



International Civil Aviation Organization

The Twelfth Meeting of the FANS Implementation Team, Bay of Bengal (FIT-BOB/12) and the Second Meeting of the Bay of Bengal Reduced Horizontal Separation Implementation Task Force (BOB-RHS/TF/2)

Bangkok, Thailand, 22 – 26 February 2010

Agenda Item 4: Review Bay of Bengal ADS/CPDLC Operations

**ADS/CPDLC TRIAL PROGRESS IN THE KUALA LUMPUR FIR
OVER THE BAY OF BENGAL AREA**

(Presented by Malaysia)

SUMMARY

This information paper presents the progress report of ADS/CPDLC operational trial in the Kuala Lumpur FIR over the Bay of Bengal area.

1. Introduction

1.1 To undertake the commitment with ICAO in carrying out and applying components of CNS/ATM systems, Malaysia had completed the installation of an ADS/CPDLC system at the Kuala Lumpur Area Control Centre (ACC) on April 2008.

1.2 The operational trial of ADS/CPDLC system has been operating on a limited trial timeframe between 1500-1900 UTC since July 2008 on seven oceanic ATS routes. The routes affected are as follows: P628, L510, L645, L627, N571, B466 and P574 within Kuala Lumpur FIR.

2. Result of ADS/CPDLC Operational Trial in Kuala Lumpur FIR.

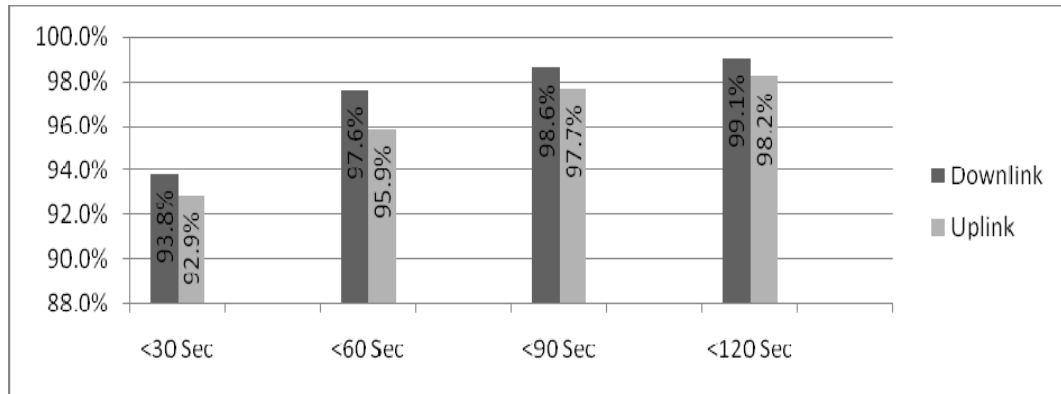
2.1 ADS/CPDLC services were available daily between 1500 – 1900 UTC and conducted with all appropriate FANS-1/A equipped aircraft.

2.2 Data collection was done throughout the year 2009. It was divided into several time phase which is less than 30 seconds, less than 60 seconds, less than 90 seconds and less than 120 seconds.

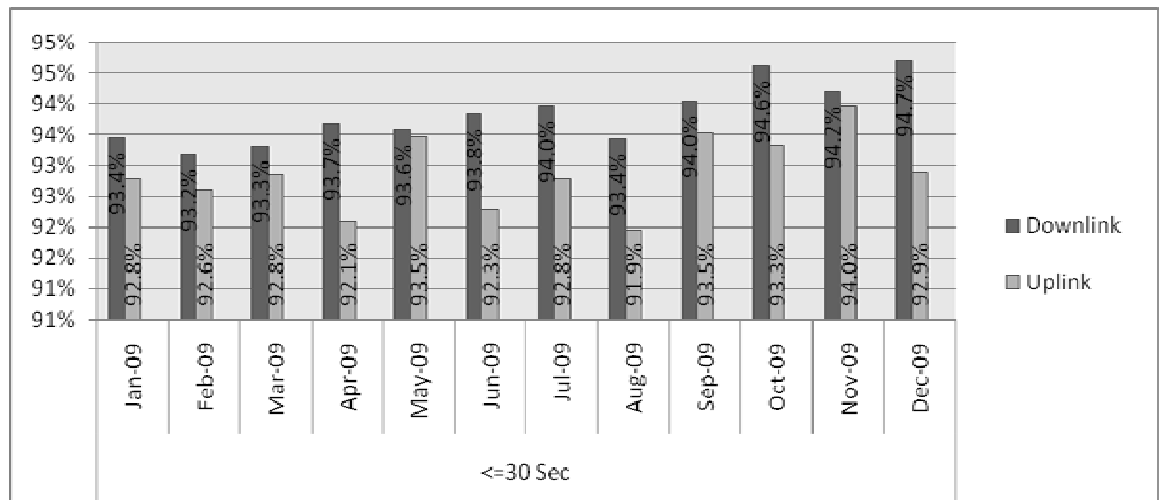
2.2.1 From the data collected between 1st Jan 2009 – 31st Dec 2009 operational trial, there were in total of 444703 downlink and 290907 uplink (round-trip) were recorded, including AFN logon, ADS and CPDLC downlink and uplink.

