Table 1: Additional swap gates and circuit depth, n = 5

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
full_10_2	ghz	7	7	0	0	0	nan	nan	7	7	7	0	0
full_10_2	dj	36	11	0	3	0	nan	100	11	17	11	0	35.29
full_10_2	graphstate	50	22	0	0	0	nan	nan	22	22	22	0	0
full_10_2	qft	71	38	0	0	0	nan	nan	38	38	38	0	0
full_10_2	wstate	73	45	0	0	0	nan	nan	45	45	45	0	0
full_10_2	qftentangled	78	42	0	0	0	nan	nan	42	42	42	0	0
full_10_2	vqe	83	21	0	0	0	nan	nan	21	21	21	0	0
full_10_2	qaoa	95	31	0	0	0	nan	nan	31	31	31	0	0
full_10_2	realamprandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_10_2	twolocalrandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_10_2	su2random	150	41	0	15	0	nan	100	41	81	41	0	49.38
full_10_2	qnn	154	58	0	0	0	nan	nan	58	58	58	0	0
full_10_2	portfolioqaoa	195	72	0	0	0	nan	nan	72	72	72	0	0
full_10_2	random	195	117	0	6	0	nan	100	97	141	97	0	31.21
full_10_2	portfoliovqe	310	107	0	0	0	nan	nan	107	107	107	0	0
full_20_1	ghz	7	7	0	0	0	nan	nan	7	7	7	0	0
full_20_1	dj	36	11	0	0	0	nan	nan	11	11	11	0	0
full_20_1	graphstate	50	22	0	0	0	nan	nan	22	22	22	0	0
full_20_1	qft	71	38	0	0	0	nan	nan	38	38	38	0	0
full_20_1	wstate	73	45	0	0	0	nan	nan	45	45	45	0	0
full_20_1	qftentangled	78	42	0	0	0	nan	nan	42	42	42	0	0
full_20_1	vqe	83	21	0	0	0	nan	nan	21	21	21	0	0
full_20_1	qaoa	95	31	0	0	0	nan	nan	31	31	31	0	0
full_20_1	realamprandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_20_1	twolocalrandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_20_1	su2random	150	41	0	0	0	nan	nan	41	41	41	0	0
full_20_1	qnn	154	58	0	0	0	nan	nan	58	58	58	0	0
full_20_1	portfolioqaoa	195	72	0	0	0	nan	nan	72	72	72	0	0
full_20_1	random	195	117	0	0	0	nan	nan	97	97	97	0	0
full_20_1	portfoliovqe	310	107	0	0	0	nan	nan	107	107	107	0	0
full_5_4	ghz	7	7	0	0	0	nan	nan	7	7	7	0	0
full_5_4	dj	36	11	0	0	0	nan	nan	11	11	11	0	0
full_5_4	graphstate	50	22	0	0	0	nan	nan	22	22	22	0	0
full_5_4	qft	71	38	0	0	0	nan	nan	38	38	38	0	0
full_5_4	wstate	73	45	0	0	0	nan	nan	45	45	45	0	0
full_5_4	qftentangled	78	42	0	0	0	nan	nan	42	42	42	0	0
full_5_4	vqe	83	21	0	0	0	nan	nan	21	21	21	0	0
full_5_4	qaoa	95	31	0	0	0	nan	nan	31	31	31	0	0
full_5_4	realamprandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_5_4	twolocalrandom	130	37	0	0	0	nan	nan	37	37	37	0	0
full_5_4	su2random	150	41	0	0	0	nan	nan	41	41	41	0	0
full_5_4	qnn	154	58	0	0	0	nan	nan	58	58	58	0	0
full_5_4	portfolioqaoa	195	72	0	0	0	nan	nan	72	72	72	0	0
full_5_4	random	195	117	0	0	0	nan	nan	117	117	117	0	0
full_5_4	portfoliovqe	310	107	0	0	0	nan	nan	107	107	107	0	0
full_7_3	ghz	7	7	0	0	0	nan	nan	7	7	7	0	0
full_7_3	dj	36	11	0	0	0	nan	nan	11	11	11	0	0
full_7_3	graphstate	50	22	0	0	0	nan	nan	22	22	22	0	0
full_7_3	qft	71	38	0	12	0	nan	100	38	55	38	0	30.91
full_7_3	wstate	73	45	0	0	0	nan	nan	45	45	45	0	0
full_7_3	qftentangled	78	42	0	6	0	nan	100	42	63	42	0	33.33
full_7_3	vqe	83	21	0	0	0	nan	nan	21	21	21	0	0
full_7_3	qaoa	95	31	0	6	0	nan	100	31	47	31	0	34.04
full_7_3	realamprandom	130	37	0	42	0	nan	100	37	111	37	0	66.67
full_7_3	twolocalrandom	130	37	0	15	0	nan	100	37	74	37	0	50
full_7_3	su2random	150	41	0	48	0	nan	100	41	108	41	0	62.04
full_7_3	qnn	154	58	0	9	0	nan	100	58	87	58	0	33.33
full_7_3	portfolioqaoa	195	72	0	0	0	nan	nan	72	72	72	0	0
full_7_3	random	195	117	0	12	0	nan	100	97	126	97	0	23.02
full_7_3	portfoliovqe	310	107	0	21	0	nan	100	107	158	107	0	32.28
grid_6_4	ghz	7	7	6	0	3	50	nan	13	7	8	38.46	-14.29

