544.572	0.000	27
28	7.90E-08	544.572	0.000	28
29	1.72E-08	544.572	0.000	29
30	3.60E-09	544.572	0.000	30
31	7.32E-10	544.572	0.000	31
32	1.44E-10	544.572	0.000	32
33	2.75E-11	544.572	0.000	33
34	5.10E-12	544.572	0.000	34
35	9.18E-13	544.572	0.000	35
36	1.61E-13	544.572	0.000	36
37	2.73E-14	544.572	0.000	37
38	4.53E-15	544.572	0.000	38
39	7.32E-16	544.572	0.000	39
40	1.15E-16	544.572	0.000	40

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M17/En Route	1 FIS	FIS	M17	En Route	1 msg/flt	3200	1 msg/flt	64		128.0	2.6					128	2.56
M21/ Terminal	1 FIS		M21	Terminal	1 msg/flt	400	1 req/flt	56		40.0	5.6			40	5.6		
M22/ Airport	1 FIS		M22	Airport	1 msg/10 sec	2100	1 req/flt	64		12600.0	6.4	12600	6.4				
M22/ Terminal	1 FIS		M22	Terminal	1 msg/10 sec	2000	6 req/flt	64		12000.0	38.4			12000	38.4		
M22/En Route	1 FIS		M22	En Route	1 msg/10 sec	2000	4 req/flt	64		20000.0	10.2					20000	10.24
M28/En Route	1 FIS		M28	En Route	1 msg/flt	45000				1800.0	0.0					1800	0
M32/ Airport	3 CPDLC	CPDLC	M32	Airport	10 msg/flt	123	10 msg/flt	32		123.0	32.0	123	32				
M32/ Terminal	3 CPDLC		M32	Terminal	9.6 msg/flt	123	13.1 msg/flt	32		118.1	41.9			118.08	41.92		
M32/En Route	3 CPDLC		M32	En Route	10.2 msg/flt	118	17.4 msg/flt	34		48.1	23.7					48.144	23.664
M34/ Airport	3 CPDLC		M34	Airport	1.25 msg/flt	1800	2.25 msg/flt	304		225.0	68.4	225	68.4				
M41/ Airport	3 CPDLC		M41	Airport	5 msg/flt	720	4 msg/flt	720		360.0	288.0	360	288				
M41/ Terminal	3 CPDLC		M41	Terminal	2 msg/flt	720	1 msg/flt	720		144.0	72.0			144	72		
M41/En Route	3 CPDLC		M41	En Route	6 msg/flt	720	5 msg/flt	720		172.8	144.0					172.8	144
M16/ Airport	5 (DSS) Aircraft - ATC Messaging	DSSDL	M16	Airport	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0	16	16				
M16/ Terminal	5 (DSS) Aircraft - ATC Messaging		M16	Terminal	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0			16	16		
M16/En Route	5 (DSS) Aircraft - ATC Messaging		M16	En Route	1 msg/5 flts	800	1 msg/5 flts	800		6.4	6.4					6.4	6.4
M2/ Airport	5 (DSS) Aircraft - ATC Messaging		M2	Airport	1 msg/flt	40	1 msg/flt	960		4.0	96.0	4	96				
M2/ Terminal	5 (DSS) Aircraft - ATC Messaging		M2	Terminal	1 msg/flt	40	1 msg/flt	960		4.0	96.0			4	96		
M2/En Route	5 (DSS) Aircraft - ATC Messaging		M2	En Route	1 msg/flt	40	1 msg/flt	960		1.6	38.4					1.6	38.4
M38/ Airport	5 (DSS) Aircraft - ATC Messaging		M38	Airport	2 msg/flt	800	2 msg/flt	800		160.0	160.0	160	160				
M38/ Terminal	5 (DSS) Aircraft - ATC Messaging		M38	Terminal	1 msg/2 flt	800	1 msg/2 flt	100		40.0	5.0			40	5		
M38/En Route	5 (DSS) Aircraft - ATC Messaging		M38	En Route	1 msg/flt	800	1 msg/flt	100		32.0	4.0					32	4
M1/ Airport	7 ADS Reporting	ADS Reporting	M1	Airport	1 msg/flt	128	1 msg/1.1 sec	144		12.8	7854.5	12.8	7854.5				
M1/ Terminal	7 ADS Reporting		M1	Terminal	1 msg/flt	128	1 msg/5.33 sec	144		12.8	1621.0			12.8	1621		
M1/En Route	7 ADS Reporting		M1	En Route	1 msg/flt	128	1 msg/12.1 sec	144		5.1	714.0					5.12	714.05
M14/ Airport	8 AUTOMET	AUTOMET	M14	Airport		0	10 msg/flt	430		0.0	0.0	0	0				
M14/ Terminal	8 AUTOMET		M14	Terminal		0	3 msg/minute	430		0.0	0.0			0	0		
M14/En Route	8 AUTOMET		M14	En Route		0	1 msg/15 minutes	430		0.0	0.0					0	0
M43/Terminal	8 AUTOMET		M43	Terminal	1 msg/flt	56	3 msg/minute	512		5.6	1536.0			5.6	1536		
M43/En Route	8 AUTOMET		M43	En Route	1 msg/flt	56	1 msg/6 minutes	2152		2.2	358.7					2.24	358.67
M44/En Route	8 AUTOMET		M44	En Route	1 msg/flt	56	1 msg/2 minutes	3544		2.2	1772.0					2.24	1772
M4/ Terminal	8 AUTOMET		M4	Terminal	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0			0	0		
M4/En Route	8 AUTOMET		M4	En Route	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0					0	0
M31/En Route	9 Onboard Passenger and Crew (APAX)	APAX	M31	En Route	5 10-min/flt	1440000	5 10-min/flt	1440000		288000.0	288000.0					288000	288000
M42/En Route	9 Onboard Passenger and Crew (APAX)		M42	En Route	1 msg/flt	1000000	20 msg/flt	1000		40000.0	800.0					40000	800
M5/En Route	9 Onboard Passenger and Crew (APAX)		M5	En Route	3 msg/flt	5200	6 msg/flt	480		624.0	115.2					624	115.2
M6/En Route	9 Onboard Passenger and Crew (APAX)		M6	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4
M7/En Route	9 Onboard Passenger and Crew (APAX)		M7	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)

Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink

ATN Protocol + subnetwork overhead	CPDLC up	CPDLC down	non-CPDLC	*Overhead factor applied*
	1.0	1.0	1.0	ATN
ATN Overhead factor	2.0	3.0	1.2	ATN
Total with ATN overhead	2.0	3.0	1.2	ATN
Physical layer overhead	0.5	0.5	0.5	ATN
Total bps for facility	3.0	4.5	1.8	
Modulation efficiency	1.25	1.25	1.25	ATN
Total ATN Overhead factor	**2.400**	**3.600**	**1.440**	

Data Message Traffic for Aircraft Class 1 (bits per min per flight)						
	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
FIS	18,144.0	9.2	17,337.6	63.4	31,576.3	18.4
CPDLC	1,699.2	1,398.2	629.0	410.1	530.3	603.6
DSSDL	259.2	391.7	86.4	168.5	57.6	70.3
AOCDL	0.0	0.0	0.0	0.0	0.0	0.0
ADS Reporting	12.8	7,854.5	12.8	1,621.0	5.1	714.0
AUTOMET	0.0	0.0	8.1	2,211.8	6.5	3,068.2
APAXS	0.0	0.0	0.0	0.0	329,456.0	288,992.0

Aircraft Equipage Factor	Data Message Traffic for Class 1 Aircraft (K-bits per min)						
	2015	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.53	FIS	1,042.5	0.5	996.2	3.6	1,814.4	1.1
0.48	CPDLC	88.7	73.0	32.8	21.4	27.7	31.5
0.10	DSSDL	2.9	4.3	1.0	1.9	0.6	0.8
0.00	AOCDL	0.0	0.0	0.0	0.0	0.0	0.0
0.53	ADS Reporting	0.7	451.3	0.7	93.1	0.3	41.0
0.52	AUTOMET	0.0	0.0	0.5	126.2	0.4	175.0
0.02	APAXS	0.0	0.0	0.0	0.0	573.9	503.4

Aircraft Equipage Factor	Data Message Traffic for Class 1 Aircraft (K-bits per min)						
	2007	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.16	FIS	290.5	0.1	277.6	1.0	505.6	0.3
0.14	CPDLC	24.9	20.5	9.2	6.0	7.8	8.8
0.03	DSSDL	0.8	1.2	0.3	0.5	0.2	0.2
0.00	AOCDL	0.0	0.0	0.0	0.0	0.0	0.0
0.16	ADS Reporting	0.2	126.7	0.2	26.1	0.1	11.5
0.16	AUTOMET	0.0	0.0	0.1	35.4	0.1	49.1
0.00	APAXS	0.0	0.0	0.0	0.0	161.1	141.3