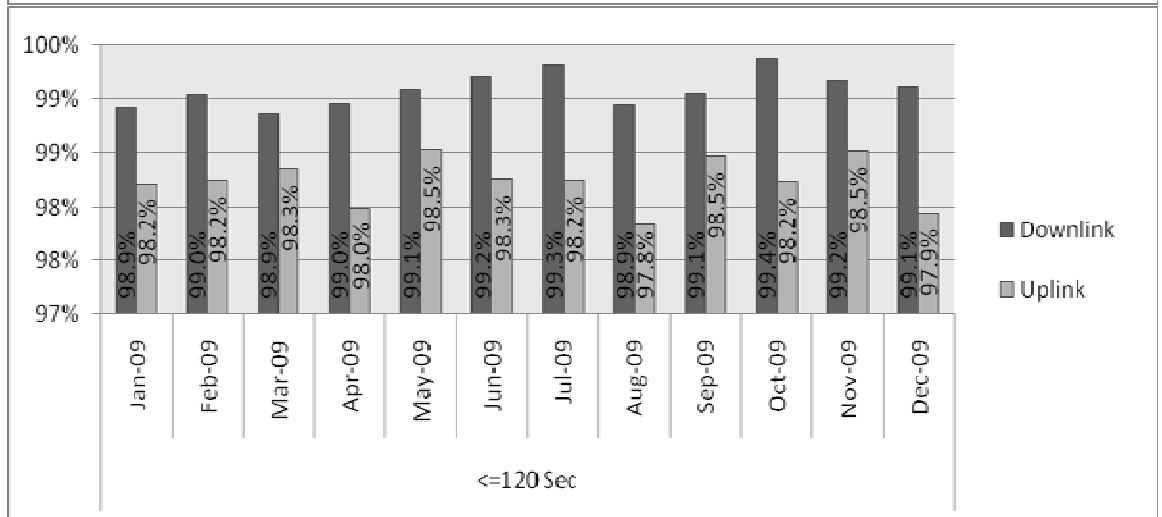
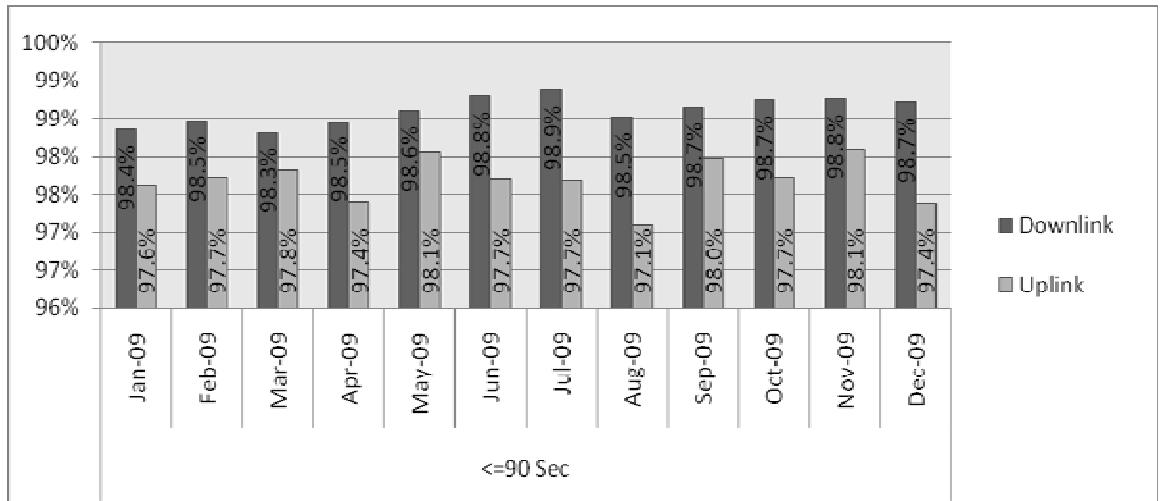
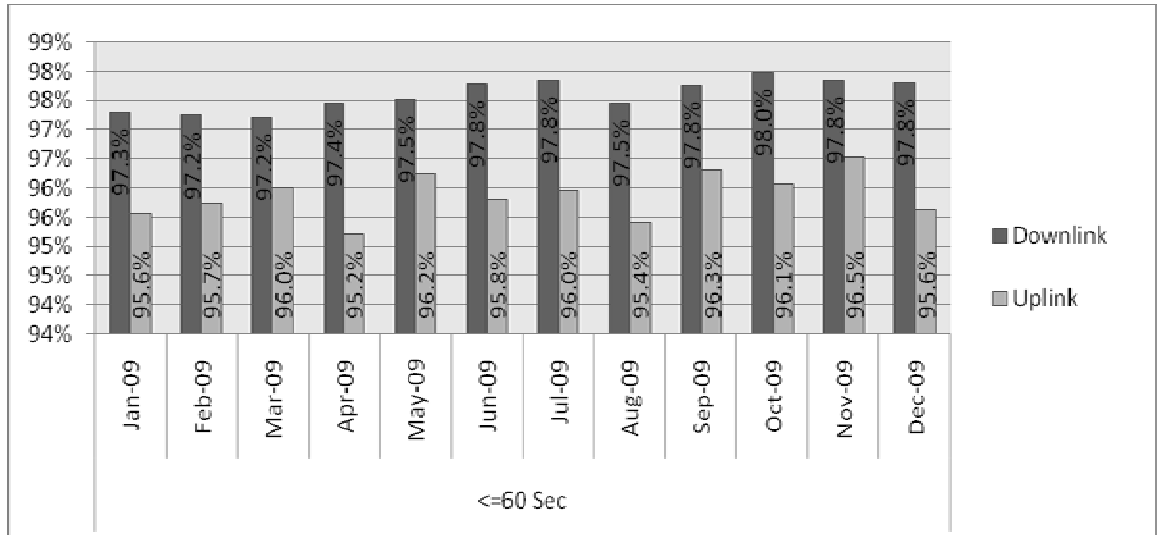
2.2.2 Based on sampling statistics and data collection during the operational trial period, Malaysia has reached following figures for the successful rate of downlink and uplink (round-trip) as shown in the chart below:

- 93.8% downlink and 92.9% uplink was successfully recorded less than 30 seconds;
- 97.6% downlink and 95.9% uplink was recorded less than 60 seconds;
- 98.6% downlink and 97.7% uplink was recorded less than 90 seconds;
- And remaining 99.1% downlink and 98.2% uplink was recorded less than 120 seconds.



2.2.3 The monthly downlink and uplink performance rate on different time phase are shown in the chart below:





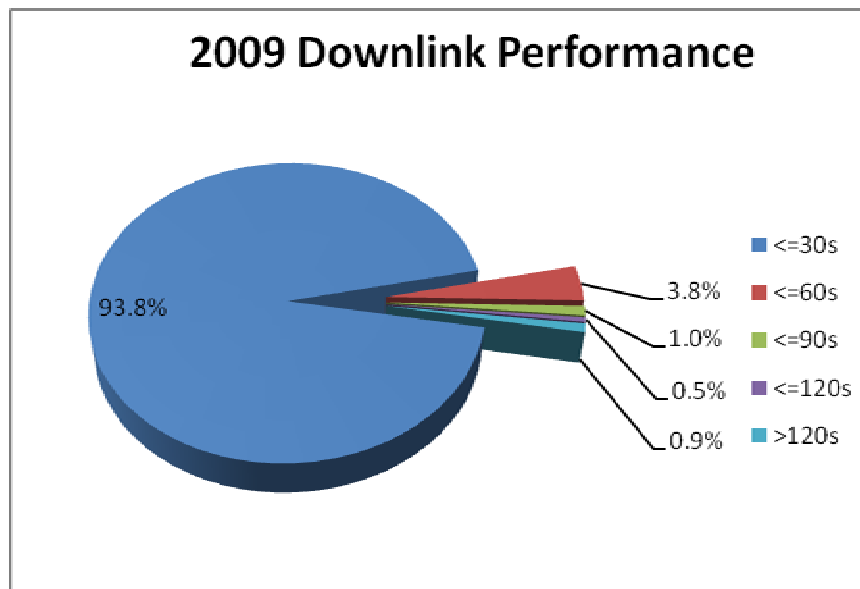
2.2.4 Based on the analysis above and total data link recorded, the downlink and uplink (round-trip) performance of 2009 was achieved as;