Continued on next page

Table 1: Additional swap gates and circuit depth, n = 5

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
grid_6_4	dj	36	11	18	3	3	83.33	0	22	14	12	45.45	14.29
grid_6_4	graphstate	50	22	6	3	9	-50	-200	32	25	22	31.25	12
grid_6_4	qft	71	38	33	12	18	45.45	-50	70	51	34	51.43	33.33
grid_6_4	wstate	73	45	15	0	3	80	nan	51	45	46	9.8	-2.22
grid_6_4	qftentangled	78	42	33	21	27	18.18	-28.57	78	76	48	38.46	36.84
grid_6_4	vqe	83	21	6	0	6	0	nan	26	21	21	19.23	0
grid_6_4	qaoa	95	31	6	3	12	-100	-300	31	42	36	-16.13	14.29
grid_6_4	realamprandom	130	37	75	42	45	40	-7.14	143	80	60	58.04	25
grid_6_4	twolocalrandom	130	37	75	39	45	40	-15.38	143	95	60	58.04	36.84
grid_6_4	su2random	150	41	75	39	45	40	-15.38	155	90	64	58.71	28.89
grid_6_4	qnn	154	58	48	30	51	-6.25	-70	122	103	78	36.07	24.27
grid_6_4	portfolioqaoa	195	72	75	39	57	24	-46.15	187	132	91	51.34	31.06
grid_6_4	random	195	117	66	33	45	31.82	-36.36	165	149	116	29.7	22.15
grid_6_4	portfoliovqe	310	107	75	39	48	36	-23.08	192	162	117	39.06	27.78
grid_8_3	ghz	7	7	6	3	3	50	0	13	10	8	38.46	20
grid_8_3	dj	36	11	18	3	3	83.33	0	22	17	12	45.45	29.41
grid_8_3	graphstate	50	22	15	9	9	40	0	34	32	21	38.24	34.38
grid_8_3	qft	71	38	33	12	18	45.45	-50	70	47	34	51.43	27.66
grid_8_3	wstate	73	45	15	0	3	80	nan	51	45	46	9.8	-2.22
grid_8_3	qftentangled	78	42	33	15	27	18.18	-80	78	78	48	38.46	38.46
grid_8_3	vqe	83	21	6	0	12	-100	nan	26	21	25	3.85	-19.05
grid_8_3	qaoa	95	31	6	3	9	-50	-200	31	42	38	-22.58	9.52
grid_8_3	realamprandom	130	37	75	48	45	40	6.25	143	107	60	58.04	43.93
grid_8_3	twolocalrandom	130	37	75	45	45	40	0	143	95	60	58.04	36.84
grid_8_3	su2random	150	41	75	42	45	40	-7.14	155	108	64	58.71	40.74
grid_8_3	qnn	154	58	48	30	51	-6.25	-70	122	100	78	36.07	22
grid_8_3	portfolioqaoa	195	72	75	39	57	24	-46.15	187	145	91	51.34	37.24
grid_8_3	random	195	117	36	12	21	41.67	-75	162	106	106	34.57	0
grid_8_3	portfoliovqe	310	107	75	39	48	36	-23.08	192	164	117	39.06	28.66
grid_9_2	ghz	7	7	6	0	6	0	nan	13	7	8	38.46	-14.29
grid_9_2	dj	36	11	9	3	0	100	100	21	14	11	47.62	21.43
grid_9_2	graphstate	50	22	15	3	6	60	-100	37	25	20	45.95	20
grid_9_2	qft	71	38	39	15	21	46.15	-40	74	59	41	44.59	30.51
grid_9_2	wstate	73	45	18	0	12	33.33	nan	54	45	41	24.07	8.89
grid_9_2	qftentangled	78	42	45	18	27	40	-50	87	60	45	48.28	25
grid_9_2	vqe	83	21	15	0	12	20	nan	35	21	27	22.86	-28.57
grid_9_2	qaoa	95	31	9	9	21	-133.33	-133.33	37	58	48	-29.73	17.24
grid_9_2	realamprandom	130	37	96	42	42	56.25	0	145	97	66	54.48	31.96
grid_9_2	twolocalrandom	130	37	96	42	42	56.25	0	145	100	66	54.48	34
grid_9_2	su2random	150	41	96	39	42	56.25	-7.69	155	102	70	54.84	31.37
grid_9_2	qnn	154	58	63	30	66	-4.76	-120	132	103	84	36.36	18.45
grid_9_2	portfolioqaoa	195	72	96	39	69	28.12	-76.92	199	132	121	39.2	8.33
grid_9_2	random	195	117	30	12	27	10	-125	114	117	111	2.63	5.13
grid_9_2	portfoliovqe	310	107	96	42	57	40.62	-35.71	209	154	111	46.89	27.92
line_20_1	ghz	7	7	0	0	18	nan	nan	7	7	9	-28.57	-28.57
line_20_1	dj	36	11	36	6	6	83.33	0	40	24	14	65	41.67
line_20_1	graphstate	50	22	12	9	12	0	-33.33	32	28	21	34.38	25
line_20_1	qft	71	38	72	24	24	66.67	0	92	57	42	54.35	26.32
line_20_1	wstate	73	45	0	0	15	nan	nan	45	45	33	26.67	26.67
line_20_1	qftentangled	78	42	72	24	36	50	-50	96	73	50	47.92	31.51
line_20_1	vqe	83	21	0	0	15	nan	nan	21	21	24	-14.29	-14.29
line_20_1	qaoa	95	31	48	12	18	62.5	-50	106	42	39	63.21	7.14
line_20_1	realamprandom	130	37	180	69	93	48.33	-34.78	206	113	59	71.36	47.79
line_20_1	twolocalrandom	130	37	180	69	93	48.33	-34.78	206	113	59	71.36	47.79
line_20_1	su2random	150	41	180	72	93	48.33	-29.17	219	135	63	71.23	53.33
line_20_1	qnn	154	58	120	48	84	30	-75	172	127	80	53.49	37.01
line_20_1	portfolioqaoa	195	72	180	66	93	48.33	-40.91	255	159	90	64.71	43.4
line_20_1	random	195	117	63	12	30	52.38	-150	160	106	99	38.12	6.6
line_20_1	portfoliovqe	310	107	180	69	90	50	-30.43	242	187	126	47.93	32.62
ring_10_2	ghz	7	7	0	0	9	nan	nan	7	7	8	-14.29	-14.29
ring_10_2	dj	36	11	36	3	3	91.67	0	40	17	12	70	29.41