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M17/En Route	1 FIS	FIS	M17	En Route	1 msg/flt	3200	1 msg/flt	64		128.0	2.6					128	2.56
M21/ Terminal	1 FIS		M21	Terminal	1 msg/flt	400	1 req/flt	56		40.0	5.6			40	5.6		
M22/ Airport	1 FIS		M22	Airport	1 msg/10 sec	2100	1 req/flt	64		12600.0	6.4	12600	6.4				
M22/ Terminal	1 FIS		M22	Terminal	1 msg/10 sec	2000	6 req/flt	64		12000.0	38.4			12000	38.4		
M22/En Route	1 FIS		M22	En Route	1 msg/10 sec	2000	4 req/flt	64		20000.0	10.2					20000	10.24
M28/En Route	1 FIS		M28	En Route	1 msg/flt	45000				1800.0	0.0					1800	0
M32/ Airport	3 CPDLC	CPDLC	M32	Airport	10 msg/flt	123	10 msg/flt	32		123.0	32.0	123	32				
M32/ Terminal	3 CPDLC		M32	Terminal	9.6 msg/flt	123	13.1 msg/flt	32		118.1	41.9			118.08	41.92		
M32/En Route	3 CPDLC		M32	En Route	10.2 msg/flt	118	17.4 msg/flt	34		48.1	23.7					48.144	23.664
M34/ Airport	3 CPDLC		M34	Airport	1.25 msg/flt	1800	2.25 msg/flt	304		225.0	68.4	225	68.4				
M41/ Airport	3 CPDLC		M41	Airport	5 msg/flt	720	4 msg/flt	720		360.0	288.0	360	288				
M41/ Terminal	3 CPDLC		M41	Terminal	2 msg/flt	720	1 msg/flt	720		144.0	72.0			144	72		
M41/En Route	3 CPDLC		M41	En Route	6 msg/flt	720	5 msg/flt	720		172.8	144.0					172.8	144
M16/ Airport	5 (DSS) Aircraft - ATC Messaging	DSSDL	M16	Airport	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0	16	16				
M16/ Terminal	5 (DSS) Aircraft - ATC Messaging		M16	Terminal	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0			16	16		
M16/En Route	5 (DSS) Aircraft - ATC Messaging		M16	En Route	1 msg/5 flts	800	1 msg/5 flts	800		6.4	6.4					6.4	6.4
M2/ Airport	5 (DSS) Aircraft - ATC Messaging		M2	Airport	1 msg/flt	40	1 msg/flt	960		4.0	96.0	4	96				
M2/ Terminal	5 (DSS) Aircraft - ATC Messaging		M2	Terminal	1 msg/flt	40	1 msg/flt	960		4.0	96.0			4	96		
M2/En Route	5 (DSS) Aircraft - ATC Messaging		M2	En Route	1 msg/flt	40	1 msg/flt	960		1.6	38.4					1.6	38.4
M38/ Airport	5 (DSS) Aircraft - ATC Messaging		M38	Airport	2 msg/flt	800	2 msg/flt	800		160.0	160.0	160	160				
M38/ Terminal	5 (DSS) Aircraft - ATC Messaging		M38	Terminal	1 msg/2 flt	800	1 msg/2 flt	100		40.0	5.0			40	5		
M38/En Route	5 (DSS) Aircraft - ATC Messaging		M38	En Route	1 msg/flt	800	1 msg/flt	100		32.0	4.0					32	4
M10/ Terminal	6 AOC	AOC	M10	Terminal	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0			144	3120		
M11/ Airport	6 AOC		M11	Airport	6 msg/flt	480	6 msg/flt	10080		288.0	6048.0	288	6048				
M11/ Terminal	6 AOC		M11	Terminal	6 msg/flt	480	6 msg/flt	10080		288.0	6048.0			288	6048		
M11/En Route	6 AOC		M11	En Route	6 msg/flt	480	6 msg/flt	10080		115.2	2419.2					115.2	2419.2
M12/ Airport	6 AOC		M12	Airport	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0	144	3120				
M12/ Airport	6 AOC		M12	Airport	3 msg/flt	480	3 msg/flt	5200		144.0	1560.0	144	1560				
M12/ Terminal	6 AOC		M12	Terminal	3 msg/flt	480	3 msg/flt	5200		144.0	1560.0			144	1560		
M12/En Route	6 AOC		M12	En Route	3 msg/flt	480	3 msg/flt	10400		57.6	1248.0					57.6	1248
M12/En Route	6 AOC		M12	En Route	3 msg/flt	480	3 msg/flt	5200		57.6	624.0					57.6	624
M19/ Terminal	6 AOC		M19	Terminal		0	1 msg/min	50		0.0	50.0			0	50		
M19/En Route	6 AOC		M19	En Route		0	1 msg/min	50		0.0	50.0					0	50
M23/En Route	6 AOC		M23	En Route		0	1 msg/flt	3000		0.0	120.0					0	120
M25/ Airport	6 AOC		M25	Airport	1 msg/flt	10	1 msg/flt	10		1.0	1.0	1	1				
M30/ Airport	6 AOC		M30	Airport	1 msg/flt	10	1 msg/flt	10		1.0	1.0	1	1				
M30/ Terminal	6 AOC		M30	Terminal	1 msg/flt	10	1 msg/flt	10		1.0	1.0			1	1		
M33/En Route	6 AOC		M33	En Route	2 msg/flt	10	2 msg/flt	80		0.8	6.4					0.8	6.4
M8/ Airport	6 AOC		M8	Airport	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0	144	3120				
M8/ Terminal	6 AOC		M8	Terminal	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0			144	3120		
M8/En Route	6 AOC		M8	En Route	3 msg/flt	480	3 msg/flt	10400		57.6	1248.0					57.6	1248
M9/ Terminal	6 AOC		M9	Terminal	1 msg/flt	2600	4 msg/flt	240		260.0	96.0			260	96		
M9/En Route	6 AOC		M9	En Route	1 msg/flt	2600	4 msg/flt	240		104.0	38.4					104	38.4
M1/ Airport	7 ADS Reporting	ADS Reporting	M1	Airport	1 msg/flt	128	1 msg/1.1 sec	144		12.8	7854.5	12.8	7854.5				
M1/ Terminal	7 ADS Reporting		M1	Terminal	1 msg/flt	128	1 msg/5.33 sec	144		12.8	1621.0			12.8	1621		
M1/En Route	7 ADS Reporting		M1	En Route	1 msg/flt	128	1 msg/12.1 sec	144		5.1	714.0					5.12	714.05
M14/ Airport	8 AUTOMET	AUTOMET	M14	Airport		0	10 msg/flt	430		0.0	0.0	0	0				
M14/ Terminal	8 AUTOMET		M14	Terminal		0	3 msg/minute	430		0.0	0.0			0	0		
M14/En Route	8 AUTOMET		M14	En Route		0	1 msg/15 minutes	430		0.0	0.0					0	0
M43/Terminal	8 AUTOMET		M43	Terminal	1 msg/flt	56	3 msg/minute	512		5.6	1536.0			5.6	1536		
M43/En Route	8 AUTOMET		M43	En Route	1 msg/flt	56	1 msg/6 minutes	2152		2.2	358.7					2.24	358.67
M44/En Route	8 AUTOMET		M44	En Route	1 msg/flt	56	1 msg/2 minutes	3544		2.2	1772.0					2.24	1772
M4/ Terminal	8 AUTOMET		M4	Terminal	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0			0	0		

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M4/En Route	8 AUTOMET		M4	En Route	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0					0	0
M31/En Route	9 Onboard Passenger and Crew (APAX)	APAX	M31	En Route	5 10-min/flt	1440000	5 10-min/flt	1440000		288000.0	288000.0					288000	288000
M42/En Route	9 Onboard Passenger and Crew (APAX)		M42	En Route	1 msg/flt	1000000	20 msg/flt	1000		40000.0	800.0					40000	800
M5/En Route	9 Onboard Passenger and Crew (APAX)		M5	En Route	3 msg/flt	5200	6 msg/flt	480		624.0	115.2					624	115.2
M6/En Route	9 Onboard Passenger and Crew (APAX)		M6	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4
M7/En Route	9 Onboard Passenger and Crew (APAX)		M7	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4

ATN Protocol + subnetwork overhead	CPDLC up	CPDLC down	non-CPDLC	*Overhead factor applied*
	1.0	1.0	1.0	ATN
ATN Overhead factor	2.0	3.0	1.2	ATN
Total with ATN overhead	2.0	3.0	1.2	ATN
Physical layer overhead	0.5	0.5	0.5	ATN
Total bps for facility	3.0	4.5	1.8	
Modulation efficiency	1.25	1.25	1.25	ATN
Total ATN Overhead factor	**2.400**	**3.600**	**1.440**	

Data Message Traffic for Aircraft Class 2 (bits per min per flight)

	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
FIS	18,144.0	9.2	17,337.6	63.4	31,576.3	18.4
CPDLC	1,699.2	1,398.2	629.0	410.1	530.3	603.6
DSSDL	259.2	391.7	86.4	168.5	57.6	70.3
AOCDL	1,039.7	19,944.0	1,412.6	20,152.8	565.6	8,285.8
ADS Reporting	12.8	7,854.5	12.8	1,621.0	5.1	714.0
AUTOMET	0.0	0.0	8.1	2,211.8	6.5	3,068.2
APAXS	0.0	0.0	0.0	0.0	329,456.0	288,992.0

Data Message Traffic for Class 2 Aircraft (K-bits per min)

Aircraft Equipage Factor	2015	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.65	FIS	436.5	0.2	417.1	1.5	759.6	0.4
0.76	CPDLC	48.0	39.5	17.8	11.6	15.0	17.0
0.34	DSSDL	3.3	4.9	1.1	2.1	0.7	0.9
0.05	AOCDL	2.0	38.4	2.7	38.8	1.1	15.9
0.65	ADS Reporting	0.3	189.0	0.3	39.0	0.1	17.2
0.74	AUTOMET	0.0	0.0	0.2	61.0	0.2	84.6
0.03	APAXS	0.0	0.0	0.0	0.0	342.7	300.6

Data Message Traffic for Class 2 Aircraft (K-bits per min)

Aircraft Equipage Factor	2007	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.22	FIS	133.8	0.1	127.9	0.5	232.9	0.1
0.23	CPDLC	12.8	10.6	4.8	3.1	4.0	4.6
0.10	DSSDL	0.9	1.3	0.3	0.6	0.2	0.2
0.05	AOCDL	1.7	32.9	2.3	33.3	0.9	13.7
0.20	ADS Reporting	0.1	50.6	0.1	10.4	0.0	4.6
0.22	AUTOMET	0.0	0.0	0.1	16.3	0.0	22.6
0.01	APAXS	0.0	0.0	0.0	0.0	91.7	80.4