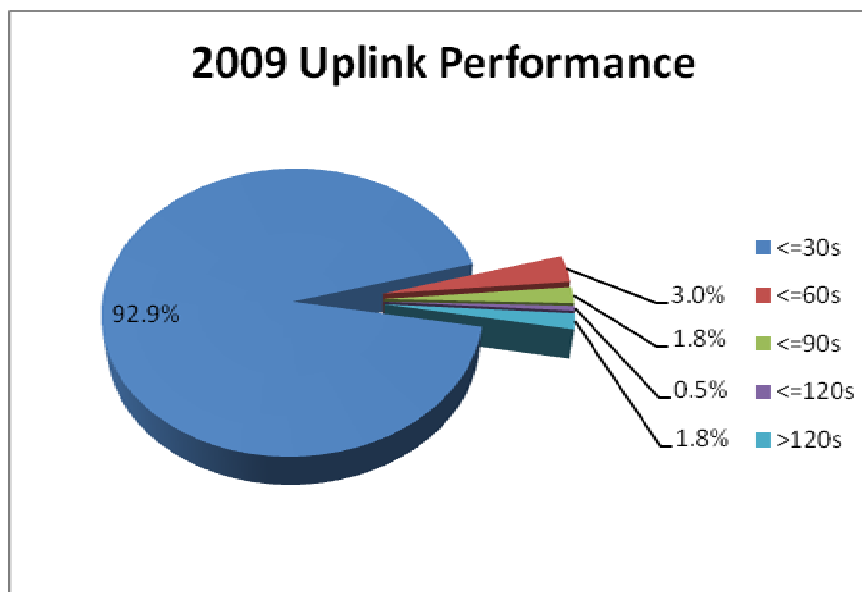
a) Downlink,

- 93.8% was less than 30 second;
- 3.8% was less than 60 second;
- 1.0% was less than 90 second;
- 0.5% was less than 120 second; and
- Remaining 0.9% was more than 120 second.

b) Uplink,

- 92% was less than 30 second;
- 3.0% was less than 60 second;
- 1.8% was less than 90 second;
- 0.5% was less than 120 second; and
- Remaining 1.8% was more than 120 second.





3. Problem reports and analysis.

3.1 During the operational trial, problem reports were mostly classified related to ground system problems such as gateway failure, taking long time to log on some occasions, flight data processor failure and SITA link failure (very rarely to happen and was unplanned).

3.2 All problem reports are being forwarded to CRA (bradly.d.cornell@boeing.com) for record and analysis.

3.3 Recently, ADS/CPDLC systems have been facing problems relating to ground flight data processor database (FDP) in which the trial has been suspended for several days for software analysis. This problem has been solved on 26 Jan 2010 and the operational trial was continued as usual.

4. Problem resolution and future system enhancement.

4.1 To prevent the ADS/CPDLC ground system problem from happening again in the future, the ADS/CPDLC system in KL ACC is now undergoing software upgrades, updates and customization to fulfill the requirements towards more advanced settings and from an input from air traffic controllers.

4.2 After a slight delay, the upgrading project that was supposed to start in early December 2009 is expected to begin on 1st March 2010 where the latest software updates and upgrades will be uploaded into the current ADS/CPDLC system and targeted to be completed in May 2010. The real-time test for the new upgrade system with Boeing Lab then will be coordinated before continuing the operational trial.

5. Training

5.1 The ADS/CPDLC training for area control rated air traffic controllers was partially complete where 52% of active area controllers have already been trained. The course for the remaining 48% ATC personnel will be held in stages given a priority to other important ATC courses throughout 2010 and targeted to be completed by October 2010.

6. Current operation status

6.1 The operational trial on a limited time between 1500-1900 UTC is currently ongoing for data collection in order to study the problem that can arise to ensure that the system is stable and will meet the requirement before being approved for official operation.

6.2 The ADS/CPDLC system is targeted to be 24-hour operational trial in October 2010 when sufficient trained personnel is made available.

7. Conclusion

7.1 The ADS/CPDLC system in Kuala Lumpur ACC is currently working satisfactorily and proceeding positively, with confidence increasing amongst pilots and controllers. Unfortunately the number of participating airlines has not increased significantly with only participation mostly from Malaysia airlines and Singapore airlines.

8. Action by the meeting

8.1 The meeting is invited to review the outcomes of the operational trials and to take note of the information provided in this information paper.

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January-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	910	943	955	960	971	971	542	566	578	580	589	589
2	821	856	866	872	890	890	529	548	569	574	581	581
3	706	731	736	737	741	741	436	459	470	472	481	481
4	1039	1096	1109	1115	1129	1129	673	687	705	712	729	729
5	1034	1055	1068	1072	1087	1087	680	695	711	717	726	726
6	814	852	860	867	874	874	493	515	522	524	539	539
7	1356	1411	1421	1426	1440	1440	783	814	833	838	856	856
8	1556	1608	1623	1636	1651	1651	1046	1074	1086	1090	1109	1109
9	900	942	948	952	960	960	585	598	605	609	619	619
10	604	621	627	630	633	633	410	428	433	433	435	435
11	942	982	993	1000	1007	1007	581	595	608	611	624	624
12	749	804	815	823	832	832	458	479	493	495	507	507
13	1104	1149	1166	1176	1196	1196	628	655	673	679	705	705
14	293	302	307	308	311	311	181	190	193	194	195	195
15	1333	1395	1409	1418	1438	1438	817	850	865	870	883	883
16	934	975	984	989	999	999	557	577	596	602	621	621
17	1072	1121	1137	1141	1147	1147	656	678	694	700	707	707
18	1042	1084	1100	1106	1115	1115	657	676	689	690	706	706
19	741	775	782	788	805	805	494	502	518	519	530	530
20	949	996	1004	1012	1028	1028	583	609	622	626	644	644
21	984	1026	1040	1048	1060	1060	586	603	614	617	627	627
22	1327	1375	1396	1405	1420	1420	721	746	768	779	804	804
23	1083	1157	1169	1175	1187	1187	644	661	680	685	704	704
24	700	730	740	745	755	755	432	439	458	463	474	474
25	865	909	918	921	932	932	536	549	561	564	570	570
26	687	717	725	728	735	735	420	430	440	444	455	455
27	936	987	998	1003	1019	1019	574	596	609	619	634	634
28	1142	1194	1206	1209	1215	1215	789	805	821	823	826	826
29	1399	1453	1475	1489	1520	1520	1042	1074	1096	1103	1114	1114
30	1247	1290	1301	1308	1320	1320	952	975	998	1004	1018	1018
31	2065	2092	2104	2110	2116	2116	1598	1612	1623	1625	1636	1636
	31334	32628	32982	33169	33533	33533	20083	20685	21131	21261	21648	21648
	31334	1294	354	187	364	33533	20083	602	446	130	387	21648
	93.44%	97.30%	98.36%	98.91%	100.00%		92.77%	95.55%	97.61%	98.21%	100.00%	
	93.44%	3.86%	1.06%	0.56%	1.09%		92.77%	2.78%	2.06%	0.60%	1.79%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.44%	97.30%	98.36%	98.91%	Downlink	93.44%	3.86%	1.06%	0.56%	1.09%
Uplink	92.77%	95.55%	97.61%	98.21%	Uplink	92.77%	2.78%	2.06%	0.60%	1.79%