Continued on next page

Table 1: Additional swap gates and circuit depth, n = 5

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
ring_10_2	graphstate	50	22	12	6	9	25	-50	32	25	20	37.5	20
ring_10_2	qft	71	38	72	15	24	66.67	-60	92	60	42	54.35	30
ring_10_2	wstate	73	45	0	0	9	nan	nan	45	45	40	11.11	11.11
ring_10_2	qftentangled	78	42	72	24	30	58.33	-25	96	73	49	48.96	32.88
ring_10_2	vqe	83	21	0	0	15	nan	nan	21	21	29	-38.1	-38.1
ring_10_2	qaoa	95	31	48	15	27	43.75	-80	106	64	45	57.55	29.69
ring_10_2	realamprandom	130	37	180	48	60	66.67	-25	206	102	66	67.96	35.29
ring_10_2	twolocalrandom	130	37	180	72	60	66.67	16.67	206	126	66	67.96	47.62
ring_10_2	su2random	150	41	180	48	60	66.67	-25	219	115	70	68.04	39.13
ring_10_2	qnn	154	58	120	39	66	45	-69.23	172	122	84	51.16	31.15
ring_10_2	portfolioqaoa	195	72	180	51	87	51.67	-70.59	255	174	110	56.86	36.78
ring_10_2	random	195	117	63	12	66	-4.76	-450	160	106	121	24.38	-14.15
ring_10_2	portfoliovqe	310	107	180	51	93	48.33	-82.35	242	204	125	48.35	38.73
ring_5_4	ghz	7	7	0	0	9	nan	nan	7	7	8	-14.29	-14.29
ring_5_4	dj	36	11	9	3	3	66.67	0	24	17	12	50	29.41
ring_5_4	graphstate	50	22	9	0	9	0	nan	31	22	18	41.94	18.18
ring_5_4	qft	71	38	27	15	18	33.33	-20	65	53	43	33.85	18.87
ring_5_4	wstate	73	45	0	0	9	nan	nan	45	45	40	11.11	11.11
ring_5_4	qftentangled	78	42	27	15	30	-11.11	-100	69	61	49	28.99	19.67
ring_5_4	vqe	83	21	0	0	15	nan	nan	21	21	29	-38.1	-38.1
ring_5_4	qaoa	95	31	18	0	27	-50	nan	53	31	45	15.09	-45.16
ring_5_4	realamprandom	130	37	57	45	60	-5.26	-33.33	86	94	66	23.26	29.79
ring_5_4	twolocalrandom	130	37	57	45	60	-5.26	-33.33	86	102	66	23.26	35.29
ring_5_4	su2random	150	41	57	48	60	-5.26	-25	96	115	70	27.08	39.13
ring_5_4	qnn	154	58	48	30	nan	nan	nan	95	98	nan	nan	nan
ring_5_4	portfolioqaoa	195	72	57	45	87	-52.63	-93.33	116	129	110	5.17	14.73
ring_5_4	random	195	117	75	42	81	-8	-92.86	180	158	132	26.67	16.46
ring_5_4	portfoliovqe	310	107	57	45	93	-63.16	-106.67	146	158	125	14.38	20.89
ring_7_3	ghz	7	7	0	3	9	nan	-200	7	10	8	-14.29	20
ring_7_3	dj	36	11	24	3	3	87.5	0	30	16	12	60	25
ring_7_3	graphstate	50	22	6	6	9	-50	-50	24	28	20	16.67	28.57
ring_7_3	qft	71	38	51	15	24	52.94	-60	77	60	42	45.45	30
ring_7_3	wstate	73	45	0	0	9	nan	nan	45	45	40	11.11	11.11
ring_7_3	qftentangled	78	42	51	24	30	41.18	-25	81	73	49	39.51	32.88
ring_7_3	vqe	83	21	0	0	15	nan	nan	21	21	29	-38.1	-38.1
ring_7_3	qaoa	95	31	24	9	27	-12.5	-200	54	48	45	16.67	6.25
ring_7_3	realamprandom	130	37	120	72	60	50	16.67	129	128	66	48.84	48.44
ring_7_3	twolocalrandom	130	37	120	48	60	50	-25	129	102	66	48.84	35.29
ring_7_3	su2random	150	41	120	51	60	50	-17.65	138	120	70	49.28	41.67
ring_7_3	qnn	154	58	93	36	66	29.03	-83.33	122	122	84	31.15	31.15
ring_7_3	portfolioqaoa	195	72	120	51	87	27.5	-70.59	157	161	110	29.94	31.68
ring_7_3	random	195	117	60	12	66	-10	-450	157	106	121	22.93	-14.15
ring_7_3	portfoliovqe	310	107	120	48	93	22.5	-93.75	179	193	125	30.17	35.23
t_horizontal_5_4	ghz	7	7	9	3	6	33.33	-100	16	10	9	43.75	10
t_horizontal_5_4	dj	36	11	24	3	3	87.5	0	37	14	12	67.57	14.29
t_horizontal_5_4	graphstate	50	22	12	9	9	25	0	35	28	20	42.86	28.57
t_horizontal_5_4	qft	71	38	48	15	24	50	-60	82	60	42	48.78	30
t_horizontal_5_4	wstate	73	45	18	0	6	66.67	nan	58	45	39	32.76	13.33
t_horizontal_5_4	qftentangled	78	42	60	21	33	45	-57.14	90	76	48	46.67	36.84
t_horizontal_5_4	vqe	83	21	12	0	12	0	nan	33	21	25	24.24	-19.05
t_horizontal_5_4	qaoa	95	31	33	9	24	27.27	-166.67	100	48	45	55	6.25
t_horizontal_5_4	realamprandom	130	37	117	48	60	48.72	-25	185	107	66	64.32	38.32
t_horizontal_5_4	twolocalrandom	130	37	117	72	60	48.72	16.67	185	113	66	64.32	41.59
t_horizontal_5_4	su2random	150	41	117	72	60	48.72	16.67	198	135	70	64.65	48.15
t_horizontal_5_4	qnn	154	58	81	39	66	18.52	-69.23	172	131	84	51.16	35.88
t_horizontal_5_4	portfolioqaoa	195	72	117	48	87	25.64	-81.25	252	153	110	56.35	28.1
t_horizontal_5_4	random	195	117	36	12	66	-83.33	-450	151	106	121	19.87	-14.15
t_horizontal_5_4	portfoliovqe	310	107	117	69	93	20.51	-34.78	239	187	125	47.7	33.16
t_vertical_5_4	ghz	7	7	9	3	6	33.33	-100	16	10	9	43.75	10
t_vertical_5_4	dj	36	11	24	3	3	87.5	0	37	18	12	67.57	33.33
t_vertical_5_4	graphstate	50	22	12	9	9	25	0	35	28	20	42.86	28.57

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Table 1: Additional swap gates and circuit depth, n = 5

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
t_vertical_5_4	qft	71	38	48	18	24	50	-33.33	82	59	42	48.78	28.81
t_vertical_5_4	wstate	73	45	18	0	6	66.67	nan	58	45	39	32.76	13.33
t_vertical_5_4	qftentangled	78	42	60	24	33	45	-37.5	90	73	48	46.67	34.25
t_vertical_5_4	vqe	83	21	12	0	12	0	nan	33	21	25	24.24	-19.05
t_vertical_5_4	qaoa	95	31	33	9	24	27.27	-166.67	100	48	45	55	6.25
t_vertical_5_4	realamprandom	130	37	117	51	60	48.72	-17.65	185	109	66	64.32	39.45
t_vertical_5_4	twolocalrandom	130	37	117	48	60	48.72	-25	185	107	66	64.32	38.32
t_vertical_5_4	su2random	150	41	117	48	60	48.72	-25	198	110	70	64.65	36.36
t_vertical_5_4	qnn	154	58	81	48	66	18.52	-37.5	172	127	84	51.16	33.86
t_vertical_5_4	portfolioqaoa	195	72	117	51	87	25.64	-70.59	252	164	110	56.35	32.93
t_vertical_5_4	random	195	117	36	12	66	-83.33	-450	151	106	121	19.87	-14.15
t_vertical_5_4	portfoliovqe	310	107	117	48	93	20.51	-93.75	239	193	125	47.7	35.23