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M17/En Route	1 FIS	FIS	M17	En Route	1 msg/flt	3200	1 msg/flt	64		128.0	2.6					128	2.56
M21/ Terminal	1 FIS		M21	Terminal	1 msg/flt	400	1 req/flt	56		40.0	5.6			40	5.6		
M22/ Airport	1 FIS		M22	Airport	1 msg/10 sec	2100	1 req/flt	64		12600.0	6.4	12600	6.4				
M22/ Terminal	1 FIS		M22	Terminal	1 msg/10 sec	2000	6 req/flt	64		12000.0	38.4			12000	38.4		
M22/En Route	1 FIS		M22	En Route	1 msg/10 sec	2000	4 req/flt	64		20000.0	10.2					20000	10.24
M28/En Route	1 FIS		M28	En Route	1 msg/flt	45000				1800.0	0.0					1800	0
M32/ Airport	3 CPDLC	CPDLC	M32	Airport	5 msg/flt	123	5 msg/flt	32		61.5	16.0	61.5	16				
M32/ Terminal	3 CPDLC		M32	Terminal	9.6 msg/flt	123	13.1 msg/flt	32		118.1	41.9			118.08	41.92		
M32/En Route	3 CPDLC		M32	En Route	10.2 msg/flt	118	17.4 msg/flt	34		48.1	23.7					48.144	23.664
M34/ Airport	3 CPDLC		M34	Airport	1.25 msg/flt	1800	2.25 msg/flt	304		225.0	68.4	225	68.4				
M41/ Airport	3 CPDLC		M41	Airport	5 msg/flt	720	4 msg/flt	720		360.0	288.0	360	288				
M41/ Terminal	3 CPDLC		M41	Terminal	2 msg/flt	720	1 msg/flt	720		144.0	72.0			144	72		
M41/En Route	3 CPDLC		M41	En Route	6 msg/flt	720	5 msg/flt	720		172.8	144.0					172.8	144
M16/ Airport	5 (DSS) Aircraft - ATC Messaging	DSSDL	M16	Airport	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0	16	16				
M16/ Terminal	5 (DSS) Aircraft - ATC Messaging		M16	Terminal	1 msg/5 flts	800	1 msg/5 flts	800		16.0	16.0			16	16		
M16/En Route	5 (DSS) Aircraft - ATC Messaging		M16	En Route	1 msg/5 flts	800	1 msg/5 flts	800		6.4	6.4					6.4	6.4
M2/ Airport	5 (DSS) Aircraft - ATC Messaging		M2	Airport	1 msg/flt	40	1 msg/flt	960		4.0	96.0	4	96				
M2/ Terminal	5 (DSS) Aircraft - ATC Messaging		M2	Terminal	1 msg/flt	40	1 msg/flt	960		4.0	96.0			4	96		
M2/En Route	5 (DSS) Aircraft - ATC Messaging		M2	En Route	1 msg/flt	40	1 msg/flt	960		1.6	38.4					1.6	38.4
M38/ Airport	5 (DSS) Aircraft - ATC Messaging		M38	Airport	1 msg/flt	800	1 msg/flt	800		80.0	80.0	80	80				
M38/ Terminal	5 (DSS) Aircraft - ATC Messaging		M38	Terminal	1 msg/2 flt	800	1 msg/2 flt	100		40.0	5.0			40	5		
M38/En Route	5 (DSS) Aircraft - ATC Messaging		M38	En Route	1 msg/flt	800	1 msg/flt	100		32.0	4.0					32	4
M10/ Terminal	6 AOC	AOC	M10	Terminal	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0			144	3120		
M11/ Airport	6 AOC		M11	Airport	6 msg/flt	480	6 msg/flt	10080		288.0	6048.0	288	6048				
M11/ Terminal	6 AOC		M11	Terminal	6 msg/flt	480	6 msg/flt	10080		288.0	6048.0			288	6048		
M11/En Route	6 AOC		M11	En Route	6 msg/flt	480	6 msg/flt	10080		115.2	2419.2					115.2	2419.2
M12/ Airport	6 AOC		M12	Airport	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0	144	3120				
M12/ Airport	6 AOC		M12	Airport	3 msg/flt	480	3 msg/flt	5200		144.0	1560.0	144	1560				
M12/ Terminal	6 AOC		M12	Terminal	3 msg/flt	480	3 msg/flt	5200		144.0	1560.0			144	1560		
M12/En Route	6 AOC		M12	En Route	3 msg/flt	480	3 msg/flt	10400		57.6	1248.0					57.6	1248
M12/En Route	6 AOC		M12	En Route	3 msg/flt	480	3 msg/flt	5200		57.6	624.0					57.6	624
M19/ Terminal	6 AOC		M19	Terminal		0	1 msg/min	50		0.0	50.0			0	50		
M19/En Route	6 AOC		M19	En Route		0	1 msg/min	50		0.0	50.0					0	50
M23/En Route	6 AOC		M23	En Route		0	1 msg/flt	3000		0.0	120.0					0	120
M25/ Airport	6 AOC		M25	Airport	1 msg/flt	10	1 msg/flt	10		1.0	1.0	1	1				
M30/ Airport	6 AOC		M30	Airport	1 msg/flt	10	1 msg/flt	10		1.0	1.0	1	1				
M30/ Terminal	6 AOC		M30	Terminal	1 msg/flt	10	1 msg/flt	10		1.0	1.0			1	1		
M33/En Route	6 AOC		M33	En Route	2 msg/flt	10	2 msg/flt	80		0.8	6.4					0.8	6.4
M8/ Airport	6 AOC		M8	Airport	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0	144	3120				
M8/ Terminal	6 AOC		M8	Terminal	3 msg/flt	480	3 msg/flt	10400		144.0	3120.0			144	3120		
M8/En Route	6 AOC		M8	En Route	3 msg/flt	480	3 msg/flt	10400		57.6	1248.0					57.6	1248
M9/ Terminal	6 AOC		M9	Terminal	1 msg/flt	2600	4 msg/flt	240		260.0	96.0			260	96		
M9/En Route	6 AOC		M9	En Route	1 msg/flt	2600	4 msg/flt	240		104.0	38.4					104	38.4
M1/ Airport	7 ADS Reporting	ADS Reporting	M1	Airport	1 msg/flt	128	1 msg/1.1 sec	144		12.8	7854.5	12.8	7854.5				
M1/ Terminal	7 ADS Reporting		M1	Terminal	1 msg/flt	128	1 msg/5.33 sec	144		12.8	1621.0			12.8	1621		
M1/En Route	7 ADS Reporting		M1	En Route	1 msg/flt	128	1 msg/12.1 sec	144		5.1	714.0					5.12	714.05
M14/ Airport	8 AUTOMET	AUTOMET	M14	Airport		0	10 msg/flt	430		0.0	0.0	0	0				
M14/ Terminal	8 AUTOMET		M14	Terminal		0	3 msg/minute	430		0.0	0.0			0	0		
M14/En Route	8 AUTOMET		M14	En Route		0	1 msg/15 minutes	430		0.0	0.0					0	0
M43/Terminal	8 AUTOMET		M43	Terminal	1 msg/flt	56	3 msg/minute	512		5.6	1536.0			5.6	1536		
M43/En Route	8 AUTOMET		M43	En Route	1 msg/flt	56	1 msg/6 minutes	2152		2.2	358.7					2.24	358.67
M44/En Route	8 AUTOMET		M44	En Route	1 msg/flt	56	1 msg/2 minutes	3544		2.2	1772.0					2.24	1772
M4/ Terminal	8 AUTOMET		M4	Terminal	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0			0	0		

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M4/En Route	8 AUTOMET		M4	En Route	1 msg/flt	56	1 msg/5 minutes	1760		0.0	0.0					0	0
M31/En Route	9 Onboard Passenger and Crew (APAX)	APAX	M31	En Route	5 10-min/flt	1440000	5 10-min/flt	1440000		288000.0	288000.0					288000	288000
M42/En Route	9 Onboard Passenger and Crew (APAX)		M42	En Route	1 msg/flt	1000000	20 msg/flt	1000		40000.0	800.0					40000	800
M5/En Route	9 Onboard Passenger and Crew (APAX)		M5	En Route	3 msg/flt	5200	6 msg/flt	480		624.0	115.2					624	115.2
M6/En Route	9 Onboard Passenger and Crew (APAX)		M6	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4
M7/En Route	9 Onboard Passenger and Crew (APAX)		M7	En Route	2 msg/flt	5200	2 msg/flt	480		416.0	38.4					416	38.4

ATN Protocol + subnetwork overhead	CPDLC up	CPDLC down	non-CPDLC	*Overhead factor applied*
	1.0	1.0	1.0	ATN
ATN Overhead factor	2.0	3.0	1.2	ATN
Total with ATN overhead	2.0	3.0	1.2	ATN
Physical layer overhead	0.5	0.5	0.5	ATN
Total bps for facility	3.0	4.5	1.8	
Modulation efficiency	1.25	1.25	1.25	ATN
Total ATN Overhead factor	**2.400**	**3.600**	**1.440**	

Data Message Traffic for Aircraft Class 3 (bits per min per flight)

	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
FIS	18,144.0	9.2	17,337.6	63.4	31,576.3	18.4
CPDLC	1,551.6	1,340.6	629.0	410.1	530.3	603.6
DSSDL	144.0	276.5	86.4	168.5	57.6	70.3
AOCDL	1,039.7	19,944.0	1,412.6	20,152.8	565.6	8,285.8
ADS Reporting	12.8	7,854.5	12.8	1,621.0	5.1	714.0
AUTOMET	0.0	0.0	8.1	2,211.8	6.5	3,068.2
APAXS	0.0	0.0	0.0	0.0	329,456.0	288,992.0

Data Message Traffic for Class 3 Aircraft (K-bits per min)

Aircraft Equipage Factor	2015	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.90	FIS	754.6	0.4	721.1	2.6	1,313.2	0.8
0.98	CPDLC	70.2	60.6	28.4	18.5	24.0	27.3
0.70	DSSDL	4.7	9.0	2.8	5.5	1.9	2.3
0.51	AOCDL	24.3	465.7	33.0	470.6	13.2	193.5
0.90	ADS Reporting	0.5	326.7	0.5	67.4	0.2	29.7
0.79	AUTOMET	0.0	0.0	0.3	80.2	0.2	111.2
0.46	APAXS	0.0	0.0	0.0	0.0	6,985.8	6,127.8

Data Message Traffic for Class 3 Aircraft (K-bits per min)

Aircraft Equipage Factor	2007	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
0.24	FIS	163.0	0.1	155.8	0.6	283.7	0.2
0.29	CPDLC	17.4	15.0	7.0	4.6	5.9	6.8
0.21	DSSDL	1.2	2.2	0.7	1.4	0.5	0.6
0.51	AOCDL	20.1	386.5	27.4	390.6	11.0	160.6
0.27	ADS Reporting	0.1	81.0	0.1	16.7	0.1	7.4
0.24	AUTOMET	0.0	0.0	0.1	19.9	0.1	27.6
0.14	APAXS	0.0	0.0	0.0	0.0	1,731.3	1,518.6