February-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	111	115	116	117	117	117	89	91	93	93	93	93
2	849	884	892	894	900	900	565	579	586	587	594	594
3	750	785	798	806	813	813	444	454	462	464	470	470
4	856	894	906	915	927	927	528	548	560	568	582	582
5	688	713	724	728	742	742	422	443	458	461	467	467
6	1268	1333	1351	1357	1385	1385	710	725	748	749	773	773
7	1382	1447	1458	1458	1470	1470	869	887	903	908	918	918
8	1017	1071	1079	1083	1091	1091	614	642	651	653	668	668
9	1192	1241	1252	1256	1261	1261	722	749	756	759	764	764
10	1204	1271	1290	1309	1323	1323	704	741	761	765	785	785
11	890	915	924	928	936	936	617	641	652	656	661	661
12	1284	1331	1344	1355	1374	1374	851	868	883	886	898	898
13	1370	1433	1458	1470	1479	1479	882	907	927	934	947	947
14	1081	1118	1130	1135	1142	1142	606	624	640	643	659	659
15	1532	1585	1601	1608	1626	1626	917	946	960	963	973	973
16	946	993	1013	1017	1028	1028	519	538	556	561	577	577
17	1453	1500	1517	1523	1535	1535	836	866	885	890	910	910
18	806	840	848	852	857	857	486	506	518	521	533	533
19	436	465	478	485	490	490	282	287	300	303	307	307
20	1094	1135	1147	1153	1161	1161	590	616	631	633	658	658
21	1835	1914	1927	1937	1963	1963	1262	1301	1324	1326	1340	1340
22	917	967	979	996	1016	1016	639	664	683	685	703	703
23	1691	1756	1784	1788	1810	1810	1135	1190	1211	1217	1249	1249
24	1173	1233	1251	1257	1264	1264	774	800	818	825	836	836
25	1660	1738	1760	1767	1774	1774	1049	1088	1101	1108	1115	1115
26	1370	1433	1458	1470	1479	1479	882	907	927	934	947	947
27	1015	1082	1101	1106	1114	1114	592	613	634	644	662	662
28	685	705	713	718	731	731	450	462	468	468	477	477
29	422	428	434	434	434	434	263	267	268	268	272	272
30						0						0
31						0						0
	30977	32325	32733	32922	33242	33242	19299	19950	20364	20472	20838	20838
	30977	1348	408	189	320	33242	19299	651	414	108	366	20838
	93.19%	97.24%	98.47%	99.04%	100.00%		92.61%	95.74%	97.73%	98.24%	100.00%	
	93.19%	4.06%	1.23%	0.57%	0.96%		92.61%	3.12%	1.99%	0.52%	1.76%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.19%	97.24%	98.47%	99.04%	Downlink	93.19%	4.06%	1.23%	0.57%	0.96%
Uplink	92.61%	95.74%	97.73%	98.24%	Uplink	92.61%	3.12%	1.99%	0.52%	1.76%

March-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	868	908	918	925	932	932	581	593	604	608	611	611
2	1505	1566	1567	1585	1604	1604	1070	1117	1128	1134	1140	1140
3	1398	1443	1461	1469	1492	1492	933	963	989	997	1013	1013
4	1254	1302	1322	1327	1339	1339	844	866	877	879	881	881
5	2288	2340	2357	2373	2387	2387	1679	1708	1733	1739	1765	1765
6	1327	1401	1424	1440	1464	1464	880	930	961	968	982	982
7	1347	1422	1443	1456	1477	1477	802	838	858	863	879	879
8	265	276	278	281	290	290	167	170	171	172	176	176
9	350	364	367	370	370	370	239	250	252	253	255	255
10	1420	1482	1501	1511	1544	1544	920	961	979	988	1021	1021
11	864	923	936	929	952	952	527	547	560	566	591	591
12	1312	1380	1390	1397	1422	1422	773	809	819	825	848	848
13	1324	1366	1390	1397	1416	1416	817	840	849	854	868	868
14	1278	1346	1367	1374	1391	1391	756	805	831	840	860	860
15	1426	1483	1495	1501	1513	1513	902	927	941	945	970	970
16	896	937	945	948	964	964	585	617	639	645	668	668
17	1847	1873	1883	1887	1896	1896	1230	1270	1293	1299	1311	1311
18	1869	1911	1923	1928	1931	1931	1382	1425	1437	1438	1451	1451
19	1619	1674	1692	1703	1718	1718	1119	1151	1169	1176	1192	1192
20	1428	1493	1516	1525	1546	1546	983	1015	1037	1042	1058	1058
21	1192	1227	1244	1251	1266	1266	802	823	835	838	850	850
22	1374	1431	1451	1456	1470	1470	849	877	901	909	920	920
23	1302	1373	1390	1399	1418	1418	784	821	842	845	864	864
24	624	651	655	662	676	676	428	436	448	451	457	457
25	865	909	918	921	932	932	536	549	561	564	570	570
26	875	920	942	948	955	955	543	566	581	587	596	596
27	951	989	998	1000	1008	1008	653	665	674	675	692	692
28	1341	1384	1395	1399	1406	1406	1016	1034	1049	1049	1054	1054
29	1153	1245	1260	1271	1281	1281	851	879	888	894	912	912
30	1276	1345	1362	1372	1392	1392	851	876	901	906	927	927
31	1340	1406	1430	1441	1458	1458	840	873	889	894	912	912
	38178	39770	40220	40446	40910	40910	25342	26201	26696	26843	27294	27294
	38178	1592	450	226	464	40910	25342	859	495	147	451	27294
	93.32%	97.21%	98.31%	98.87%	100.00%		92.85%	96.00%	97.81%	98.35%	100.00%	
	93.32%	3.89%	1.10%	0.55%	1.13%		92.85%	3.15%	1.81%	0.54%	1.65%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.32%	97.21%	98.31%	98.87%	Downlink	93.32%	3.89%	1.10%	0.55%	1.13%
Uplink	92.85%	96.00%	97.81%	98.35%	Uplink	92.85%	3.15%	1.81%	0.54%	1.65%

April-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1226	1288	1303	1311	1327	1327	752	784	799	800	808	808
2	774	805	816	823	837	837	465	484	503	509	526	526
3	729	776	795	801	816	816	495	511	526	530	541	541
4	1481	1545	1560	1567	1587	1587	963	991	1016	1022	1043	1043
5	306	321	325	327	327	327	195	198	202	203	207	207
6	685	718	728	735	749	749	426	440	448	453	471	471
7	1283	1335	1352	1358	1370	1370	778	801	816	818	832	832
8	540	564	574	575	583	583	314	327	336	338	354	354
9	998	1028	1038	1040	1047	1047	608	634	644	646	659	659
10	1275	1301	1305	1308	1320	1320	725	753	783	790	812	812
11	1128	1160	1166	1170	1175	1175	673	701	717	722	734	734
12	796	826	835	839	844	844	506	512	521	525	529	529
13	1440	1479	1489	1496	1506	1506	993	1019	1033	1038	1050	1050
14	730	759	766	769	782	782	448	465	472	475	492	492
15	1134	1193	1201	1210	1223	1223	777	810	829	832	841	841
16	558	592	601	604	609	609	361	370	381	385	394	394
17						0						0
18						0						0
19						0						0
20						0						0
21						0						0
22						0						0
23						0						0
24						0						0
25						0						0
26						0						0
27						0						0
28						0						0
29						0						0
30						0						0
31						0						0
	15083	15690	15854	15933	16102	16102	9479	9800	10026	10086	10293	10293
	15083	607	164	79	169	16102	9479	321	226	60	207	10293
	93.67%	97.44%	98.46%	98.95%	100.00%		92.09%	95.21%	97.41%	97.99%	100.00%	
	93.67%	3.77%	1.02%	0.49%	1.05%		92.09%	3.12%	2.20%	0.58%	2.01%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.67%	97.44%	98.46%	98.95%	Downlink	93.67%	3.77%	1.02%	0.49%	1.05%
Uplink	92.09%	95.21%	97.41%	97.99%	Uplink	92.09%	3.12%	2.20%	0.58%	2.01%

