



Consolidated Tape Association

Key Operating Metrics of Tape A&B U.S. Equities Securities Information Processor (CTA SIP)

CQS: Quote Feed (Tape A&B)

	System Availability (1)	Peak Messages Per Second (thousands)	Capacity Messages Per Second (millions)	Capacity vs Peak Ratio	Peak Messages Per 100 Milliseconds (thousands) (2)	Capacity Messages Per 100 Milliseconds (thousands)	Capacity vs Peak Ratio	Peak Transactions Per Day (millions)	Capacity Transactions Per Day (billions)	Average Latency (us) (3)	Median Latency (us) (3)	10th Percentile Latency (us)	90th Percentile Latency (us)	99th Percentile Latency (us)
1Q10	100.00%	215	0.25	1.2:1	n/a	n/a	n/a	619	8	4,040	n/a	n/a	n/a	n/a
2Q10	99.99%	233	0.25	1.1:1	n/a	n/a	n/a	1112	8	6,430	n/a	n/a	n/a	n/a
3Q10	99.99%	299	0.30	1.0:1	n/a	n/a	n/a	849	8	11,450	n/a	n/a	n/a	n/a
4Q10	99.99%	309	0.35	1.1:1	n/a	n/a	n/a	574	8	3,270	n/a	n/a	n/a	n/a
1Q11	100.00%	390	0.50	1.3:1	n/a	n/a	n/a	971	8	1,170	n/a	n/a	n/a	n/a
2Q11	100.00%	453	0.75	1.7:1	n/a	n/a	n/a	839	8	520	n/a	n/a	n/a	n/a
3Q11	100.00%	567	1.00	1.8:1	n/a	n/a	n/a	1919	8	470	n/a	n/a	n/a	n/a
4Q11	100.00%	581	1.25	2.2:1	n/a	n/a	n/a	1418	8	430	n/a	n/a	n/a	n/a
1Q12	100.00%	561	1.50	2.7:1	n/a	n/a	n/a	743	16	350	n/a	n/a	n/a	n/a
2Q12	100.00%	553	1.75	3.2:1	n/a	n/a	n/a	809	16	300	n/a	n/a	n/a	n/a
3Q12	99.99%	567	2.00	3.5:1	n/a	n/a	n/a	559	16	280	n/a	n/a	n/a	n/a
4Q12	100.00%	474	2.25	4.7:1	n/a	n/a	n/a	617	16	260	n/a	n/a	n/a	n/a
1Q13	99.99%	508	2.50	4.9:1	n/a	n/a	n/a	607	16	690	n/a	n/a	n/a	n/a
2Q13	100.00%	575	2.50	4.3:1	n/a	n/a	n/a	744	16	590	n/a	n/a	1.02	n/a
3Q13	100.00%	458	2.75	6.0:1	116.2	275	2.4:1	547	16	400	n/a	n/a	0.65	n/a
4Q13	100.00%	516	3.00	5.8:1	120.7	300	2.5:1	634	16	400	n/a	n/a	0.65	n/a
1Q14	100.00%	565	n/a	n/a	121.1	300	2.5:1	710	16	450	n/a	n/a	0.90	n/a
2Q14	99.99%	559	n/a	n/a	131.7	300	2.3:1	833	16	440	n/a	n/a	0.76	n/a
3Q14	100.00%	476	n/a	n/a	121.1	325	2.7:1	596	16	450	n/a	n/a	0.88	n/a
4Q14	99.99%	517	n/a	n/a	141.8	325	2.3:1	1397	16	410	n/a	n/a	0.75	n/a
1Q15	100.00%	510	n/a	n/a	146.4	350	2.4:1	849	16	390	n/a	n/a	0.68	n/a
2Q15	100.00%	526	n/a	n/a	142.6	350	2.5:1	625	16	460	n/a	n/a	1.02	n/a
3Q15	100.00%	583	n/a	n/a	158.4	375	2.4:1	952	16	510	230	n/a	1.13	n/a
4Q15	99.99%	652	n/a	n/a	162.3	375	2.3:1	910	16	440	210	n/a	0.93	n/a
1Q16	100.00%	615	n/a	n/a	163.3	392	2.4:1	1338	16	490	220	150	1,080	3,890
2Q16	100.00%	618	n/a	n/a	168.4	400	2.4:1	1093	16	490	220	150	1,090	4,000
3Q16	100.00%	541	n/a	n/a	185.5	450	2.4:1	1027	16	470	210	150	970	3860
4Q16	99.99%	785	n/a	n/a	210.8	450	2.1:1	1150	16	260	80	60	280	1570
1Q17	100.00%	530	n/a	n/a	175.7	450	2.6:1	720	16	145	81	63	257	1097
2Q17	100.00%	543	n/a	n/a	189.2	450	2.4:1	676	16	150	82	63	281	1114
3Q17	100.00%	519	n/a	n/a	165.4	450	2.7:1	546	16	141	83	64	251	1020
4Q17	100.00%	527	n/a	n/a	187.2	450	2.4:1	782	16	121	87	70	164	722
1Q18	100.00%	691	n/a	n/a	182.6	450	2.5:1	1571	16	130	84	68	180	861
2Q18	100.00%	660	n/a	n/a	195.5	450	2.3:1	985	16	134	84	66	174	860
3Q18	100.00%	790	n/a	n/a	232.6	450	1.9:1	684	16	131	85	66	179	810
4Q18	100.00%	942	n/a	n/a	249.6	600	2.4:1	1755	16	97	60	49	100	371
1Q19	100.00%	853	n/a	n/a	265.1	750	2.8:1	1140	16	75	61	49	89	339
2Q19	100.00%	903	n/a	n/a	227.2	750	3.3:1	1043	16	69	61	49	83	240
3Q19	99.97%	958	n/a	n/a	246.8	750	3.0:1	1090	16	165	61	49	82	233