2015	Airport	Terminal	En Route	New York	Kansas	National
APAXS			213.4	213.4	213.4	4268
AUTOMET		4.4	6.2	10.6	28.2	
FIS	0.2	0.9	6.9	8.6	12.4	**334**
TIS	23.7	7.1	20.5	122.4	174.5	425
ADS-B	34.7	34.7	34.7	34.7	34.7	
AOCDL	8.8	9.1	3.7	48	93.2	
DSSDL	0.5	0.3	0.2	2.5	4.2	
CPDCL	6.3	2.2	2.4	29.8	44.9	

Note: ADS-B is based on 888 aircraft in 225 mile range

VDL-3						
DSSDL	0.5	0.3	0.2			
CPDCL	6.3	2.2	2.4			
VDL-3 sum	**6.8**	**2.5**	**2.6**			
VDL-2						
AUTOMET		4.4	6.2	10.6	28.2	
AOCDL	8.8	9.1	3.7	48	93.2	
DSSDL	0.5	0.3	0.2	2.5	4.2	
CPDCL	6.3	2.2	2.4	29.8	44.9	
VDL-2 sum				**90.9**		
AUTOMET		4.4	6.2	10.6	28.2	
AOCDL	8.8	9.1	3.7	48	93.2	
VDL-2 sum				**58.6**		
UAT						
FIS	0.2	0.9	6.9	8.6	12.4	
TIS	23.7	7.1	20.5	122.4	174.5	
ADS-B	34.7	34.7	34.7	34.7	34.7	
UAT sum				**165.7**		
ADS-B Link						
ADS-B	34.7	34.7	34.7	34.7	34.7	
SATCOM						
APAXS			213.4	213.4	213.4	4268
FIS	0.2	0.9	6.9	8.6	12.4	334
TIS	23.7	7.1	20.5	122.4	174.5	425
SATCOM sum						**5027**

Note: APAX needs a two-way link, so should be separated from FIS/TIS

2007	Airport	Terminal	En Route	New York	Kansas	National
APAXS			54.8	54.8	54.8	1096
AUTOMET		1.2	1.7	2.9	7.7	
FIS	0.2	0.9	6.9	8.6	12.4	**334**
TIS	0.3	0.9	7.1	9.2	13.1	425
ADS-B	22.6	3.4	5.4	34.7	34.7	
AOCDL	7.4	7.6	3.1	40.3	78.1	
DSSDL		0.06	0.03	0.09	0.33	
CPDCL	1.7	0.5	0.6	7.9	11.6	

Note: ADS-B is based on 888 aircraft in 225 mile range

VDL-3						
DSSDL		0.06	0.03			
CPDCL	1.7	0.5	0.6			
VDL-3 sun	**1.7**	**0.56**	**0.63**			
VDL-2						
AUTOMET		1.2	1.7	2.9	7.7	
AOCDL	7.4	7.6	3.1	40.3	78.1	
DSSDL		0.06	0.03	0.09	0.33	
CPDCL	1.7	0.5	0.6	7.9	11.6	
VDL-2 sum				**51.19**		
AUTOMET		1.2	1.7	2.9	7.7	
AOCDL	7.4	7.6	3.1	40.3	78.1	
VDL-2 sum				**43.2**		
UAT						
FIS	0.2	0.9	6.9	8.6	12.4	
TIS	0.3	0.9	7.1	9.2	13.1	
ADS-B	22.6	3.4	5.4	34.7	34.7	
UAT sum				**52.5**		
ADS-B Link						
ADS-B	22.6	3.4	5.4	34.7	34.7	
SATCOM						
APAXs			54.8	54.8	54.8	1096
FIS	0.2	0.9	6.9	8.6	12.4	334
TIS	0.3	0.9	7.1	9.2	13.1	425
SATCOM sum						**1855**

Note: APAX needs a two-way link, so should be separated from FIS/TIS

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
M15/En Route	1 FIS	FIS	M15	En Route	4 products/60 minutes	252000				16800						16800	0
M15/En Route	1 FIS		M15	En Route	6 products/60 minutes	306000				30600						30600	0
M15/Terminal	1 FIS		M15	Terminal	6 products/60 minutes	252000				25200				25200	0		
M18/Terminal	1 FIS		M18	Terminal	60 products/60 minutes	1300				130				130	0		
M17/En Route	1 FIS		M17	En Route	1 msg/flt	3200	1 msg/flt	64		128.0	2.6					128	2.56
M21/ Terminal	1 FIS		M21	Terminal	1 msg/flt	400	1 req/flt	56		40.0	5.6			40	5.6		
M22/ Airport	1 FIS		M22	Airport	1 msg/10 sec	2100	1 req/flt	64		12600.0	6.4	12600	6.4				
M22/ Terminal	1 FIS		M22	Terminal	1 msg/10 sec	2000	6 req/flt	64		12000.0	38.4			12000	38.4		
M22/En Route	1 FIS		M22	En Route	1 msg/10 sec	2000	4 req/flt	64		20000.0	10.2					20000	10.24
M28/En Route	1 FIS		M28	En Route	1 msg/flt	45000				1800.0	0.0					1800	0
M20/En Route	1 FIS		M20	En Route	4 products/60 minutes	2800000				186667						186667	0
M26/En Route	1 FIS		M26	En Route	2 product/60 min	144000				4800						4800	0
M26/En Route	1 FIS		M26	En Route	6 products /60 min	350000				35000						35000	0
M27/Terminal	1 FIS		M27	Terminal	60 products /60 min	5510				5510				5510	0		
M28/En Route	1 FIS		M28	En Route	6 products /60 min	219000				21900						21900	0
M28/En Route	1 FIS		M28	En Route	2 products/60 min	27000				900						900	0
M28/En Route	1 FIS		M40	En Route	1 product/60 minutes	54000				900						900	0
M28/En Route	1 FIS		M40	En Route	6 product/60 minutes	262500				26250						26250	0
M29/Terminal	1 FIS		M29	Terminal	6 products/60 min	480				48				48	0		
M35/Terminal	1 FIS		M35	Terminal	31 products/60 minutes	7350				3798				3797.5	0		
M37/En Route	1 FIS		M37	En Route	4 products/60 minutes	28800				1920						1920	0
M39/En Route	1 FIS		M39	En Route	1 product/60 minutes	27000				450						450	0
M39/En Route	1 FIS		M39	En Route	6 product/60 minutes	131000				13100						13100	0
M39/En Route	1 FIS		M39	En Route	4 product/60 minutes	252000				16800						16800	0
M3/Airport	2 TIS	TIS	M3	Airport	1 msg/2 sec	224	1 req/flt	56		6720	5.6	6720	5.6				
M3/En Route	2 TIS		M3	En Route	1 msg/6 sec	224	1 req/flt	56		2240	2.24					2240	2.24
M3/Terminal	2 TIS		M3	Terminal	1 msg/4.8 sec	224	1 req/flt	56		2800	5.6			2800	5.6		

All values include 10% overhead for broadcast

		Airport Uplink	Airport Downlink	Terminal Uplink	Terminal Downlink	En Route Uplink	En Route Donwlink
b/min	FIS	13,860.0	7.0	51,398.1	48.4	415,816.1	14.1
	TIS	7,392.0	6.2	3,080.0	6.2	2,464.0	2.5
Kbps:	FIS	0.23	0.00	0.86	0.00	6.93	0.00
	TIS	0.12	0.00	0.05	0.00	0.04	0.00

National FIS-B = 334

		Regional Loading (kilobits per second)						Total
2015	FIS	0.2	0.0	0.9	0.0	6.9	0.0	8.0
	TIS	23.7	0.0	7.0	0.0	20.5	0.0	51.3
	Total	**23.9**	**0.0**	**7.9**	**0.0**	**27.5**	**0.0**	59.3
2007	FIS	0.2	0.0	0.9	0.0	6.9	0.0	8.0
	TIS	21.3	0.0	6.4	0.0	18.5	0.0	46.3
	Total	**21.5**	**0.0**	**7.3**	**0.0**	**25.4**	**0.0**	54.3

		National Loading (kilobits per second)						Total
2015	FIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TIS	196.4	0.2	58.5	0.1	170.0	0.2	425.3
	Total	**196.4**	**0.2**	**58.5**	**0.1**	**170.0**	**0.2**	425.3
2007	FIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TIS	176.9	0.1	52.7	0.1	153.2	0.2	383.2
	Total	**176.9**	**0.1**	**52.7**	**0.1**	**153.2**	**0.2**	383.2

Lookup Key	Message Category	Service	Msg ID	Domain Name	Uplink Frequency	Uplink size (bits)	Downlink Frequency	Downlink Size (bits)	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain		Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)
M26/Oceanic	1 FIS	FIS	M26	Oceanic	2 product/60 min	144000						4800.0	
M3/Oceanic	2 TIS	TIS	M3	Oceanic	1 msg/6 sec	224	1 req/flt	56	1800	1		2240.0	0.3
M32/Oceanic	3 CPDLC	CPDLC	M32	Oceanic	10.2 msg/flg	118	17.4 msg/flt	34	10.2	17.4		6.7	3.3
M41/Oceanic	3 CPDLC		M41	Oceanic	36 msg/flt	720	35 msg/flt	720	36	35		144.0	140.0
M2/Oceanic	5 (DSS) Aircraft - ATC Messaging	DSSDL	M2	Oceanic	1msg/flt	40	1msg/flt	960	1	1		0.2	5.3
M38/Oceanic	5 (DSS) Aircraft - ATC Messaging		M38	Oceanic	1msg/flt	800	1msg/flt	100	1	1		4.4	0.6
M11/Oceanic	6 AOC	AOC	M11	Oceanic	6 msg/flt	480	6 msg/flt	10080	6	6		16.0	336.0
M12/Oceanic	6 AOC		M12	Oceanic	3 msg/flt	480	3 msg/flt	5200	3	3		8.0	86.7
M33/Oceanic	6 AOC		M33	Oceanic	12/ per flight	10	12/ per flight	80	12	12		0.7	5.3
M8/Oceanic	6 AOC		M8	Oceanic	3 msg/flt	480	3 msg/flt	10400	3	3		8.0	173.3
M1/Oceanic	7 ADS Reporting	ADS Reporting	M1	Oceanic	1 msg/flt	128	1 msg/300 sec	144	1	36		0.7	28.8
M43/Oceanic	8 AUTOMET	AUTOMET	M43	Oceanic	1 msg/flt	56	1 msg/6 minutes	2152	1	30		0.3	358.7
M44/Oceanic	8 AUTOMET		M44	Oceanic	1 msg/flt	56	1 msg/2 minutes	3544	1	90		0.3	1772.0
M5/Oceanic	9 Onboard Passenger and Crew (APAX)	APAX	M5	Oceanic	3/flt	5200	6flt	480	3	6		86.7	16.0
M6/Oceanic	9 Onboard Passenger and Crew (APAX)		M6	Oceanic	2/flt	5200	2/flt	480	2	2		57.8	5.3
M7/Oceanic	9 Onboard Passenger and Crew (APAX)		M7	Oceanic	4/flt	5200	4/flt	480	4	4		115.6	10.7
M31/Oceanic	9 Onboard Passenger and Crew (APAX)		M31	Oceanic	5/flt	1440000	5/flt	1440000	5	5		40000.0	40000.0