May-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1646	1688	1704	1711	1724	1724	1267	1298	1317	1319	1336	1336
2	2163	2213	2231	2239	2253	2253	1424	1468	1489	1493	1508	1508
3	724	738	745	745	751	751	485	504	516	518	525	525
4	1641	1667	1677	1683	1688	1688	1061	1091	1103	1104	1119	1119
5	959	1011	1027	1031	1055	1055	664	687	704	709	731	731
6	1256	1318	1337	1346	1358	1358	773	807	826	830	848	848
7	1516	1574	1592	1604	1621	1621	1008	1027	1046	1056	1072	1072
8	908	956	969	975	993	993	532	557	581	587	617	617
9	1312	1357	1369	1379	1390	1390	865	897	909	910	918	918
10	950	1002	1017	1024	1032	1032	610	634	652	655	675	675
11	558	624	628	629	630	630	356	373	378	379	389	389
12	888	939	946	947	952	952	617	628	638	643	657	657
13	1150	1197	1205	1212	1223	1223	745	782	795	799	802	802
14	859	895	904	906	929	929	513	532	550	553	563	563
15	1678	1768	1793	1804	1824	1824	1138	1162	1186	1195	1214	1214
16	1537	1600	1615	1622	1633	1633	918	950	970	979	990	990
17	825	867	877	883	892	892	493	511	527	529	545	545
18	975	1013	1024	1028	1046	1046	699	717	731	737	743	743
19	791	829	844	849	858	858	535	555	572	579	592	592
20	1543	1606	1619	1629	1646	1646	1091	1116	1137	1139	1144	1144
21	1362	1426	1440	1448	1455	1455	836	866	877	879	887	887
22	1084	1117	1126	1131	1141	1141	682	708	724	724	737	737
23	1201	1278	1303	1312	1326	1326	875	907	931	935	946	946
24	1396	1449	1464	1467	1486	1486	981	1001	1019	1026	1038	1038
25	1610	1663	1681	1692	1706	1706	1196	1216	1233	1238	1253	1253
26	1716	1776	1797	1803	1814	1814	1234	1261	1272	1276	1298	1298
27	1250	1308	1324	1332	1346	1346	885	902	918	923	928	928
28	1666	1757	1773	1781	1787	1787	1247	1275	1293	1298	1321	1321
29	1152	1234	1255	1264	1274	1274	716	748	766	773	785	785
30	1294	1343	1360	1367	1378	1378	772	797	817	818	832	832
31	1518	1561	1580	1585	1599	1599	1094	1115	1128	1132	1137	1137
	39128	40774	41226	41428	41810	41810	26312	27092	27605	27735	28150	28150
	39128	1646	452	202	382	41810	26312	780	513	130	415	28150
	93.59%	97.52%	98.60%	99.09%	100.00%		93.47%	96.24%	98.06%	98.53%	100.00%	
	93.59%	3.94%	1.08%	0.48%	0.91%		93.47%	2.77%	1.82%	0.46%	1.47%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.59%	97.52%	98.60%	99.09%	Downlink	93.59%	3.94%	1.08%	0.48%	0.91%
Uplink	93.47%	96.24%	98.06%	98.53%	Uplink	93.47%	2.77%	1.82%	0.46%	1.47%

June-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1212	1256	1274	1280	1290	1290	811	837	852	858	871	871
2	1356	1416	1425	1428	1432	1432	782	817	835	841	857	857
3	1929	2040	2071	2083	2097	2097	1187	1242	1277	1285	1302	1302
4	1598	1663	1679	1687	1704	1704	1012	1054	1086	1095	1128	1128
5	1287	1362	1377	1389	1407	1407	768	808	834	843	866	866
6	395	421	426	427	431	431	265	275	282	287	291	291
7	1076	1109	1120	1125	1133	1133	656	676	686	688	699	699
8	1196	1264	1278	1283	1292	1292	855	879	902	911	916	916
9	1747	1803	1817	1821	1822	1822	1156	1198	1209	1212	1233	1233
10	1132	1183	1196	1203	1217	1217	666	698	719	723	735	735
11	1059	1099	1107	1111	1170	1170	650	671	683	687	702	702
12	1001	1053	1062	1070	1080	1080	640	669	677	681	685	685
13	1259	1302	1321	1324	1331	1331	805	841	851	854	873	873
14	1711	1781	1796	1802	1813	1813	1206	1235	1256	1261	1279	1279
15	1357	1425	1434	1439	1447	1447	827	853	863	870	883	883
16	1443	1496	1502	1505	1512	1512	925	951	967	973	988	988
17	2013	2085	2108	2117	2126	2126	1250	1299	1322	1332	1354	1354
18	2112	2190	2214	2225	2238	2238	1385	1443	1469	1482	1501	1501
19	2106	2171	2187	2192	2195	2195	1323	1360	1388	1398	1420	1420
20	1292	1346	1362	1371	1391	1391	890	923	938	939	959	959
21	1335	1404	1426	1435	1452	1452	874	897	922	927	933	933
22	999	1053	1079	1088	1099	1099	646	671	692	694	716	716
23	984	1037	1047	1048	1053	1053	567	602	615	616	631	631
24	157	166	167	167	170	170	96	100	103	103	106	106
25	702	749	763	771	787	787	458	484	503	506	519	519
26	1158	1217	1230	1237	1250	1250	693	721	743	749	759	759
27	1033	1080	1095	1099	1106	1106	653	679	690	693	708	708
28	3440	3555	3590	3599	3616	3616	2028	2095	2126	2133	2175	2175
29	2279	2351	2369	2374	2383	2383	1343	1393	1412	1415	1445	1445
30	1257	1298	1304	1307	1314	1314	708	742	751	752	769	769
31						0						0
	41625	43375	43826	44007	44358	44358	26125	27113	27653	27808	28303	28303
	41625	1750	451	181	351	44358	26125	988	540	155	495	28303
	93.84%	97.78%	98.80%	99.21%	100.00%		92.30%	95.80%	97.70%	98.25%	100.00%	
	93.84%	3.95%	1.02%	0.41%	0.79%		92.30%	3.49%	1.91%	0.55%	1.75%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.84%	97.78%	98.80%	99.21%	Downlink	93.84%	3.95%	1.02%	0.41%	0.79%
Uplink	92.30%	95.80%	97.70%	98.25%	Uplink	92.30%	3.49%	1.91%	0.55%	1.75%