Table 2: Additional swap gates and circuit depth, n = 10

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
full_10_2	ghz	12	12	0	6	0	nan	100	12	15	12	0	20
full_10_2	dj	79	17	0	3	0	nan	100	17	20	17	0	15
full_10_2	graphstate	100	22	0	3	0	nan	100	22	25	22	0	12
full_10_2	wstate	163	90	0	3	0	nan	100	90	93	90	0	3.23
full_10_2	vqe	168	26	0	6	0	nan	100	26	38	26	0	31.58
full_10_2	qaoa	190	34	0	0	0	nan	nan	34	34	34	0	0
full_10_2	qft	270	78	0	33	0	nan	100	78	151	78	0	48.34
full_10_2	qftentangled	282	82	0	36	0	nan	100	82	178	82	0	53.93
full_10_2	realamprandom	335	57	0	99	0	nan	100	57	223	57	0	74.44
full_10_2	twolocalrandom	335	57	0	51	0	nan	100	57	142	57	0	59.86
full_10_2	su2random	375	61	0	96	0	nan	100	61	245	61	0	75.1
full_10_2	qnn	459	108	0	78	0	nan	100	108	280	108	0	61.43
full_10_2	portfolioqaoa	615	132	0	81	0	nan	100	132	363	132	0	63.64
full_10_2	random	1058	322	0	78	0	nan	100	155	353	155	0	56.09
full_10_2	portfoliovqe	1145	217	0	18	0	nan	100	217	261	217	0	16.86
full_20_1	ghz	12	12	0	0	0	nan	nan	12	12	12	0	0
full_20_1	dj	79	17	0	0	0	nan	nan	17	17	17	0	0
full_20_1	graphstate	100	22	0	0	0	nan	nan	22	22	22	0	0
full_20_1	wstate	163	90	0	0	0	nan	nan	90	90	90	0	0
full_20_1	vqe	168	26	0	0	0	nan	nan	26	26	26	0	0
full_20_1	qaoa	190	34	0	0	0	nan	nan	34	34	34	0	0
full_20_1	qft	270	78	0	0	0	nan	nan	78	78	78	0	0
full_20_1	qftentangled	282	82	0	0	0	nan	nan	82	82	82	0	0
full_20_1	realamprandom	335	57	0	0	0	nan	nan	57	57	57	0	0
full_20_1	twolocalrandom	335	57	0	0	0	nan	nan	57	57	57	0	0
full_20_1	su2random	375	61	0	0	0	nan	nan	61	61	61	0	0
full_20_1	qnn	459	108	0	0	0	nan	nan	108	108	108	0	0
full_20_1	portfolioqaoa	615	132	0	0	0	nan	nan	132	132	132	0	0
full_20_1	random	1058	322	0	0	0	nan	nan	155	155	155	0	0
full_20_1	portfoliovqe	1145	217	0	0	0	nan	nan	217	217	217	0	0
full_5_4	ghz	12	12	0	0	0	nan	nan	12	12	12	0	0
full_5_4	dj	79	17	36	3	9	75	-200	56	24	24	57.14	0
full_5_4	graphstate	100	22	18	6	9	50	-50	44	32	25	43.18	21.88
full_5_4	wstate	163	90	0	0	0	nan	nan	90	90	90	0	0
full_5_4	vqe	168	26	0	0	0	nan	nan	26	26	26	0	0
full_5_4	qaoa	190	34	63	9	24	61.9	-166.67	150	48	46	69.33	4.17
full_5_4	qft	270	78	198	42	78	60.61	-85.71	280	164	107	61.79	34.76
full_5_4	qftentangled	282	82	198	48	78	60.61	-62.5	284	204	111	60.92	45.59
full_5_4	realamprandom	335	57	531	99	183	65.54	-84.85	644	224	132	79.5	41.07
full_5_4	twolocalrandom	335	57	531	138	183	65.54	-32.61	644	310	132	79.5	57.42
full_5_4	su2random	375	61	531	117	183	65.54	-56.41	663	258	136	79.49	47.29
full_5_4	qnn	459	108	345	123	135	60.87	-9.76	513	351	151	70.57	56.98
full_5_4	portfolioqaoa	615	132	531	156	300	43.5	-92.31	781	481	240	69.27	50.1
full_5_4	random	1058	322	423	225	504	-19.15	-124	923	712	430	53.41	39.61
full_5_4	portfoliovqe	1145	217	531	111	243	54.24	-118.92	818	550	288	64.79	47.64
full_7_3	ghz	12	12	0	3	0	nan	100	12	15	12	0	20
full_7_3	dj	79	17	48	9	9	81.25	0	70	30	22	68.57	26.67
full_7_3	graphstate	100	22	21	6	18	14.29	-200	43	22	26	39.53	-18.18
full_7_3	wstate	163	90	0	0	0	nan	nan	90	90	90	0	0
full_7_3	vqe	168	26	0	0	0	nan	nan	26	26	26	0	0
full_7_3	qaoa	190	34	48	9	15	68.75	-66.67	138	50	42	69.57	16
full_7_3	qft	270	78	168	63	150	10.71	-138.1	236	170	140	40.68	17.65
full_7_3	qftentangled	282	82	168	51	150	10.71	-194.12	240	191	144	40	24.61
full_7_3	realamprandom	335	57	471	219	141	70.06	35.62	632	299	130	79.43	56.52
full_7_3	twolocalrandom	335	57	471	135	141	70.06	-4.44	632	266	130	79.43	51.13
full_7_3	su2random	375	61	471	195	141	70.06	27.69	657	262	135	79.45	48.47
full_7_3	qnn	459	108	294	132	249	15.31	-88.64	531	366	214	59.7	41.53
full_7_3	portfolioqaoa	615	132	471	180	231	50.96	-28.33	845	406	239	71.72	41.13
full_7_3	random	1058	322	159	102	132	16.98	-29.41	419	358	179	57.28	50
full_7_3	portfoliovqe	1145	217	471	132	255	45.86	-93.18	878	499	308	64.92	38.28
grid_6_4	ghz	12	12	9	0	12	-33.33	nan	21	12	14	33.33	-16.67