ATN Protocol + subnetwork overhead	CPDLC Up	CPDLC Down	Non-CPDLC
	1.0	1.0	1.0
ATN Overhead factor	2.0	3.0	1.2
Total with ATN overhead	2.0	3.0	1.2
Physical layer overhead	0.5	0.5	0.5
Total bps for facility	3.0	4.5	1.8
Modulation efficiency	1.25	1.25	1.25
Total ATN Overhead factor	**2.400**	**3.600**	**1.440**

Overhead factor applied
ATN
ATN
ATN
ATN
ATN (ADS-C)
ATN

Data Message Traffic for Aircraft Class 3 (bits per min per flight)		
	Oceanic Uplink	Oceanic Downlink
FIS	6,912.0	0.0
CPDLC	361.6	515.8
DSSDL	6.7	8.5
AOCDL	47.0	865.9
ADS Reporting	1.0	41.5
AUTOMET	0.9	3,068.2
APAXS	40,260.0	40,032.0

2015

Aircraft Equipage Factor	Data Message Traffic for Aircraft Class 3 (K-bits per sec)	
1.00	FIS	12.1	0.0
1.00	CPDLC	0.6	0.9
1.00	DSSDL	0.0	0.0
1.00	AOCDL	0.1	1.5
1.00	ADS Reporting	0.0	0.1
1.00	AUTOMET	0.0	5.4
1.00	APAXS	70.5	70.1

2007

Aircraft Equipage Factor	Data Message Traffic for Aircraft Class 3 (K-bits per sec)	
1.00	FIS	10.9	0.0
1.00	CPDLC	0.6	0.8
1.00	DSSDL	0.0	0.0
1.00	AOCDL	0.1	1.4
1.00	ADS Reporting	0.0	0.1
1.00	AUTOMET	0.0	4.9
1.00	APAXS	63.7	63.4

Flight Activity 2007 & 2015

1998 Operations =	73169228

	Peak Domain Traffic			Peak National Traffic	
	1998	**2007**	**2015**	**2007**	**2015**
Airport	154	173	192	1436	1594
Terminal	110	124	137	1026	1139
En Route	400	450	500	3731	4140
Oceanic	84	95	105	N/A	N/A

2007	Estimated Operations	Ratio to Total	Aircraft in Airport	Aircraft in Terminal	Aircraft in En Route
Class 1 =	48,452,403	0.588069717	102	73	265
Class 2 =	15,629,983	0.18970204	33	24	85
Class 3 =	18,309,891	0.222228244	38	28	100
Total hours per year	82,392,277	1	173	125	450

2015	Estimated Operations	Ratio to Total	Aircraft in Airport	Aircraft in Terminal	Aircraft in En Route
Class 1 =	51,883,989	0.567450447	109	78	284
Class 2 =	17,545,459	0.191893082	37	26	96
Class 3 =	22,004,067	0.24065647	46	33	120
Total hours per year	91,433,515	1	192	137	500

Number of ADS-B Equipped Aircraft					
2007	ADS Equip		Airport	Terminal	En Route
Class 1	0.16		6	4	16
Class 2	0.20		35	25	90
Class 3	0.27		0	0	0
Total			41	29	106

Number of ADS-B Equipped Aircraft					
2015	ADS Equip		Airport	Terminal	En Route
Class 1	0.53		24	17	64
Class 2	0.65		125	89	325
Class 3	0.9		0	0	0
Total			149	106	389

AIRSPACE UTILIZATION BY AIRCRAFT TYPE , % of aircraft that will be equipped to participate

Aircraft Type	Use	Number of Aircraft			
Class 1A: Low Utilization, Uncontrolled Airspace (Class G), Few IFR Operations					
Single Eng Piston	Corporate	1,174	0.95	1.00	1.00
Single Eng Piston	Public Use	1,887	1.53	1.00	1.00
Single Eng Piston	Business	20,796	16.84	1.00	1.00
Single Eng Piston	Personal	87,407	70.76	1.00	1.00
Single Eng Piston	Other	11,318	9.16	1.00	1.00
Rotorcraft	Business	463	0.37	1.00	1.00
Rotorcraft	Personal	482	0.39	1.00	1.00
Total		**123,527**		0.88	
Class 1B: High Utilization, Uncontrolled Airspace (Class G), Few IFR Operations					
Single Eng Piston	Air Taxi	462	2.68	1.00	1.00
Single Eng Piston	Instructional	11,318	65.72	1.00	1.00
Rotorcraft	Corporate	868	5.04	1.00	1.00
Rotorcraft	Public Use	1,324	7.69	1.00	1.00
Rotorcraft	Air Taxi	500	2.90	1.00	1.00
Rotorcraft	Instructional	487	2.83	1.00	1.00
Rotorcraft	Other	2,262	13.14	1.00	1.00
Total		**17,221**		0.12	
				140748	
Class 2A: Low Utilization, Class C,D,E Airspace, IFR Operations					
Twin Engine Piston	Corporate	1,364	7.03	1.00	1.00
Twin Engine Piston	Public Use	397	2.05	1.00	1.00
Twin Engine Piston	Business	5,246	27.05	1.00	1.00
Twin Engine Piston	Personal	5,295	27.31	1.00	1.00
Twin Engine Piston	Instructional	952	4.91	1.00	1.00
Twin Engine Piston	Other	832	4.29	1.00	1.00
Turboprop	Corporate	2,327	12.00	1.00	1.00
Turboprop	Public Use	451	2.33	1.00	1.00
Turboprop	Business	708	3.65	1.00	1.00

Turboprop	Personal	364	1.88	1.00	1.00
Turboprop	Instructional	73	0.38	1.00	1.00
Turboprop	Other	1,382	7.13	1.00	1.00
Total		**19,391**	5207%	0.83	

Class 2B: High Utilization, Class C,D,E Airspace, IFR Operations

Twin Engine Piston	Air Taxi	1,585	39.06	1.00	1.00
Turboprop	Air Taxi	393	9.68	1.00	1.00
Turboprop	Regional/Commuter	2,080	51.26	1.00	1.00
Total		**4,058**		0.17	
				23449	

Class 3A: Low Utilization, Class A,B Airspace

Turbojet	Corporate	3,350	86.65	1.00	1.00
Turbojet	Public Use	89	2.30	1.00	1.00
Turbojet	Business	211	5.46	1.00	1.00
Turbojet	Personal	94	2.43	1.00	1.00
Turbojet	Other	122	3.16	1.00	1.00
Total		**3,866**		0.42	

Class 3B: High Utilization, Class A,B Airspace

Turbojet	Air Taxi	393	7.38	1.00	1.00
Turbojet	Instructional	25	0.47	1.00	1.00
Turbojet	Commercial (GA)	4,907	92.15	1.00	1.00
Turbojet	Air Carrier*	4,775		1.00	1.00
Turbojet	Regional*	2,090		1.00	1.00
Total		**5,325**		0.58	
				9,191	

* From "FAA Aviation Forecasts, Fiscal Years 1997 - 2008, FAA APO-97-1, March 1997

% of Aircraft Equipped

	2015					
	CPDLC	DSSDL	ADS-B/TIS	FIS/AUTOMET	APAXS	AOCDL
Corporate	1.00	0.50	0.80	0.80	0.85	0.00
Business	1.00	0.50	0.80	0.80	0.85	0.10
Personal	0.50	0.00	0.50	0.50	0.00	0.00
Public Use	1.00	0.10	1.00	1.00	0.00	0.00
Air Taxi	1.00	0.70	1.00	0.80	0.00	0.00
Instructional	0.50	0.20	0.80	0.80	0.00	0.00
Regional /Commuter	1.00	0.70	1.00	0.80	0.00	0.30
Commercial	1.00	0.90	1.00	0.80	0.85	0.95

Class 1 A	53	9	51	51	2	0
Class 1 B	9	18	64	61	1	2
Class 2 A	71	26	58	73	3	3
Class 2 B	100	70	100	80	0	15
Class 3 A	96	46	77	77	2	0
Class 3 B	100	88	100	80	78	88

	2015						2007 (30% of 2015 for CPDLC, DSSDL ADS-B/TIS APAXS and 70% of 2015 for FIS/AUTOMET and 100% of AOCDL)					
	CPDLC	**DSSDL**	**ADS-B/TIS**	**FIS/AUTOMET**	**APAXS**	**AOCDL**	**CPDLC**	**DSSDL**	**ADS-B/TIS**	**FIS/AUTOMET**	**APAXS**	**AOCDL**
Class 1	48	10	53	52	2	0	14	3	16	16	0	0
Class 2	76	34	65	74	3	5	23	10	20	22	1	5
Class 3	98	70	90	79	46	51	29	21	27	24	14	51