July-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1007	1065	1083	1093	1105	1105	623	652	668	673	688	688
2	861	888	894	899	904	904	634	652	658	667	681	681
3	1372	1447	1469	1473	1484	1484	999	1025	1038	1042	1067	1067
4	1079	1123	1138	1144	1151	1151	697	727	744	748	764	764
5	1583	1634	1653	1659	1667	1667	1009	1048	1067	1081	1093	1093
6	1236	1294	1303	1307	1313	1313	816	839	854	861	875	875
7	2038	2104	2133	2143	2159	2159	1476	1521	1552	1564	1594	1594
8	955	991	1005	1008	1015	1015	601	614	630	632	640	640
9	465	485	487	491	493	493	311	319	330	332	340	340
10	1660	1715	1730	1748	1756	1756	963	1012	1042	1049	1073	1073
11	1428	1487	1505	1510	1525	1525	853	881	897	899	912	912
12	1347	1423	1440	1444	1453	1453	841	876	886	893	913	913
13	1314	1360	1374	1381	1385	1385	797	827	839	843	856	856
14	1610	1679	1701	1708	1721	1721	991	1024	1047	1057	1083	1083
15	992	1031	1037	1040	1045	1045	663	641	647	648	656	656
16	1401	1463	1479	1485	1489	1489	684	727	745	751	770	770
17	1301	1372	1382	1383	1399	1399	793	826	843	848	856	856
18	2310	2427	2447	2455	2475	2475	1633	1675	1696	1700	1717	1717
19	1582	1644	1663	1669	1678	1678	1151	1196	1211	1214	1243	1243
20	855	894	902	905	916	916	521	544	563	567	583	583
21	858	881	889	891	895	895	520	541	545	549	557	557
22	1932	2003	2016	2030	2033	2033	1265	1297	1321	1325	1344	1344
23	1080	1119	1126	1135	1140	1140	694	717	728	732	738	738
24	1141	1187	1203	1206	1217	1217	723	754	769	777	795	795
25	1524	1584	1609	1616	1633	1633	978	1015	1027	1029	1046	1046
26	1092	1143	1154	1159	1169	1169	691	727	739	742	751	751
27	1173	1210	1217	1222	1234	1234	809	834	841	844	854	854
28	1357	1405	1419	1427	1443	1443	780	812	833	836	859	859
29						0						0
30						0						0
31						0						0
	36553	38058	38458	38631	38897	38897	23516	24323	24760	24903	25348	25348
	36553	1505	400	173	266	38897	23516	807	437	143	445	25348
	93.97%	97.84%	98.87%	99.32%	100.00%		92.77%	95.96%	97.68%	98.24%	100.00%	
	93.97%	3.87%	1.03%	0.44%	0.68%		92.77%	3.18%	1.72%	0.56%	1.76%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.97%	97.84%	98.87%	99.32%	Downlink	93.97%	3.87%	1.03%	0.44%	0.68%
Uplink	92.77%	95.96%	97.68%	98.24%	Uplink	92.77%	3.18%	1.72%	0.56%	1.76%

August-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1774	1833	1848	1850	1859	1859	1239	1274	1285	1287	1303	1303
2	1248	1302	1315	1321	1331	1331	784	813	818	825	844	844
3	1615	1675	1696	1706	1721	1721	1078	1111	1130	1132	1159	1159
4	306	316	322	323	326	326	206	213	216	218	220	220
5	1172	1231	1248	1255	1282	1282	919	947	971	982	998	998
6	1207	1249	1263	1266	1281	1281	798	832	849	860	887	887
7	858	901	906	909	921	921	566	585	591	597	618	618
8	1613	1699	1714	1727	1743	1743	1156	1204	1222	1228	1253	1253
9	1746	1838	1865	1876	1899	1899	1105	1165	1203	1216	1242	1242
10	1219	1264	1277	1279	1293	1293	715	745	761	769	792	792
11						0						0
12						0						0
13						0						0
14						0						0
15						0						0
16						0						0
17						0						0
18						0						0
19						0						0
20						0						0
21						0						0
22						0						0
23						0						0
24						0						0
25						0						0
26						0						0
27						0						0
28						0						0
29						0						0
30						0						0
31						0						0
	12758	13308	13454	13512	13656	13656	8566	8889	9046	9114	9316	9316
	12758	550	146	58	144	13656	8566	323	157	68	202	9316
	93.42%	97.45%	98.52%	98.95%	100.00%		91.95%	95.42%	97.10%	97.83%	100.00%	
	93.42%	4.03%	1.07%	0.42%	1.05%		91.95%	3.47%	1.69%	0.73%	2.17%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	93.42%	97.45%	98.52%	98.95%	Downlink	93.42%	4.03%	1.07%	0.42%	1.05%
Uplink	91.95%	95.42%	97.10%	97.83%	Uplink	91.95%	3.47%	1.69%	0.73%	2.17%

September-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	998	1031	1037	1041	1051	1051	605	620	628	631	651	651
2	1088	1131	1141	1153	1166	1166	682	701	718	724	750	750
3	1607	1673	1690	1699	1715	1715	1031	1060	1079	1087	1110	1110
4	1094	1126	1136	1140	1148	1148	700	717	730	731	740	740
5	1932	1997	2019	2028	2035	2035	1200	1253	1280	1284	1299	1299
6	1242	1299	1313	1318	1339	1339	719	751	766	769	787	787
7	1491	1547	1565	1571	1581	1581	890	913	925	927	942	942
8	1545	1626	1644	1644	1667	1667	975	1007	1041	1042	1060	1060
9	971	1006	1013	1015	1039	1039	620	644	652	656	662	662
10	1186	1206	1213	1217	1231	1231	729	748	764	769	784	784
11	1339	1383	1398	1408	1416	1416	951	974	991	1000	1014	1014
12	1567	1640	1661	1665	1678	1678	1107	1147	1169	1179	1205	1205
13	1636	1700	1711	1715	1729	1729	1172	1205	1226	1232	1237	1237
14	1662	1728	1735	1742	1751	1751	1042	1067	1083	1086	1095	1095
15	1173	1226	1237	1239	1254	1254	814	837	848	850	855	855
16	1913	1992	2015	2026	2038	2038	1371	1407	1430	1438	1448	1448
17	2013	2089	2104	2114	2125	2125	1373	1421	1440	1445	1455	1455
18	1292	1334	1345	1350	1361	1361	599	610	620	623	639	639
19	514	534	538	540	544	544	293	298	300	302	305	305
20	1294	1350	1364	1368	1384	1384	856	885	900	904	925	925
21	1154	1205	1212	1216	1225	1225	674	696	709	712	723	723
22	1372	1421	1430	1432	1443	1443	939	957	964	967	980	980
23	1559	1627	1641	1648	1669	1669	871	906	925	934	968	968
24	1823	1898	1918	1926	1943	1943	1272	1298	1321	1328	1356	1356
25	1430	1511	1530	1541	1555	1555	966	994	1018	1024	1038	1038
26	1382	1441	1459	1467	1485	1485	876	903	917	921	931	931
27	546	554	560	564	581	581	424	432	436	438	443	443
28	980	1022	1029	1030	1044	1044	701	724	733	738	749	749
29	1408	1464	1479	1487	1501	1501	931	961	978	982	987	987
30						0						0
31						0						0
	39211	40761	41137	41304	41698	41698	25383	26136	26591	26723	27138	27138
	39211	1550	376	167	394	41698	25383	753	455	132	415	27138
	94.04%	97.75%	98.65%	99.06%	100.00%		93.53%	96.31%	97.98%	98.47%	100.00%	
	94.04%	3.72%	0.90%	0.40%	0.94%		93.53%	2.77%	1.68%	0.49%	1.53%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	94.04%	97.75%	98.65%	99.06%	Downlink	94.04%	3.72%	0.90%	0.40%	0.94%
Uplink	93.53%	96.31%	97.98%	98.47%	Uplink	93.53%	2.77%	1.68%	0.49%	1.53%