**CTS: Trade Feed (Tape A&B)**

	System Availability (1)	Peak Messages Per Second (thousands)	Capacity Messages Per Second (thousands)	Capacity vs Peak Ratio	Peak Messages Per 100 Milliseconds (thousands) (2)	Capacity Messages Per 100 Milliseconds (thousands)	Capacity vs Peak Ratio	Peak Transactions Per Day (millions)	Capacity Transactions Per Day (millions)	Average Latency (3)	Median Latency (3)	10th Percentile Latency	90th Percentile Latency	99th Percentile Latency
1Q10	100.00%	49.6	50	1.0:1	n/a	n/a	n/a	36.8	200	6,460	n/a	n/a	n/a	n/a
2Q10	99.99%	42.9	50	1.2:1	n/a	n/a	n/a	55.5	200	6,170	n/a	n/a	n/a	n/a
3Q10	99.99%	42.1	60	1.4:1	n/a	n/a	n/a	38.3	200	5,730	n/a	n/a	n/a	n/a
4Q10	99.99%	48.4	75	1.5:1	n/a	n/a	n/a	30.2	200	3,240	n/a	n/a	n/a	n/a
1Q11	100.00%	57.2	100	1.7:1	n/a	n/a	n/a	36.9	200	1,960	n/a	n/a	n/a	n/a
2Q11	99.99%	78.2	150	1.9:1	n/a	n/a	n/a	31.6	200	1,250	n/a	n/a	n/a	n/a
3Q11	100.00%	77.8	200	2.6:1	n/a	n/a	n/a	61.6	200	800	n/a	n/a	n/a	n/a
4Q11	100.00%	67.5	250	3.7:1	n/a	n/a	n/a	44.8	200	730	n/a	n/a	n/a	n/a
1Q12	100.00%	57.2	300	5.2:1	n/a	n/a	n/a	26.9	1000	580	n/a	n/a	n/a	n/a
2Q12	100.00%	80.7	350	4.3:1	n/a	n/a	n/a	25.9	1000	370	n/a	n/a	n/a	n/a
3Q12	99.99%	72.4	400	5.5:1	n/a	n/a	n/a	25.5	1000	360	n/a	n/a	n/a	n/a
4Q12	100.00%	59.5	450	7.6:1	n/a	n/a	n/a	22.8	1000	320	n/a	n/a	n/a	n/a
1Q13	100.00%	67.7	500	7.4:1	n/a	n/a	n/a	22.2	1000	480	n/a	n/a	n/a	n/a
2Q13	100.00%	68.7	500	7.3:1	n/a	n/a	n/a	27.9	1000	380	n/a	n/a	500	n/a
3Q13	100.00%	70.8	550	7.8:1	21.4	55	2.6:1	25.0	1000	380	n/a	n/a	540	n/a
4Q13	100.00%	91.1	600	6.6:1	20.6	60	2.9:1	30.4	1000	420	n/a	n/a	530	n/a
1Q14	100.00%	111.8	n/a	n/a	21.8	60	2.8:1	36.5	1000	510	n/a	n/a	710	n/a
2Q14	99.99%	98.7	n/a	n/a	23.5	60	2.6:1	30.0	1000	510	n/a	n/a	660	n/a
3Q14	100.00%	81.7	n/a	n/a	22.7	65	2.9:1	29.2	1000	510	n/a	n/a	660	n/a
4Q14	99.99%	109.7	n/a	n/a	24.2	65	2.7:1	49.6	1000	450	n/a	n/a	600	n/a
1Q15	100.00%	85.5	n/a	n/a	22.1	70	3.2:1	34.6	1000	450	n/a	n/a	590	n/a
2Q15	100.00%	111.6	n/a	n/a	31.8	70	2.2:1	31.6	1000	340	n/a	n/a	430	n/a
3Q15	100.00%	79.6	n/a	n/a	27.1	75	2.8:1	56.0	1000	320	240	n/a	410	n/a