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Message Char. Source Title	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3
76	M5/En Route	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M5	X	En Route Cruise	En Route	Airline Business Support: Electronic Database Updating	3/flt	5200	1	5200	6/flt	480	3	6	1560	288	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
77	M5/Oceanic	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M5	X	Oceanic	Oceanic	Airline Business Support: Electronic Database Updating	3/flt	5200	1	5200	6/flt	480	3	6	1560	288	Average flight duration is 3 hours per oceanic domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
78	M5/Terminal	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M5	X	Arrival/ Departure	Terminal	Airline Business Support: Electronic Database Updating	3/flt	5200	1	5200	6/flt	480	3	6	1560	288	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
79	M6/Airport	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M6	X	Arrival/ Departure	Airport	Airline Business Support: Passenger Profiling	2/flt	5200	1	5200	2/flt	480	2	2	1040	96	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
80	M6/En Route	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M6	X	En Route Cruise	En Route	Airline Business Support: Passenger Profiling	2/flt	5200	1	5200	2/flt	480	2	2	1040	96	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
81	M6/Terminal	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M6	X	Arrival/ Departure	Terminal	Airline Business Support: Passenger Profiling	2/flt	5200	1	5200	2/flt	480	2	2	1040	96	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
82	M6/Oceanic	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M6	X	Arrival/ Departure	Terminal	Airline Business Support: Passenger Profiling	2/flt	5200	1	5200	2/flt	480	2	2	1040	96	Average flight duration is 3 hours per oceanic domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
84	M7/En Route	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M7	X	En Route Cruise	En Route	Airline Business Support: Passenger Re-Accomodation	2/flt	5200	1	5200	2/flt	480	2	2	1040	96	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
85	M7/Oceanic	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Administrative Flight Information	M7	X	Oceanic	Oceanic	Airline Business Support: Passenger Re-Accomodation	4/flt	5200	1	5200	4/flt	480	4	4	2080	192	Average flight duration is 3 hours per oceanic domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
105	M31/En Route	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Public Communications	M31	X	En Route Cruise	En Route	Passenger Services: On Board Phone	5/flt	1440000	1	1440000	5/flt	1440000	5	5	720000	720000	5% of 100 people, 10 min each, equally distributed on uplink and downlink	SAIC Team		SAIC Team	0.5	55	95	0.00001					x
105	M31/Oceanic	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Public Communications	M31	X	En Route Oceanic	Oceanic	Passenger Services: On Board Phone	5/flt	1440000	1	1440000	5/flt	1440000	5	5	720000	720000	5% of 100 people, 10 min each, equally distributed on uplink and downlink	SAIC Team		SAIC Team	0.5	55	95	0.00001					x
105	M31/Terminal	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Public Communications	M31	X	Terminal	Terminal	Passenger Services: On Board Phone	5/flt	288000	1	288000	5/flt	288000	5	5	144000	144000	5% of 100 people, 2 min each, equally distributed on uplink and downlink	SAIC Team		SAIC Team	0.5	55	95	0.00001					x
105	M31/Airport	9 Onboard Passenger and Crew (APAX)	On-Board Service	Provide Public Communications	M31	X	Airport	Airport	Passenger Services: On Board Phone	5/flt	288000	1	288000	5/flt	288000	5	5	144000	144000	5% of 100 people, 2 min each, equally distributed on uplink and downlink	SAIC Team		SAIC Team	0.5	55	95	0.00001					x
	M42/Airport	9 Onboard Passenger and Crew (APAX)	On-Board Service	E-mail, fax, TV	M42			Airport	Miscellaneous "at-seat" services	0		1		0		0	0	0	0	Not permitted; equipment stowed	SAIC Team											x
	M42/En Route	9 Onboard Passenger and Crew (APAX)	On-Board Service	E-mail, fax, TV	M42		Cruise	En Route	Miscellaneous "at-seat" services	1/flt	10000000	10	1000000	20/flt	1000	1	20	100000	2000	Average flight duration is 25 minutes per en route center	SAIC Team											x
	M42/Terminal	9 Onboard Passenger and Crew (APAX)	On-Board Service	E-mail, fax, TV	M42			Terminal	Miscellaneous "at-seat" services	0		1		0		0	0	0	0	Not permitted; equipment stowed	SAIC Team											x

System mgt and control?

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3
9	M4/Terminal	8 AUTOMET	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M4		Arrival/ Departure	Terminal	Aircraft Originated Meteorological Observations	1 msg/flt	56	1	56	1 msg/5 minutes	1760	1	2	5.6	352	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	15	55	99.9	0.00001	1		x	x	x
10	M4/En Route	8 AUTOMET	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M4		En Route Cruise	En Route	Aircraft Originated Meteorological Observations	1 msg/flt	56	1	56	1 msg/5 minutes	1760	1	5	2.24	352	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	15	55	95	0.000001	3		x	x	x
16	M14/Airport	8 AUTOMET	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M14		Arrival/ Departure	Airport	AUTOMET			1	0	10 msg/flt	430		10	0	430	Average flight duration is 10 minutes per airport domain.	80	5.1.2	Operational Requirements for the ADL System	15	55	99.9	0.00001			x	x	x
17	M14/En Route	8 AUTOMET	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M14		En Route Cruise	En Route	AUTOMET			1	0	1 msg/15 minutes	430		1.666667	0	28.66667	Average flight duration is 25 minutes per en route center	80	5.1.2	Operational Requirements for the ADL	15	55	99.9	0.00001			x	x	x
18	M14/Terminal	8 AUTOMET	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M14		Arrival/ Departure	Terminal	AUTOMET			1	0	3 msg/minute	430		30	0	1290	Average flight duration is 10 minutes per terminal domain.	80	5.1.2	Operational Requirements for the ADL System	15	55	99.9	0.00001			x	x	x
118	M43/Terminal	8 AUTOMET	ATC Advisory Service	Aircraft Originated Ascent Series Meteorological Observations	M43		Arrival/ Departure	Terminal	AUTOMET	1 msg/flt	56	1	56	3 msg/minute	512	1	30	5.6	1536	Average flight duration is 10 minutes per terminal domain.	157		Operational Requirements for the ADL System	15	55	99.9	0.00001			x	x	x
119	M43/En Route	8 AUTOMET	ATC Advisory Service	Aircraft Originated Ascent Series Meteorological Observations	M43		En Route Cruise	En Route	AUTOMET	1 msg/flt	56	1	56	1 msg/6 minutes	2152	1	4.166667	2.24	358.6667	Average flight duration is 25 minutes per en route center	157		Operational Requirements for the ADL System	15	55	99.9	0.00001			x	x	x
120	M44/En Route	8 AUTOMET	ATC Advisory Service	Aircraft Originated Descent Series Meteorological Observations	M44		En Route Cruise	En Route	AUTOMET	1 msg/flt	56	1	56	1 msg/2 minutes	3544	1	12.5	2.24	1772	Average flight duration is 25 minutes per en route center	157		Operational Requirements for the ADL System	15	55	99.9	0.00001			x	x	x

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3
1	M1/Airport	7 ADS Reporting	Traffic Management Synchronization Service	Project Aircraft In-flight Position and Identify Potential Conflicts	M1	X	Arrival/ Departure	Airport	ADS	1 msg/flt	128	1	128	1 msg/1.1 sec	144	1	545.4545	12.8	7854.545	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	2	2.2	99.999	0.000001	2		X	X	X
4	M1/Terminal	7 ADS Reporting	Traffic Management Synchronization Service	Project Aircraft In-flight Position and Identify Potential Conflicts	M1	X	Arrival/ Departure	Terminal	ADS	1 msg/flt	128	1	128	1 msg/5.33 sec	144	1	112.5704	12.8	1621.013	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	3	5	99.999	0.000001	1		X	X	X
2	M1/En Route	7 ADS Reporting	Traffic Management Synchronization Service	Project Aircraft In-flight Position and Identify Potential Conflicts	M1	X	En Route Cruise	En Route	ADS	1 msg/flt	128	1	128	1 msg/12.1 sec	144	1	123.9669	5.12	714.0496	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	10	20	99.999	0.000001	3		X	X	X
3	M1/Oceanic	7 ADS Reporting	Traffic Management Synchronization Service	Project Aircraft In-flight Position and Identify Potential Conflicts	M1	X	Enroute Oceanic	Oceanic	ADS	1 msg/flt	128	1	128	1 msg/300 sec	144	1	36	0.711111	28.8	Average flight duration is 10 minutes per terminal domain.	80	Derived from DO 237 en route	Operational Requirements for the ADL System	10	20	99.999	0.000001	4				X

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comme	Comments	Class 1	Class 2	Class 3
96	M10/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M10	X	Arrival/ Departure	Terminal	Airline Maintenance Support: Non-Routine Maintenance/	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	144	3120	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
97	M11/Airport	6 AOC	AOC	Monitor Flight Progress - AOC	M11	X	Preflight	Airport	Airline Maintenance Support: On-Board Trouble Shooting (non-routine)	6 msg/flt	480	1	480	6 msg/flt	10080	6	6	288	6048	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
98	M11/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M11	X	En Route Cruise	En Route	Airline Maintenance Support: On-Board Trouble Shooting (non-routine)	6 msg/flt	480	1	480	6 msg/flt	10080	6	6	115.2	2419	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
99	M11/Oceanic	6 AOC	AOC	Monitor Flight Progress - AOC	M11	X	Oceanic	Oceanic	Airline Maintenance Support: On-Board Trouble Shooting (non-routine)	6 msg/flt	480	1	480	6 msg/flt	10080	6	6	16	336	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
100	M11/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M11	X	Arrival/ Departure	Terminal	Airline Maintenance Support: On-Board Trouble Shooting (non-routine)	6 msg/flt	480	1	480	6 msg/flt	10080	6	6	288	6048	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
93	M12/Airport	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	Preflight	Airport	Airline Maintenance Support: Maintenance/ Information	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	144	3120	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
94	M12/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	En Route Cruise	En Route	Airline Maintenance Support:Maintenance / Information Reporting	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	57.6	1248	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
101	M12/Airport	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	Preflight	Airport	Airline Maintenance Support: Routine Maintenance/ Information	3 msg/flt	480	1	480	3 msg/flt	5200	3	3	144	1560	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
102	M12/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	En Route Cruise	En Route	Airline Maintenance Support: Routine Maintenance/ Information	3 msg/flt	480	1	480	3 msg/flt	5200	3	3	57.6	624	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
103	M12/Oceanic	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	Oceanic	Oceanic	Airline Maintenance Support: Routine Maintenance/ Information	3 msg/flt	480	1	480	3 msg/flt	5200	3	3	8	87	Average flight duration is 3 hours per oceanic domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
104	M12/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M12	X	Arrival/ Departure	Terminal	Airline Maintenance Support: Routine Maintenance/ Information	3 msg/flt	480	1	480	3 msg/flt	5200	3	3	144	1560	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
28	M19/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M19		En Route Cruise	En Route	Diagnostic Data			1	0	1 msg/min	50		25	0	50	Average flight duration is 25 minutes per en route center	80	5.1.1	Operational Requirements for the ADL System	15	55	99.9	0.000001					x
28	M19/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M19		Arrival/ Departure	Terminal	Diagnostic Data			1	0	1 msg/min	50		25	0	125	Average flight duration is 10 minutes per terminal domain.	80	5.1.1	Operational Requirements for the ADL System	15	55	99.9	0.000001					x
37	M23/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M23		En Route Cruise	En Route	Flight Data Recorder			1	0	1msg/flt	3000		1	0	120	Average flight duration is 25 minutes per en route center	80	5.1.1	Operational Requirements for the ADL System	15	55	99.9	0.000001					x
39	M25/Airport	6 AOC	AOC	Collaborate with ATM on NAS Projections and User Preferences	M25	X	Arrival/ Departure	Airport	Gate Assignment	1msg/flt	10	1	10	1msg/flt	10	1	1	1	1	Average flight duration is 10 minutes per airport domain.	50	A-8	Operational Requirements for the ADL System	15	55	99.9	0.00001					x
49	M30/Airport	6 AOC	AOC	Schedule; Dispatch; and Manage Aircraft Flights	M30	X	Arrival/ Departure	Airport	Out/ Off/ On/ In	1msg/flt	10	1	10	1msg/flt	10	1	1	1	1	Average flight duration is 10 minutes per airport domain.	50	A-8	Operational Requirements for the ADL System	10	13	99.9	0.000001					x
49	M30/Terminal	6 AOC	AOC	Schedule; Dispatch; and Manage Aircraft Flights	M30	X	Arrival/ Departure	Terminal	Out/ Off/ On/ In	1msg/flt	10	1	10	1msg/flt	10	1	1	1	1	Average flight duration is 10 minutes per Terminal domain.	50	A-8	Operational Requirements for the ADL System	10	13	99.9	0.000001					x
56	M33/Oceanic	6 AOC	AOC	Monitor Flight Progress - AOC	M33		Oceanic	Oceanic	Position Reports	12/ per flight	10	1	10	12/ per flight	80	12	12	0.666667	5	Average flight duration is 3 hours per oceanic domain.	50	A-8	Operational Requirements for the ADL System	15	55	99.9	0.000001					x