Continued on next page

Table 2: Additional swap gates and circuit depth, n = 10

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
grid_6_4	dj	79	17	108	12	12	88.89	0	79	43	26	67.09	39.53
grid_6_4	graphstate	100	22	27	6	30	-11.11	-400	49	25	27	44.9	-8
grid_6_4	wstate	163	90	12	0	12	0	nan	99	90	59	40.4	34.44
grid_6_4	vqe	168	26	54	0	18	66.67	nan	60	26	31	48.33	-19.23
grid_6_4	qaoa	190	34	96	12	24	75	-100	188	57	42	77.66	26.32
grid_6_4	qft	270	78	408	96	183	55.15	-90.62	318	197	119	62.58	39.59
grid_6_4	qftentangled	282	82	393	108	201	48.85	-86.11	314	183	138	56.05	24.59
grid_6_4	realamprandom	335	57	828	228	264	68.12	-15.79	669	241	131	80.42	45.64
grid_6_4	twolocalrandom	335	57	828	228	264	68.12	-15.79	669	262	131	80.42	50
grid_6_4	su2random	375	61	828	228	264	68.12	-15.79	690	254	135	80.43	46.85
grid_6_4	qnn	459	108	618	171	297	51.94	-73.68	594	267	179	69.87	32.96
grid_6_4	portfolioqaoa	615	132	828	225	471	43.12	-109.33	818	349	281	65.65	19.48
grid_6_4	random	1058	322	801	420	699	12.73	-66.43	1085	666	438	59.63	34.23
grid_6_4	portfoliovqe	1145	217	828	222	297	64.13	-33.78	890	447	251	71.8	43.85
grid_8_3	ghz	12	12	9	9	18	-100	-100	21	18	18	14.29	0
grid_8_3	dj	79	17	108	15	12	88.89	20	79	41	25	68.35	39.02
grid_8_3	graphstate	100	22	42	6	24	42.86	-300	60	25	21	65	16
grid_8_3	wstate	163	90	12	3	15	-25	-400	99	93	65	34.34	30.11
grid_8_3	vqe	168	26	54	3	21	61.11	-600	60	35	31	48.33	11.43
grid_8_3	qaoa	190	34	96	21	33	65.62	-57.14	188	53	42	77.66	20.75
grid_8_3	qft	270	78	408	93	183	55.15	-96.77	318	183	119	62.58	34.97
grid_8_3	qftentangled	282	82	393	102	201	48.85	-97.06	314	175	138	56.05	21.14
grid_8_3	realamprandom	335	57	828	225	249	69.93	-10.67	669	245	120	82.06	51.02
grid_8_3	twolocalrandom	335	57	828	228	249	69.93	-9.21	669	234	120	82.06	48.72
grid_8_3	su2random	375	61	828	234	249	69.93	-6.41	690	260	123	82.17	52.69
grid_8_3	qnn	459	108	618	198	288	53.4	-45.45	594	315	181	69.53	42.54
grid_8_3	portfolioqaoa	615	132	828	249	450	45.65	-80.72	818	402	273	66.63	32.09
grid_8_3	random	1058	322	327	165	306	6.42	-85.45	492	350	208	57.72	40.57
grid_8_3	portfoliovqe	1145	217	828	255	291	64.86	-14.12	890	477	251	71.8	47.38
grid_9_2	ghz	12	12	12	3	27	-125	-800	24	12	19	20.83	-58.33
grid_9_2	dj	79	17	90	12	12	86.67	0	82	38	22	73.17	42.11
grid_9_2	graphstate	100	22	24	0	27	-12.5	nan	42	22	25	40.48	-13.64
grid_9_2	wstate	163	90	21	0	30	-42.86	nan	102	90	57	44.12	36.67
grid_9_2	vqe	168	26	9	0	39	-333.33	nan	31	26	33	-6.45	-26.92
grid_9_2	qaoa	190	34	63	9	78	-23.81	-766.67	145	45	46	68.28	-2.22
grid_9_2	qft	270	78	279	96	180	35.48	-87.5	288	186	120	58.33	35.48
grid_9_2	qftentangled	282	82	282	102	198	29.79	-94.12	288	167	135	53.12	19.16
grid_9_2	realamprandom	335	57	690	222	321	53.48	-44.59	591	250	151	74.45	39.6
grid_9_2	twolocalrandom	335	57	690	273	321	53.48	-17.58	591	307	151	74.45	50.81
grid_9_2	su2random	375	61	690	288	321	53.48	-11.46	619	290	157	74.64	45.86
grid_9_2	qnn	459	108	456	165	240	47.37	-45.45	537	251	174	67.6	30.68
grid_9_2	portfolioqaoa	615	132	690	234	384	44.35	-64.1	803	347	248	69.12	28.53
grid_9_2	random	1058	322	285	177	225	21.05	-27.12	455	309	185	59.34	40.13
grid_9_2	portfoliovqe	1145	217	690	276	387	43.91	-40.22	951	530	284	70.14	46.42
line_20_1	ghz	12	12	0	30	27	nan	10	12	36	15	-25	58.33
line_20_1	dj	79	17	216	27	21	90.28	22.22	94	51	30	68.09	41.18
line_20_1	graphstate	100	22	66	18	42	36.36	-133.33	56	31	29	48.21	6.45
line_20_1	wstate	163	90	0	0	27	nan	nan	90	90	76	15.56	15.56
line_20_1	vqe	168	26	0	0	27	nan	nan	26	26	33	-26.92	-26.92
line_20_1	qaoa	190	34	168	30	75	55.36	-150	228	53	44	80.7	16.98
line_20_1	qft	270	78	780	168	195	75	-16.07	342	184	106	69.01	42.39
line_20_1	qftentangled	282	82	780	195	195	75	0	346	214	110	68.21	48.6
line_20_1	realamprandom	335	57	2160	372	396	81.67	-6.45	876	272	112	87.21	58.82
line_20_1	twolocalrandom	335	57	2160	360	396	81.67	-10	876	268	112	87.21	58.21
line_20_1	su2random	375	61	2160	360	396	81.67	-10	904	291	116	87.17	60.14
line_20_1	qnn	459	108	1440	258	327	77.29	-26.74	657	296	155	76.41	47.64
line_20_1	portfolioqaoa	615	132	2160	360	408	81.11	-13.33	985	380	176	82.13	53.68
line_20_1	random	1058	322	582	312	435	25.26	-39.42	708	404	225	68.22	44.31
line_20_1	portfoliovqe	1145	217	2160	360	408	81.11	-13.33	1007	402	255	74.68	36.57
ring_10_2	ghz	12	12	0	15	51	nan	-240	12	24	21	-75	12.5
ring_10_2	dj	79	17	78	21	21	73.08	0	64	46	21	67.19	54.35