4Q15	100.00%	128.1	n/a	n/a	43.7	75	1.7:1	38.0	1000	310	240	n/a	410	n/a
1Q16	100.00%	123.0	n/a	n/a	42.4	86	2.0:1	49.8	1000	330	250	160	430	1,730
2Q16	100.00%	91.9	n/a	n/a	37.4	96	2.6:1	45.6	1000	340	240	190	450	1,730
3Q16	100.00%	98.2	n/a	n/a	41.5	105	2.5:1	33.8	1000	320	240	200	440	1,650
4Q16	100.00%	94.3	n/a	n/a	38.7	105	2.7:1	49.3	1000	250	160	130	310	1,410
1Q17	100.00%	121.8	n/a	n/a	45.4	105	2.3:1	32.9	1000	167	115	83	218	1,023
2Q17	100.00%	98.2	n/a	n/a	51.0	105	2.1:1	32.4	1000	154	113	83	210	848
3Q17	100.00%	88.3	n/a	n/a	46.9	105	2.2:1	29.2	1000	144	113	83	199	708
4Q17	100.00%	67.6	n/a	n/a	39.6	105	2.7:1	38.5	1000	151	120	87	205	708
1Q18	100.00%	68.0	n/a	n/a	35.8	105	2.9:1	57.3	1000	147	119	87	198	662
2Q18	100.00%	77.3	n/a	n/a	35.8	105	2.9:1	40.2	1000	150	121	87	202	716
3Q18	100.00%	77.4	n/a	n/a	31.0	105	3.4:1	40.1	1000	150	122	85	206	648
4Q18	100.00%	91.9	n/a	n/a	39.8	105	2.6:1	55.3	1000	164	112	85	193	783
1Q19	100.00%	77.2	n/a	n/a	38.3	105	2.7:1	41.7	1000	147	102	77	198	823
2Q19	100.00%	98.4	n/a	n/a	43.8	250	5.7:1	49.8	1000	139	94	70	179	648
3Q19	99.82%	134.3	n/a	n/a	54.1	250	4.6:1	55.6	1000	115	64	50	117	377

(1) Service level guidelines: (A) 99.98% system availability; (B) 10 minute recovery time for full system failures; (C) Operations production support 24x5 in primary and backup data center and test support provided on Tuesdays, Thursdays, and Saturdays.

(2) Beginning 1Q14, capacity planning interval changed from 1-second to 100-milliseconds.

(3) Prior to 1Q13, latency was measured from the time a message received from a Participant was time-stamped by CTS/CQS, to the time that processing the message was completed.

Beginning 1Q13, message latency is measured beginning with the time-stamp taken as an inbound Participant message arrives at the network entrance to the CTS/CQS environment, through processing by the system into a consolidated message for Data Recipients, to the time-stamp taken as the outbound message arrives at the network exit from the environment. Latency is represented in milliseconds.