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comme	Comments	Class 1	Class 2	Class 3
55	M33/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M33		En Route Cruise	En Route	Position Reports	2 msg/flt	10	1	10	2 msg/flt	80	2	2	0.8	6	Average flight duration is 25 minutes per en route center	50	A-8	Operational Requirements for the ADL System	15	55	99.9	0.000001					x
87	M8/Airport	6 AOC	AOC	Monitor Flight Progress - AOC	M8	X	Arrival/ Departure	Airport	Airline Maintenance Support: Electronic Database Updating	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	144	3120	Average flight duration is 10 minutes per airport domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
88	M8/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M8	X	En Route Cruise	En Route	Airline Maintenance Support: Electronic Database Updating	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	57.6	1248	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
89	M8/Oceanic	6 AOC	AOC	Monitor Flight Progress - AOC	M8	X	Oceanic	Oceanic	Airline Maintenance Support: Electronic Database Updating	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	8	173	Average flight duration is 3 hours per oceanic domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
90	M8/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M8	X	Arrival/ Departure	Terminal	Airline Maintenance Support: Electronic Database Updating	3 msg/flt	480	1	480	3 msg/flt	10400	3	3	144	3120	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x
91	M9/En Route	6 AOC	AOC	Monitor Flight Progress - AOC	M9	X	En Route Cruise	En Route	Airline Maintenance Support: In-Flight Emergency Support	1msg/flt	2600	1	2600	4 msg/flt	240	1	4	260	96	Average flight duration is 25 minutes per en route center	SAIC Team		SAIC Team	15	55	95	0.00001					x
92	M9/Terminal	6 AOC	AOC	Monitor Flight Progress - AOC	M9	X	Arrival/ Departure	Terminal	Airline Maintenance Support: In-Flight Emergency Support	1msg/flt	2600	1	2600	4 msg/flt	240	1	4	260	96	Average flight duration is 10 minutes per terminal domain.	SAIC Team		SAIC Team	15	55	95	0.00001					x

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5	M2/Airport	5 (DSS) Aircraft - ATC Messaging	Traffic Management Synchronization Service	Process User Preferences	M2	X	Arrival/ Departure	Airport	Advanced ATM	1msg/flt	40	1	40	1msg/flt	960	1	1	4	96	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	3	5	99.9	1E-06	2		X	X	X
6	M2/En Route	5 (DSS) Aircraft - ATC Messaging	Traffic Management Synchronization Service	Process User Preferences	M2	X	En Route Cruise	En Route	Advanced ATM	1msg/flt	40	1	40	1msg/flt	960	1	1	1.6	38.4	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	10	13	99.999	1E-06	3		X	X	X
7	M2/Oceanic	5 (DSS) Aircraft - ATC Messaging	Traffic Management Synchronization Service	Process User Preferences	M2	X	En Route Cruise	Oceanic	Advanced ATM	1msg/flt	40	1	40	1msg/flt	960	1	1	0.222222	5.333333	Average flight duration is 3 hours per oceanic domain.	80	Derived from DO 237 en route	Operational Requirements for the ADL System	10	13	99.9	1E-06	4				X
8	M2/Terminal	5 (DSS) Aircraft - ATC Messaging	Traffic Management Synchronization Service	Process User Preferences	M2	X	Arrival/ Departure	Terminal	Advanced ATM	1msg/flt	40	1	40	1msg/flt	960	1	1	4	96	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	3	5	99.9	1E-06	1		X	X	X
22	M16/Airport	5 (DSS) Aircraft - ATC Messaging	Flight Plan Services	Process Flight Plans and Amendments	M16		Arrival/ Departure	Airport	Delivery of Route Deviation Warnings	1msg/5 flts	800	1	800	1msg/5 flts	800	0.2	0.2	16	16	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	3	5	99.9	0.00001	1		X	X	X
23	M16/En Route	5 (DSS) Aircraft - ATC Messaging	Flight Plan Services	Process Flight Plans and Amendments	M16		En Route Cruise	En Route	Delivery of Route Deviation Warnings	1msg/5 flts	800	1	800	1msg/5 flts	800	0.2	0.2	6.4	6.4	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	3	5	99.9	1E-06	3		X	X	X
24	M16/Terminal	5 (DSS) Aircraft - ATC Messaging	Flight Plan Services	Process Flight Plans and Amendments	M16		Arrival/ Departure	Terminal	Delivery of Route Deviation Warnings	1msg/5 flts	800	1	800	1msg/5 flts	800	0.2	0.2	16	16	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	3	5	99.9	0.00001	1		X	X	X
64	M38/Airport	5 (DSS) Aircraft - ATC Messaging	Traffic Management Strategic Flow Service	Provide Future NAS Traffic Projections	M38	X	Oceanic	Airport	TFM Information	1 msg/flt	800	1	800	1 msg/flt	800	2	2	160	160	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	15	55	95	0.00001	2		X	X	X
65	M38/En Route	5 (DSS) Aircraft - ATC Messaging	Traffic Management Strategic Flow Service	Provide Future NAS Traffic Projections	M38	X	Arrival/ Departure	En Route	TFM Information	1msg/flt	800	1	800	1msg/flt	100	1	1	32	4	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	15	55	99.9	1E-06	3		X	X	X
66	M38/Oceanic	5 (DSS) Aircraft - ATC Messaging	Traffic Management Strategic Flow Service	Provide Future NAS Traffic Projections	M38	X	Oceanic	Oceanic	TFM Information	1msg/flt	800	1	800	1msg/flt	100	1	1	4.444444	0.555556	Average flight duration is 3 hours per oceanic domain.	80	Derived from DO 237 en route	Operational Requirements for the ADL System	10	20	99.9	1E-06	3				X
67	M38/Terminal	5 (DSS) Aircraft - ATC Messaging	Traffic Management Strategic Flow Service	Provide Future NAS Traffic Projections	M38	X	Arrival/ Departure	Terminal	TFM Information	1 msg/2 flt	800	1	800	1 msg/2 flt	100	1	1	80	10	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	15	55	99.9	0.00001	1		X	X	X

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Type	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3
50	M32/En Route	3 CPDLC	Flight Plan Services	Process Flight Plans and Amendments	M32	X	En Route Cruise	En Route	Pilot/ Controller Communications	10.2 msg/flt	118	1	118	17.4 msg/flt	34	10.2	17.4	48.144	23.664	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	10	13	99.9	0.000001	3		x	x	x
51	M32/Oceanic	3 CPDLC	ATC Advisory Service	Provide In-flight or Pre-flight Traffic Advisories	M32	X	Oceanic	Oceanic	Pilot/ Controller Communications	10.2 msg/flg	118	1	118	17.4 msg/flt	34	10.2	17.4	6.6866667	3.286667	Average flight duration is 3 hours per oceanic domain.	80	Derived from Table F-3	Operational Requirements for the ADL System	10	13	99.9	0.000001	4				x
52	M32/Terminal	3 CPDLC	ATC Advisory Service	Provide In-flight or Pre-flight Traffic Advisories	M32	X	Arrival/ Departure	Terminal	Pilot/ Controller Communications	9.6 msg/flt	123	1	123	13.1msg/flt	32	9.6	13.1	118.08	41.92	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	3	5	99.9	0.000001	1		x	x	x
53	M32/Airport	3 CPDLC	Flight Plan Services	File Flight Plans and Amendments	M32	X	Arrival/ Departure	Airport	Pilot/ Controller Communications - Full	5 msg/flt	123	1	123	5 msg/flt	32	10	10	123	32	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	3	5	99.9	0.00001	2		x	x	x
57	M34/Airport	3 CPDLC	Flight Plan Services	Process Flight Plans and Amendments	M34	X	Preflight	Airport	Pre-Departure Clearance	1.25 msg/flt	1800	1	1800	2.25 msg/flt	304	1.25	2.25	225	68.4	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	15	55	99.9	0.00001	2		x	x	x
	M41/Airport	3 CPDLC	M41		M41	X		Airport	System Mgmt & Control	5 msg/flt	720	1	720	4 msg/flt	720	5	4	360	288	Average flight duration is 10 minutes per airport domain.	SAIC Team									x	x	x
	M41/En Route	3 CPDLC	M41		M41	X		En Route	System Mgmt & Control	6 msg/flt	720	1	720	5 msg/flt	720	6	5	172.8	144	Average flight duration is 25 minutes per en route center	SAIC Team									x	x	x
	M41/Oceanic	3 CPDLC	M41		M41	X		Oceanic	System Mgmt & Control	36 msg/flt	720	1	720	35 msg/flt	720	36	35	144	140	Average flight duration is 3 hours per oceanic domain.	SAIC Team											x
	M41/Terminal	3 CPDLC	M41		M41	X		Terminal	System Mgmt & Control	2 msg/flt	720	1	720	1 msg/flt	720	2	1	144	72	Average flight duration is 10 minutes per terminal domain.	SAIC Team									x	x	x

