

Key Operating Metrics of U.S. Options Securities Information Processor (OPRA SIP)

Quarter	System Availability (1)	Peak Messages Per Second (millions)	Capacity Messages Per Second (millions)	Capacity vs Peak Ratio	Peak Messages Per 100 Milliseconds (millions) (2)	Capacity Messages Per 100 Milliseconds (millions)	Capacity vs Peak Ratio	Peak Messages Per 10 Milliseconds (millions)	Peak Messages Per 1 Millisecond (millions)	Peak Transactions Per Day (billions)	Capacity Transactions Per Day (billions)	Average Latency (us) (3)	Median Latency (us)	10th Percentile Latency (us)	90th Percentile Latency (us)	99th Percentile Latency (us)
1Q16	99.99%	11.1	n/a	n/a	2.3	6.0	2.6:1	n/a	n/a	23.1	100	400	150	110	590	4,440
2Q16	99.99%	11.3	n/a	n/a	2.2	6.5	3.0:1	n/a	n/a	14.7	150	110	60	50	130	870
3Q16	100.00%	10.4	n/a	n/a	3.1	7.3	2.4:1	n/a	n/a	15.0	200	110	60	50	120	700
4Q16	100.00%	14.5	n/a	n/a	2.8	7.3	2.6:1	n/a	n/a	17.7	200	100	50	40	120	670
1Q17	100.00%	10.5	n/a	n/a	2.9	7.3	2.5:1	n/a	n/a	11.4	200	84	53	41	113	659
2Q17	100.00%	11.0	n/a	n/a	2.2	8.5	3.9:1	n/a	n/a	16.4	200	72	42	32	94	610
3Q17	100.00%	12.9	n/a	n/a	2.3	8.5	3.7:1	n/a	n/a	15.4	200	80	40	30	100	890
4Q17	100.00%	10.9	n/a	n/a	2.3	8.5	3.6:1	n/a	n/a	13.9	200	78	40	30	104	729
1Q18	100.00%	13.5	n/a	n/a	2.8	8.5	3.0:1	n/a	n/a	30.6	200	91	44	31	120	918
2Q18	100.00%	13.0	n/a	n/a	2.7	8.5	3.2:1	n/a	n/a	27.5	200	93	42	31	115	953
3Q18	100.00%	18.0	n/a	n/a	3.3	8.5	2.6:1	n/a	n/a	24.4	200	145	42	30	115	2,556
4Q18	100.00%	19.8	n/a	n/a	4.2	8.5	2.0:1	n/a	n/a	45.9	200	110	41	29	103	1,653
1Q19	99.97%	18.0	n/a	n/a	3.4	8.6	2.5:1	4.4	4.8	41.7	200	136	41	29	113	2,311
Jan '19	100.00%	18.0	n/a	n/a	3.4	8.5	2.5:1	4.1	4.2	41.7	200	140	41	29	107	1,989
Feb '19	99.92%	15.6	n/a	n/a	3.3	8.5	2.6:1	4.1	4.5	31.4	200	132	41	29	111	2,273
Mar '19	100.00%	15.6	n/a	n/a	3.3	8.5	2.6:1	4.4	4.8	31.4	200	160	43	29	136	2,717
2Q19	99.99%	21.8	n/a	n/a	4.2	8.6	2.0:1	6.0	6.8	45.9	200	153	42	29	121	2,773
Apr '19	99.99%	14.2	n/a	n/a	3.5	8.5	2.4:1	5.8	6.5	25.3	200	164	42	29	132	2,878
May '19	100.00%	21.8	n/a	n/a	4.2	8.5	2.0:1	6.0	6.6	37.6	200	144	42	29	116	2,556
Jun '19	100.00%	21.4	n/a	n/a	4.2	8.5	2.0:1	5.7	6.8	45.9	200	150	42	29	116	2,766
3Q19	100.00%	21.4	n/a	n/a	4.1	9.4	2.3:1	6.3	7.0	46.5	200	118	40	28	96	1,897
Jul '19	100.00%	19.3	n/a	n/a	4.0	8.5	2.1:1	4.9	6.4	38.8	200	121	40	28	98	1,986
Aug '19	100.00%	18.2	n/a	n/a	3.9	9.4	0.2:1	6.3	7.0	46.5	200	114	40	28	95	1,856
Sep '19	100.00%	21.4	n/a	n/a	4.1	9.4	2.3:1	4.6	5.5	44.0	200	118	40	28	95	1,849
4Q19	100.00%	25.2	n/a	n/a	4.9	9.4	1.9:1	5.3	6.1	44.9	200	156	42	28	148	2,472
Oct '19	100.00%	23.5	n/a	n/a	4.8	9.4	2.0:1	4.8	5.4	44.0	200	130	42	28	100	2,129
Nov '19	100.00%	23.5	n/a	n/a	4.9	9.4	1.9:1	5.3	5.5	41.7	200	170	42	28	163	2,584
Dec '19	100.00%	25.2	n/a	n/a	4.6	9.4	2.0:1	5.3	6.1	45.5	200	171	43	28	196	2,577
1Q20	100.00%	33.1	n/a	n/a	5.0	9.5	1.9:1	8.2	8.5	102.0	200	181	44	29	201	2,808
Jan '20	100.00%	25.1	n/a	n/a	5.0	9.5	1.9:1	6.5	7.3	72.6	200	186	44	29	244	2,731
Feb '20	100.00%	24.4	n/a	n/a	4.8	9.5	2.0:1	8.2	8.5	102.0	200	191	44	29	241	2,878
Mar '20	100.00%	33.1	n/a	n/a	4.4	9.5	2.2:1	6.6	7.3	101.5	200	167	43	29	149	2,759
2Q20	99.998%	24.3	n/a	n/a	4.1	9.5	2.3:1	6.0	7.0	74.2	200	174	44	29	149	2,868
Apr '20	100.00%	21.6	n/a	n/a	4.1	9.5	2.3:1	5.9	7.0	64.1	200	173	41	28	141	2,955
May '20	99.995%	24.3	n/a	n/a	3.7	9.5	2.6:1	4.2	4.6	74.2	200	194	44	29	215	2,990
Jun '20	100.00%	22.7	n/a	n/a	3.9	9.5	2.4:1	6.0	7.0	73.9	200	156	46	36	118	2,199
3Q20																
Jul '20	100.00%	20.9	n/a	n/a	3.2	10.0	3.1:1	5.2	7.0	61.9	200	116	44	35	89	1,730
Aug '20	100.00%	17.6	n/a	n/a	3.6	10.0	2.8:1	6.0	6.1	53.9	200	113	43	34	84	1,674

(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) Message latency is measured beginning with the time-stamp taken as an inbound Participant message arrives at the network entrance to the OPRA 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 microseconds.