October-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1122	1173	1183	1189	1208	1208	682	709	716	719	735	735
2	1730	1800	1814	1820	1845	1845	1181	1203	1226	1234	1269	1269
3	1465	1524	1528	1531	1542	1542	916	937	949	953	976	976
4	1594	1655	1670	1679	1699	1699	1193	1217	1235	1240	1250	1250
5	423	439	442	444	456	456	320	328	345	349	358	358
6	1421	1458	1473	1480	1492	1492	879	894	908	912	928	928
7	1876	1957	1977	1987	2008	2008	1242	1274	1294	1299	1317	1317
8	1983	2047	2066	2076	2093	2093	1346	1393	1411	1417	1432	1432
9	1678	1738	1752	1760	1784	1784	1104	1140	1152	1160	1186	1186
10	1307	1351	1362	1366	1378	1378	777	793	812	815	835	835
11	1811	1897	1910	1918	1930	1930	1069	1112	1136	1147	1167	1167
12	2177	2249	2266	2272	2280	2280	1451	1488	1504	1506	1524	1524
13	2107	2170	2180	2188	2197	2197	1606	1639	1671	1680	1691	1691
14	1502	1558	1566	1671	1590	1590	950	971	990	994	1023	1023
15	2864	2968	2989	3004	3035	3035	1995	2054	2096	2104	2128	2128
16	1632	1703	1719	1728	1738	1738	1121	1156	1166	1168	1183	1183
17	1208	1251	1255	1260	1267	1267	701	727	748	753	770	770
18	1052	1089	1101	1108	1113	1113	640	654	662	665	681	681
19	243	251	253	253	255	255	171	175	178	178	179	179
20	1540	1626	1653	1664	1689	1689	896	955	975	986	1013	1013
21	1612	1697	1715	1719	1722	1722	1039	1072	1091	1103	1135	1135
22	1551	1598	1611	1622	1631	1631	992	1016	1028	1032	1038	1038
23	1521	1597	1619	1629	1647	1647	1015	1062	1080	1088	1111	1111
24	1824	1879	1896	1909	1922	1922	1165	1208	1236	1240	1257	1257
25	2292	2327	2335	2341	2353	2353	1517	1559	1584	1599	1631	1631
26	1502	1514	1519	1525	1536	1536	980	1008	1026	1029	1041	1041
27	1311	1327	1330	1333	1344	1344	829	847	858	862	875	875
28	1034	1052	1057	1064	1080	1080	622	643	654	659	675	675
29	1340	1401	1420	1428	1433	1433	884	907	925	928	951	951
30	1540	1601	1616	1623	1627	1627	970	994	1015	1016	1042	1042
31	747	778	781	781	789	789	492	507	516	520	537	537
	47009	48675	49058	49372	49683	49683	30745	31642	32187	32355	32938	32938
	47009	1666	383	314	311	49683	30745	897	545	168	583	32938
	94.62%	97.97%	98.74%	99.37%	100.00%		93.34%	96.07%	97.72%	98.23%	100.00%	
	94.62%	3.35%	0.77%	0.63%	0.63%		93.34%	2.72%	1.65%	0.51%	1.77%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	94.62%	97.97%	98.74%	99.37%	Downlink	94.62%	3.35%	0.77%	0.63%	0.63%
Uplink	93.34%	96.07%	97.72%	98.23%	Uplink	93.34%	2.72%	1.65%	0.51%	1.77%

November-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1249	1289	1296	1301	1309	1309	832	856	864	866	873	873
2	1475	1511	1526	1528	1533	1533	922	956	967	970	972	972
3	2017	2087	2103	2109	2125	2125	1299	1338	1355	1362	1378	1378
4	517	548	553	555	560	560	405	414	419	421	427	427
5	1255	1297	1310	1319	1324	1324	769	781	789	790	795	795
6	1264	1311	1319	1324	1329	1329	888	911	921	923	939	939
7	1538	1591	1608	1612	1626	1626	1034	1067	1082	1086	1101	1101
8	1550	1615	1633	1636	1645	1645	1042	1070	1087	1091	1105	1105
9	1642	1719	1739	1741	1762	1762	970	1016	1029	1038	1060	1060
10	1965	2033	2057	2069	2074	2074	1379	1422	1437	1442	1459	1459
11	2541	2642	2636	2643	2661	2661	1841	1844	1902	1911	1924	1924
12	1348	1427	1442	1448	1462	1462	955	981	990	992	1008	1008
13	1405	1456	1474	1477	1487	1487	978	998	1014	1018	1037	1037
14	1305	1341	1350	1357	1384	1384	862	888	912	918	933	933
15	1966	2025	2040	2052	2070	2070	1308	1346	1368	1373	1400	1400
16	1699	1750	1769	1774	1792	1792	1155	1192	1212	1219	1240	1240
17	1867	1928	1944	1949	1958	1958	1224	1266	1285	1293	1320	1320
18	1503	1576	1589	1597	1609	1609	925	959	976	979	1006	1006
19	1345	1391	1402	1407	1412	1412	908	922	938	947	965	965
20	1337	1394	1413	1420	1434	1434	846	880	896	898	906	906
21	817	854	868	872	877	877	509	527	534	535	545	545
22	1341	1392	1413	1425	1433	1433	817	847	863	866	881	881
23	1655	1748	1770	1775	1789	1789	1082	1106	1130	1138	1152	1152
24	1376	1433	1449	1456	1466	1466	957	971	987	991	1000	1000
25	1238	1289	1301	1308	1340	1340	765	794	808	812	835	835
26	1336	1393	1411	1415	1436	1436	851	864	881	890	910	910
27	1843	1922	1937	1945	1968	1968	1169	1206	1222	1224	1246	1246
28	1422	1465	1475	1482	1494	1494	856	879	897	897	908	908
29	1387	1448	1469	1475	1493	1493	944	976	987	989	1005	1005
30	1373	1428	1445	1459	1474	1474	946	962	979	982	997	997
31						0						0
	44576	46303	46741	46930	47326	47326	29438	30239	30731	30861	31327	31327
	44576	1727	438	189	396	47326	29438	801	492	130	466	31327
	94.19%	97.84%	98.76%	99.16%	100.00%		93.97%	96.53%	98.10%	98.51%	100.00%	
	94.19%	3.65%	0.93%	0.40%	0.84%		93.97%	2.56%	1.57%	0.41%	1.49%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	94.19%	97.84%	98.76%	99.16%	Downlink	94.19%	3.65%	0.93%	0.40%	0.84%
Uplink	93.97%	96.53%	98.10%	98.51%	Uplink	93.97%	2.56%	1.57%	0.41%	1.49%