Continued on next page

Table 2: Additional swap gates and circuit depth, n = 10

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
ring_10_2	graphstate	100	22	27	18	51	-88.89	-183.33	42	28	33	21.43	-17.86
ring_10_2	wstate	163	90	0	21	57	nan	-171.43	90	102	57	36.67	44.12
ring_10_2	vqe	168	26	0	3	90	nan	-2900	26	35	45	-73.08	-28.57
ring_10_2	qaoa	190	34	120	24	66	45	-175	154	42	48	68.83	-14.29
ring_10_2	qft	270	78	330	147	165	50	-12.24	233	179	104	55.36	41.9
ring_10_2	qftentangled	282	82	330	153	165	50	-7.84	237	219	107	54.85	51.14
ring_10_2	realamprandom	335	57	885	390	516	41.69	-32.31	522	360	215	58.81	40.28
ring_10_2	twolocalrandom	335	57	885	414	516	41.69	-24.64	522	406	215	58.81	47.04
ring_10_2	su2random	375	61	885	366	537	39.32	-46.72	543	336	224	58.75	33.33
ring_10_2	qnn	459	108	663	267	432	34.84	-61.8	440	390	232	47.27	40.51
ring_10_2	portfolioqaoa	615	132	885	342	594	32.88	-73.68	606	443	292	51.82	34.09
ring_10_2	random	1058	322	402	225	423	-5.22	-88	493	379	244	50.51	35.62
ring_10_2	portfoliovqe	1145	217	885	405	636	28.14	-57.04	636	617	298	53.14	51.7
ring_5_4	ghz	12	12	0	3	45	nan	-1400	12	15	21	-75	-40
ring_5_4	dj	79	17	60	15	18	70	-20	69	35	23	66.67	34.29
ring_5_4	graphstate	100	22	24	6	42	-75	-600	50	29	28	44	3.45
ring_5_4	wstate	163	90	0	3	42	nan	-1300	90	93	58	35.56	37.63
ring_5_4	vqe	168	26	0	3	51	nan	-1600	26	35	38	-46.15	-8.57
ring_5_4	qaoa	190	34	117	15	69	41.03	-360	191	50	60	68.59	-20
ring_5_4	qft	270	78	336	105	nan	nan	nan	258	162	nan	nan	nan
ring_5_4	qftentangled	282	82	336	102	195	41.96	-91.18	262	163	137	47.71	15.95
ring_5_4	realamprandom	335	57	852	231	nan	nan	nan	624	259	nan	nan	nan
ring_5_4	twolocalrandom	335	57	852	231	nan	nan	nan	624	253	nan	nan	nan
ring_5_4	su2random	375	61	852	231	nan	nan	nan	646	274	nan	nan	nan
ring_5_4	qnn	459	108	603	180	nan	nan	nan	538	303	nan	nan	nan
ring_5_4	portfolioqaoa	615	132	852	255	nan	nan	nan	798	381	nan	nan	nan
ring_5_4	random	1058	322	801	468	nan	nan	nan	1130	716	nan	nan	nan
ring_5_4	portfoliovqe	1145	217	852	231	nan	nan	nan	894	478	nan	nan	nan
ring_7_3	ghz	12	12	0	6	51	nan	-750	12	18	25	-108.33	-38.89
ring_7_3	dj	79	17	126	18	24	80.95	-33.33	79	41	19	75.95	53.66
ring_7_3	graphstate	100	22	45	12	45	0	-275	56	28	31	44.64	-10.71
ring_7_3	wstate	163	90	0	9	66	nan	-633.33	90	96	62	31.11	35.42
ring_7_3	vqe	168	26	0	6	66	nan	-1000	26	44	43	-65.38	2.27
ring_7_3	qaoa	190	34	81	6	75	7.41	-1150	158	42	56	64.56	-33.33
ring_7_3	qft	270	78	540	108	159	70.56	-47.22	319	191	116	63.64	39.27
ring_7_3	qftentangled	282	82	540	138	nan	nan	nan	323	239	nan	nan	nan
ring_7_3	realamprandom	335	57	1299	342	435	66.51	-27.19	799	338	167	79.1	50.59
ring_7_3	twolocalrandom	335	57	1299	330	435	66.51	-31.82	799	365	167	79.1	54.25
ring_7_3	su2random	375	61	1299	345	435	66.51	-26.09	827	344	172	79.2	50
ring_7_3	qnn	459	108	816	240	nan	nan	nan	597	343	nan	nan	nan
ring_7_3	portfolioqaoa	615	132	1299	348	nan	nan	nan	925	482	nan	nan	nan
ring_7_3	random	1058	322	417	213	nan	nan	nan	555	369	nan	nan	nan
ring_7_3	portfoliovqe	1145	217	1299	360	nan	nan	nan	947	600	nan	nan	nan
t_horizontal_5_4	ghz	12	12	18	9	18	0	-100	30	18	17	43.33	5.56
t_horizontal_5_4	dj	79	17	150	21	15	90	28.57	88	47	26	70.45	44.68
t_horizontal_5_4	graphstate	100	22	54	18	54	0	-200	53	29	32	39.62	-10.34
t_horizontal_5_4	wstate	163	90	45	0	24	46.67	nan	116	90	78	32.76	13.33
t_horizontal_5_4	vqe	168	26	51	3	30	41.18	-900	71	35	37	47.89	-5.71
t_horizontal_5_4	qaoa	190	34	129	24	114	11.63	-375	206	53	64	68.93	-20.75
t_horizontal_5_4	qft	270	78	486	162	195	59.88	-20.37	331	177	106	67.98	40.11
t_horizontal_5_4	qftentangled	282	82	510	150	195	61.76	-30	313	185	110	64.86	40.54
t_horizontal_5_4	realamprandom	335	57	1614	366	414	74.35	-13.11	840	270	143	82.98	47.04
t_horizontal_5_4	twolocalrandom	335	57	1614	360	414	74.35	-15	840	268	143	82.98	46.64
t_horizontal_5_4	su2random	375	61	1614	381	414	74.35	-8.66	868	271	147	83.06	45.76
t_horizontal_5_4	qnn	459	108	1056	264	402	61.93	-52.27	662	288	194	70.69	32.64
t_horizontal_5_4	portfolioqaoa	615	132	1614	360	489	69.7	-35.83	979	380	238	75.69	37.37
t_horizontal_5_4	random	1058	322	522	279	402	22.99	-44.09	660	345	231	65	33.04
t_horizontal_5_4	portfoliovqe	1145	217	1614	372	441	72.68	-18.55	1001	424	276	72.43	34.91
t_vertical_5_4	ghz	12	12	27	6	30	-11.11	-400	39	18	19	51.28	-5.56
t_vertical_5_4	dj	79	17	135	18	15	88.89	16.67	85	51	25	70.59	50.98
t_vertical_5_4	graphstate	100	22	57	15	48	15.79	-220	59	26	29	50.85	-11.54

Continued on next page

Table 2: Additional swap gates and circuit depth, n = 10

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
t_vertical_5_4	wstate	163	90	72	3	45	37.5	-1400	137	93	66	51.82	29.03
t_vertical_5_4	vqe	168	26	66	0	51	22.73	nan	73	26	38	47.95	-46.15
t_vertical_5_4	qaoa	190	34	114	21	111	2.63	-428.57	196	53	60	69.39	-13.21
t_vertical_5_4	qft	270	78	498	138	195	60.84	-41.3	273	195	106	61.17	45.64
t_vertical_5_4	qftentangled	282	82	510	150	195	61.76	-30	309	198	110	64.4	44.44
t_vertical_5_4	realamprandom	335	57	1515	378	447	70.5	-18.25	835	304	154	81.56	49.34
t_vertical_5_4	twolocalrandom	335	57	1515	384	447	70.5	-16.41	835	287	154	81.56	46.34
t_vertical_5_4	su2random	375	61	1515	429	447	70.5	-4.2	863	374	160	81.46	57.22
t_vertical_5_4	qnn	459	108	1002	249	423	57.78	-69.88	662	258	204	69.18	20.93
t_vertical_5_4	portfolioqaoa	615	132	1515	354	504	66.73	-42.37	976	394	255	73.87	35.28
t_vertical_5_4	random	1058	322	525	270	381	27.43	-41.11	710	344	228	67.89	33.72
t_vertical_5_4	portfoliovqe	1145	217	1515	366	507	66.53	-38.52	997	508	282	71.72	44.49