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Category	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID		Class 1	Class 2	Class 3
12	M3/Airport	2 TIS	Traffic Management Synchronizati	Project Aircraft In-flight Position and Identify Potential	M3	X	Arrival/ Departure	Airport	Air Traffic Information	1 msg/2 sec	224	1	224	1 req/flt	56	300	1	6720	5.6	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL	0.6	0.7	99.999	0.00001	2		X	X	X
13	M3/En Route	2 TIS	Traffic Management Synchronizati	Project Aircraft In-flight Position and Identify Potential	M3	X	En Route Cruise	En Route	Air Traffic Information	1 msg/6 sec	224	1	224	1 req/flt	56	250	1	2240	2.24	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL	5	10	99.999	0.000001	3		X	X	X
14	M3/Oceanic	2 TIS	Traffic Management Synchronizati	Project Aircraft In-flight Position and Identify Potential	M3	X	Oceanic	Oceanic	Air Traffic Information	1 msg/6 sec	224	1	224	1 req/flt	56	1800	1	2240	0.311111	Average flight duration is 3 hours per oceanic domain.	80	Derived from Table F-3	Operational Requirements for the ADL	0.6	0.7	99.999	0.000001	4				X
15	M3/Terminal	2 TIS	Traffic Management Synchronizati	Project Aircraft In-flight Position and Identify Potential	M3	X	Arrival/ Departure	Terminal	Air Traffic Information	1 msg/4.8 sec	224	1	224	1 req/flt	56	125	1	2800	5.6	Average flight duration is 10 minutes per terminal domain	80	Table F-2	Operational Requirements for the ADL	0.6	0.7	99.999	0.00001	2		X	X	X

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Category	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3	Number of products required to cover CONUS
19	M15/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M15		En Route Cruise	En Route	Convection	4 products/60 minutes	12600000	50	252000					16800		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Altitude: 50K ft; Time 300 min)	x	x	x	6
20	M15/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M15		En Route Cruise	En Route	Convection	6 products/60 minutes	6120000	20	306000					30600		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		500nm , 50K ft 70min	x	x	x	6
21	M15/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M15		Arrival/ Departure	Terminal	Convection	6 products/60 minutes	12600000	50	252000					25200		Average flight duration is 10 minutes per terminal domain.	33	Sect 3.5.3 (Terminal Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		1500nm , 50K ft 300 min	x	x	x	6
26	M18/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M17		En Route Cruise	En Route	Departure ATIS	1 msg/flt	13000	10	3200	1 msg/flt	64	1	1	128	3	Average flight duration is 25 minutes per en route center	80	Table F-1	Operational Requirements for the ADL System	15	55	95	0.00001			x	x	x	N/A
27	M18/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M18		Arrival/ Departure	Terminal	Destination Field Conditions	60 products/60 minutes	13000	10	1300					130		Average flight duration is 10 minutes per terminal domain.	33	3.5.3 (Terminal Tactical)	Operational Requirements for the ADL System	15	55	95	0.00001		5nm , surface 1 pict	x	x	x	6
29	M20/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M20		En Route Cruise	En Route	En Route Backup Strategic General Imagery	4 products/60 minutes	28000000	10	2800000					186667		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Single altitude; 10 pict)	x	x	x	6
33	M21/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M21		Arrival/ Departure	Terminal	FIS Planning - ATIS	1 msg/flt	400	1	400	1 req/flt	56	1	1	40	6	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	15	55	99.9	0.00001	1		x	x	x	N/A
34	M22/Airport	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M22		Arrival/ Departure	Airport	FIS Planning Services	1 msg/10 sec	2100	1	2100	1 req/flt	64	60	1	12600	6	Average flight duration is 10 minutes per airport domain.	80	Table F-1	Operational Requirements for the ADL System	15	55	99.9	0.00001	2		x	x	x	N/A
35	M22/En Route	1 FIS	Flight Plan Services	File Flight Plans and Amendments	M22		En Route Cruise	En Route	FIS Planning Services	1 msg/10 sec	2000	1	2000	4 req/flt	64	250	4	50000	26	Average flight duration is 25 minutes per en route center	80	Table F-3	Operational Requirements for the ADL System	15	55	99.9	0.000001	3		x	x	x	N/A
36	M22/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M22		Arrival/ Departure	Terminal	FIS Planning Services	1 msg/10 sec	2000	1	2000	6 req/flt	64	60	6	12000	38	Average flight duration is 10 minutes per terminal domain.	80	Table F-2	Operational Requirements for the ADL System	15	55	99.9	0.00001	1		x	x	x	N/A
40	M26/Oceanic	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M26		Oceanic	Oceanic	General Hazard (En Route Far Term Strategic)	2 product/60 min	7200000	50	144000					4800		Average flight duration is 3 hours per oceanic center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		1500nm , 50K ft 300 min			x	N/A
41	M26/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M26		En Route Cruise	En Route	General Hazard (En Route Far Term Strategic)	2 product/60 min	7200000	50	144000					4800		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Altitude: 50K ft; Time 300 min)	x	x	x	6
42	M26/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M26		En Route Cruise	En Route	General Hazard (En Route Near Term Strategic)	6 products /60 min	7000000	20	350000					35000		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		500nm , 50K ft 70min	x	x	x	6
43	M27/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M27		Arrival/ Departure	Terminal	Icing (Terminal Tactical)	60 products /60 min	55100	10	5510					5510		Average flight duration is 10 minutes per terminal domain.	33	3.4.5.2.2.2 (Terminal Tactical)	Operational Requirements for the ADL System	15	55	95	0.00001		35nm , 15 k ft 1 pict	x	x	x	1
44	M28/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M28		En Route Cruise	En Route	Icing/ Flight Conditions (En Route Far Term Strategic)	1/flt	2250000	50	45000			1		4500	0	Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Altitude: 50K ft; Time 300 min)	x	x	x	6
45	M28/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M28		En Route Cruise	En Route	Icing/ Flight Conditions (En Route Near Term Strategic)	6 products /60 min	4380000	20	219000					21900		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		500nm , 50K ft 70min	x	x	x	N/A
47	M28/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M28		En Route Cruise	En Route	Icing/ Flight Conditions (En Route Tactical)	2 products/60 min	1350000	50	27000					900		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Tactical)	Operational Requirements for the ADL System	15	55	95	0.00001		125nm , 20 K ft, 5 pict	x	x	x	6
48	M29/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M29		Arrival/ Departure	Terminal	Low Level Wind Shear (Terminal Tactical)	6 products/60 min	4800	10	480					48		Average flight duration is 10 minutes per terminal domain.	33	3.5.3 (Terminal Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		10nm ,surface,1 pict	x	x	x	6

DB ID	Lookup Key	Message Category	Service	Function Name (Functional Capability)	Msg ID (M#)	Ack Req	Phase of Flight	Domain Name	Message Category	Uplink Frequency	Uplink Size Bits	Estimated Uplink Compression Ratio (1 if not applied)	Net Uplink Size Bits (see table 4.3 for compression)	Downlink Frequency	Downlink Size Bits	Uplink Msg Per Aircraft Per Domain	Downlink Msg Per Aircraft Per Domain	Uplink Data Rate (bits per minute)	Downlink Data Rate (bits per minute)	Domain Assumptions	Source Reference	Source Comment	Source Performance Reqs.	End To End Delay (Mean)	End To End Delay 95%	Availability %	Integrity	Data Link Equipage Comment ID	Comments	Class 1	Class 2	Class 3	Number of products required to cover CONUS
58	M35/Terminal	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M35		Arrival/ Departure	Terminal	Radar Mosaic	31 products/60 minutes	73500	10	7350					3798		Average flight duration is 10 minutes per terminal domain.	33	3.4.5.2.2.1 (Terminal Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		35nm , 15 k ft ,1 pict	x	x	x	1
61	M37/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M37		En Route Cruise	En Route	Surface Conditions (En Route Far Term Strategic)	4 products/60 minutes	576000	20	28800					1920		Average flight duration is 25 minutes per en route center	33	Sect 3.4.5.1.2.6 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Surface; Time 300 min)	x	x	x	6
69	M39/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M39		En Route Cruise	En Route	Turbulence (En Route Far Term Strategic)	1 product/60 minutes	1350000	50	27000					450		Average flight duration is 25 minutes per en route center	33	Sect 3.4.5.1.1.2 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Altitude: 50K ft; Time 300 min)	x	x	x	6
70	M39/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M39		En Route Cruise	En Route	Turbulence (En Route Near Term Strategic)	6 product/60 minutes	2620000	20	131000					13100		Average flight duration is 25 minutes per en route center	33	Sect 3.4.5.1.2.2 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		500nm, 50K ft 70min	x	x	x	
71	M39/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M39		En Route Cruise	En Route	Turbulence (En Route Tactical)	4 product/60 minutes	12600000	50	252000					16800		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3-3(En Route Tactical)	Operational Requirements for the ADL System	15	55	95	0.00001		125nm , 20 K ft 5 pict	x	x	x	
	M28/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M40		En Route Cruise	En Route	Winds/Temperature (En Route Far Term Strategic)	1 product/60 minutes	2700000	50	54000					900		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Far Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		Area of Regard (Area: 1500nm; Altitude: 50K ft; Time 300 min)	x	x	x	6
	M28/En Route	1 FIS	ATC Advisory Service	Provide In-flight or Pre-flight Weather Advisories	M40		En Route Cruise	En Route	Winds/Temperature (En Route Near Term Strategic)	6 product/60 minutes	5250000	20	262500					26250		Average flight duration is 25 minutes per en route center	33	Sect 3.5.3 (En Route Near Term Strategic)	Operational Requirements for the ADL System	15	55	95	0.00001		500nm , 50K ft 70min	x	x	x	