December-09

Bil	Downlink						Uplink					
	<30s	<60s	<90s	<120s	>120s	Total Downlink	<30s	<60s	<90s	<120s	>120s	Total Uplink
1	1438	1497	1516	1525	1544	1544	894	915	934	938	959	959
2	1221	1264	1276	1281	1286	1286	864	878	889	891	902	902
3	928	990	1006	1011	1016	1016	694	709	721	727	738	738
4	2228	2294	2315	2322	2349	2349	1493	1536	1556	1568	1589	1589
5	1839	1895	1915	1927	1937	1937	1214	1241	1265	1269	1291	1291
6	835	872	878	882	902	902	455	481	492	495	509	509
7	1079	1126	1148	1154	1176	1176	624	649	668	676	694	694
8	1303	1343	1362	1366	1374	1374	713	751	771	778	802	802
9	1484	1524	1537	1540	1561	1561	881	908	929	932	949	949
10	1173	1206	1213	1215	1228	1228	675	692	700	704	723	723
11	1740	1805	1822	1834	1842	1842	1121	1161	1176	1184	1208	1208
12	2027	2108	2122	2131	2151	2151	1269	1308	1333	1341	1369	1369
13	1477	1527	1548	1559	1569	1569	991	1020	1041	1043	1064	1064
14	1115	1164	1173	1176	1179	1179	671	695	711	713	732	732
15	1314	1339	1354	1359	1370	1370	943	967	975	977	991	991
16	1507	1558	1570	1576	1586	1586	916	938	962	965	988	988
17	2065	2140	2154	2162	2178	2178	1438	1461	1485	1491	1514	1514
18	2154	2220	2242	2252	2279	2279	1544	1579	1592	1597	1622	1622
19	635	651	658	660	664	664	425	434	439	443	451	451
20	1139	1191	1205	1213	1248	1248	694	726	756	764	799	799
21	1216	1248	1257	1260	1271	1271	692	720	736	742	770	770
22	1066	1108	1117	1125	1135	1135	658	674	690	691	707	707
23	1287	1320	1334	1336	1343	1343	775	798	801	805	824	824
24	1065	1065	1078	1083	1091	1091	594	620	634	640	649	649
25	976	989	993	995	1001	1001	577	597	611	622	640	640
26	907	919	922	923	927	927	497	517	531	535	563	563
27	1199	1225	1231	1237	1247	1247	745	772	795	800	824	824
28	1171	1185	1188	1189	1200	1200	717	742	752	755	764	764
29	748	785	787	787	792	792	457	476	486	488	503	503
30	1587	1644	1663	1666	1672	1672	1143	1160	1177	1187	1202	1202
31	1267	1331	1345	1354	1370	1370	926	951	965	968	974	974
	41190	42533	42929	43100	43488	43488	26300	27076	27573	27729	28314	28314
	41190	1343	396	171	388	43488	26300	776	497	156	585	28314
	94.72%	97.80%	98.71%	99.11%	100.00%		92.89%	95.63%	97.38%	97.93%	100.00%	
	94.72%	3.09%	0.91%	0.39%	0.89%		92.89%	2.74%	1.76%	0.55%	2.07%	

	<30s	<60s	<90s	<120s		<30s	<60s	<90s	<120s	>120s
Downlink	94.72%	97.80%	98.71%	99.11%	Downlink	94.72%	3.09%	0.91%	0.39%	0.89%
Uplink	92.89%	95.63%	97.38%	97.93%	Uplink	92.89%	2.74%	1.76%	0.55%	2.07%

<=30 Sec													
	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Average
Downlink	93.4%	93.2%	93.3%	93.7%	93.6%	93.8%	94.0%	93.4%	94.0%	94.6%	94.2%	94.7%	93.8%
Uplink	92.8%	92.6%	92.8%	92.1%	93.5%	92.3%	92.8%	91.9%	93.5%	93.3%	94.0%	92.9%	92.9%

<=60 Sec													
	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Average
Downlink	97.3%	97.2%	97.2%	97.4%	97.5%	97.8%	97.8%	97.5%	97.8%	98.0%	97.8%	97.8%	97.6%
Uplink	95.6%	95.7%	96.0%	95.2%	96.2%	95.8%	96.0%	95.4%	96.3%	96.1%	96.5%	95.6%	95.9%

<=90 Sec													
	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Average
Downlink	98.4%	98.5%	98.3%	98.5%	98.6%	98.8%	98.9%	98.5%	98.7%	98.7%	98.8%	98.7%	98.6%
Uplink	97.6%	97.7%	97.8%	97.4%	98.1%	97.7%	97.7%	97.1%	98.0%	97.7%	98.1%	97.4%	97.7%

<=120 Sec													
	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Average
Downlink	98.9%	99.0%	98.9%	99.0%	99.1%	99.2%	99.3%	98.9%	99.1%	99.4%	99.2%	99.1%	99.1%
Uplink	98.2%	98.2%	98.3%	98.0%	98.5%	98.3%	98.2%	97.8%	98.5%	98.2%	98.5%	97.9%	98.2%

	<=30s	<=60s	<=90s	<=120s	>120s
2009 Downlink Performance	93.8%	3.8%	1.0%	0.5%	0.9%

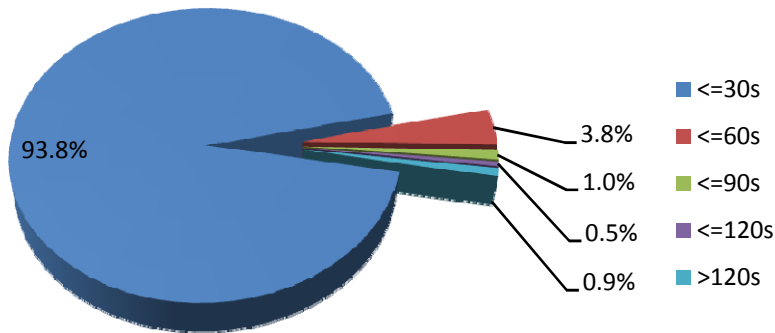
Total Downlink	444,703
Total Uplink	290,907

	<=30s	<=60s	<=90s	<=120s	>120s
2009 Uplink Performance	92.9%	3.0%	1.8%	0.5%	1.8%

Performance Average

	<30 Sec	<60 Sec	<90 Sec	<120 Sec
Downlink	93.8%	97.6%	98.6%	99.1%
Uplink	92.9%	95.9%	97.7%	98.2%

2009 Downlink Performance



2009 Uplink Performance