Table 3: Additional swap gates and circuit depth, n = 15

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
full_10_2	ghz	17	17	0	12	0	nan	100	17	23	17	0	26.09
full_10_2	dj	118	22	66	6	9	86.36	-50	95	27	29	69.47	-7.41
full_10_2	graphstate	150	31	18	3	15	16.67	-400	57	26	29	49.12	-11.54
full_10_2	vqe	253	31	0	6	0	nan	100	31	40	31	0	22.5
full_10_2	wstate	253	135	0	6	0	nan	100	135	138	135	0	2.17
full_10_2	qaoa	285	34	63	6	69	-9.52	-1050	164	62	65	60.37	-4.84
full_10_2	qft	591	118	378	48	321	15.08	-568.75	485	307	241	50.31	21.5
full_10_2	qftentangled	608	122	378	72	321	15.08	-345.83	489	329	245	49.9	25.53
full_10_2	realamprandom	615	77	1146	168	315	72.51	-87.5	1399	401	210	84.99	47.63
full_10_2	twolocalrandom	615	77	1146	168	315	72.51	-87.5	1399	395	210	84.99	46.84
full_10_2	su2random	675	81	1146	186	315	72.51	-69.35	1433	429	215	85	49.88
full_10_2	qnn	914	158	720	69	369	48.75	-434.78	1103	430	302	72.62	29.77
full_10_2	portfolioqaoa	1260	192	1146	120	393	65.71	-227.5	1766	747	351	80.12	53.01
full_10_2	portfoliovqe	2505	327	1146	192	534	53.4	-178.12	1903	1094	504	73.52	53.93
full_10_2	random	2542	581	534	252	597	-11.8	-136.9	1200	950	529	55.92	44.32
full_20_1	ghz	17	17	0	0	0	nan	nan	17	17	17	0	0
full_20_1	dj	118	22	0	0	0	nan	nan	22	22	22	0	0
full_20_1	graphstate	150	31	0	0	0	nan	nan	26	26	26	0	0
full_20_1	vqe	253	31	0	0	0	nan	nan	31	31	31	0	0
full_20_1	wstate	253	135	0	0	0	nan	nan	135	135	135	0	0
full_20_1	qaoa	285	34	0	0	0	nan	nan	34	34	34	0	0
full_20_1	qft	591	118	0	0	0	nan	nan	118	118	118	0	0
full_20_1	qftentangled	608	122	0	0	0	nan	nan	122	122	122	0	0
full_20_1	realamprandom	615	77	0	0	0	nan	nan	77	77	77	0	0
full_20_1	twolocalrandom	615	77	0	0	0	nan	nan	77	77	77	0	0
full_20_1	su2random	675	81	0	0	0	nan	nan	81	81	81	0	0
full_20_1	qnn	914	158	0	0	0	nan	nan	158	158	158	0	0
full_20_1	portfolioqaoa	1260	192	0	0	0	nan	nan	192	192	192	0	0
full_20_1	portfoliovqe	2505	327	0	0	0	nan	nan	327	327	327	0	0
full_20_1	random	2542	581	0	0	0	nan	nan	412	412	412	0	0
full_5_4	ghz	17	17	0	0	0	nan	nan	17	17	17	0	0
full_5_4	dj	118	22	114	9	21	81.58	-133.33	99	40	38	61.62	5
full_5_4	graphstate	150	31	48	12	36	25	-200	72	35	41	43.06	-17.14
full_5_4	vqe	253	31	0	0	0	nan	nan	31	31	31	0	0
full_5_4	wstate	253	135	0	0	0	nan	nan	135	135	135	0	0
full_5_4	qaoa	285	34	126	24	nan	nan	nan	213	65	nan	nan	nan
full_5_4	qft	591	118	468	204	nan	nan	nan	466	389	nan	nan	nan
full_5_4	qftentangled	608	122	468	168	nan	nan	nan	470	436	nan	nan	nan
full_5_4	realamprandom	615	77	1497	450	nan	nan	nan	1228	454	nan	nan	nan
full_5_4	twolocalrandom	615	77	1497	456	nan	nan	nan	1228	515	nan	nan	nan
full_5_4	su2random	675	81	1497	501	nan	nan	nan	1259	517	nan	nan	nan
full_5_4	qnn	914	158	1134	276	nan	nan	nan	1077	498	nan	nan	nan
full_5_4	portfolioqaoa	1260	192	1497	450	nan	nan	nan	1557	883	nan	nan	nan
full_5_4	portfoliovqe	2505	327	1497	444	nan	nan	nan	1538	1013	nan	nan	nan
full_5_4	random	2542	581	1689	918	nan	nan	nan	2380	1647	nan	nan	nan
full_7_3	ghz	17	17	0	18	0	nan	100	17	23	17	0	26.09
full_7_3	dj	118	22	96	15	15	84.38	0	116	41	30	74.14	26.83
full_7_3	graphstate	150	31	21	9	27	-28.57	-200	44	29	31	29.55	-6.9
full_7_3	vqe	253	31	0	12	0	nan	100	31	58	31	0	46.55
full_7_3	wstate	253	135	0	15	0	nan	100	135	141	135	0	4.26
full_7_3	qaoa	285	34	108	15	51	52.78	-240	223	56	53	76.23	5.36
full_7_3	qft	591	118	501	141	300	40.12	-112.77	588	313	213	63.78	31.95
full_7_3	qftentangled	608	122	501	105	300	40.12	-185.71	592	361	217	63.34	39.89
full_7_3	realamprandom	615	77	1395	414	nan	nan	nan	1456	456	nan	nan	nan
full_7_3	twolocalrandom	615	77	1395	438	nan	nan	nan	1456	494	nan	nan	nan
full_7_3	su2random	675	81	1395	414	nan	nan	nan	1499	508	nan	nan	nan
full_7_3	qnn	914	158	927	282	nan	nan	nan	1170	529	nan	nan	nan
full_7_3	portfolioqaoa	1260	192	1395	318	nan	nan	nan	1787	897	nan	nan	nan
full_7_3	portfoliovqe	2505	327	1395	372	0	100	100	2112	837	327	84.52	60.93
full_7_3	random	2542	581	705	492	nan	nan	nan	1490	1059	nan	nan	nan
grid_6_4	ghz	17	17	15	0	27	-80	nan	32	17	23	28.12	-35.29

Continued on next page

Table 3: Additional swap gates and circuit depth, n = 15

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
grid_6_4	dj	118	22	261	21	21	91.95	0	123	59	40	67.48	32.2
grid_6_4	graphstate	150	31	72	21	69	4.17	-228.57	82	35	36	56.1	-2.86
grid_6_4	vqe	253	31	66	0	33	50	nan	80	31	40	50	-29.03
grid_6_4	wstate	253	135	21	0	27	-28.57	nan	147	135	88	40.14	34.81
grid_6_4	qaoa	285	34	303	39	129	57.43	-230.77	293	70	67	77.13	4.29
grid_6_4	qft	591	118	933	288	537	42.44	-86.46	550	335	239	56.55	28.66
grid_6_4	qftentangled	608	122	870	294	597	31.38	-103.06	624	353	233	62.66	33.99
grid_6_4	realamprandom	615	77	2646	639	714	73.02	-11.74	1371	453	224	83.66	50.55
grid_6_4	twolocalrandom	615	77	2646	672	714	73.02	-6.25	1371	393	224	83.66	43
grid_6_4	su2random	675	81	2646	627	714	73.02	-13.88	1400	434	228	83.71	47.47
grid_6_4	qnn	914	158	1905	432	789	58.58	-82.64	1129	396	334	70.42	15.66
grid_6_4	portfolioqaoa	1260	192	2646	609	1179	55.44	-93.6	1613	578	424	73.71	26.64
grid_6_4	portfoliovqe	2505	327	2646	627	837	68.37	-33.49	1756	734	425	75.8	42.1
grid_6_4	random	2542	581	3018	1548	2148	28.83	-38.76	2987	1668	853	71.44	48.86
grid_8_3	ghz	17	17	15	12	39	-160	-225	32	26	29	9.38	-11.54
grid_8_3	dj	118	22	261	27	21	91.95	22.22	125	57	40	68	29.82
grid_8_3	graphstate	150	31	63	9	51	19.05	-466.67	81	26	34	58.02	-30.77
grid_8_3	vqe	253	31	66	9	54	18.18	-500	80	40	45	43.75	-12.5
grid_8_3	wstate	253	135	21	3	39	-85.71	-1200	147	138	99	32.65	28.26
grid_8_3	qaoa	285	34	300	33	135	55	-309.09	335	53	58	82.69	-9.43
grid_8_3	qft	591	118	1413	270	405	71.34	-50	697	254	195	72.02	23.23
grid_8_3	qftentangled	608	122	1413	285	537	62	-88.42	709	294	234	67	20.41
grid_8_3	realamprandom	615	77	4404	645	711	83.86	-10.23	1828	446	224	87.75	49.78
grid_8_3	twolocalrandom	615	77	4404	624	711	83.86	-13.94	1828	404	224	87.75	44.55
grid_8_3	su2random	675	81	4404	606	711	83.86	-17.33	1869	429	230	87.69	46.39
grid_8_3	qnn	914	158	2721	426	813	70.12	-90.85	1368	393	338	75.29	13.99
grid_8_3	portfolioqaoa	1260	192	4404	684	1197	72.82	-75	2050	667	430	79.02	35.53
grid_8_3	portfoliovqe	2505	327	4404	720	744	83.11	-3.33	2212	829	429	80.61	48.25
grid_8_3	random	2542	581	1962	915	1257	35.93	-37.38	1954	1054	577	70.47	45.26
grid_9_2	ghz	17	17	18	9	30	-66.67	-233.33	35	23	25	28.57	-8.7
grid_9_2	dj	118	22	234	27	24	89.74	11.11	122	50	32	73.77	36
grid_9_2	graphstate	150	31	75	15	60	20	-300	70	29	33	52.86	-13.79
grid_9_2	vqe	253	31	48	24	60	-25	-150	60	45	50	16.67	-11.11
grid_9_2	wstate	253	135	57	15	48	15.79	-220	156	144	96	38.46	33.33
grid_9_2	qaoa	285	34	198	18	141	28.79	-683.33	247	48	60	75.71	-25
grid_9_2	qft	591	118	1248	255	396	68.27	-55.29	679	346	200	70.54	42.2
grid_9_2	qftentangled	608	122	1113	255	357	67.92	-40	610	357	192	68.52	46.22
grid_9_2	realamprandom	615	77	3033	624	834	72.5	-33.65	1625	453	240	85.23	47.02
grid_9_2	twolocalrandom	615	77	3033	609	834	72.5	-36.95	1625	431	240	85.23	44.32
grid_9_2	su2random	675	81	3033	657	855	71.81	-30.14	1659	508	249	84.99	50.98
grid_9_2	qnn	914	158	2064	438	726	64.83	-65.75	1266	486	328	74.09	32.51
grid_9_2	portfolioqaoa	1260	192	3033	597	1077	64.49	-80.4	1849	633	416	77.5	34.28
grid_9_2	portfoliovqe	2505	327	3033	651	1107	63.5	-70.05	2088	798	471	77.44	40.98
grid_9_2	random	2542	581	1680	762	1125	33.04	-47.64	1845	1041	583	68.4	44
line_20_1	ghz	17	17	0	27	42	nan	-55.56	17	29	20	-17.65	31.03
line_20_1	dj	118	22	546	57	36	93.41	36.84	146	104	45	69.18	56.73
line_20_1	graphstate	150	31	99	27	90	9.09	-233.33	72	35	38	47.22	-8.57
line_20_1	vqe	253	31	0	0	42	nan	nan	31	31	43	-38.71	-38.71
line_20_1	wstate	253	135	0	0	42	nan	nan	135	135	121	10.37	10.37
line_20_1	qaoa	285	34	438	63	210	52.05	-233.33	391	53	71	81.84	-33.96
line_20_1	qft	591	118	2877	450	519	81.96	-15.33	742	322	170	77.09	47.2
line_20_1	qftentangled	608	122	2877	420	543	81.13	-29.29	746	308	177	76.27	42.53
line_20_1	realamprandom	615	77	8190	882	936	88.57	-6.12	1996	418	162	91.88	61.24
line_20_1	twolocalrandom	615	77	8190	915	936	88.57	-2.3	1996	402	162	91.88	59.7
line_20_1	su2random	675	81	8190	876	936	88.57	-6.85	2039	451	165	91.91	63.41
line_20_1	qnn	914	158	5460	591	732	86.59	-23.86	1442	431	234	83.77	45.71
line_20_1	portfolioqaoa	1260	192	8190	876	948	88.42	-8.22	2165	591	260	87.99	56.01
line_20_1	portfoliovqe	2505	327	8190	876	948	88.42	-8.22	2297	655	378	83.54	42.29
line_20_1	random	2542	581	3348	1545	1926	42.47	-24.66	2915	1131	656	77.5	42
ring_10_2	ghz	17	17	0	21	114	nan	-442.86	17	32	37	-117.65	-15.62
ring_10_2	dj	118	22	336	45	63	81.25	-40	122	69	25	79.51	63.77

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Table 3: Additional swap gates and circuit depth, n = 15

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
ring_10_2	graphstate	150	31	60	21	93	-55	-342.86	71	31	37	47.89	-19.35
ring_10_2	vqe	253	31	0	15	144	nan	-860	31	48	51	-64.52	-6.25
ring_10_2	wstate	253	135	0	42	156	nan	-271.43	135	153	90	33.33	41.18
ring_10_2	qaoa	285	34	291	51	141	51.55	-176.47	303	65	60	80.2	7.69
ring_10_2	qft	591	118	2034	384	504	75.22	-31.25	707	358	186	73.69	48.04
ring_10_2	qftentangled	608	122	2034	387	627	69.17	-62.02	711	445	216	69.62	51.46
ring_10_2	realamprandom	615	77	5427	1116	1332	75.46	-19.35	1879	568	302	83.93	46.83
ring_10_2	twolocalrandom	615	77	5427	1056	1332	75.46	-26.14	1879	555	302	83.93	45.59
ring_10_2	su2random	675	81	5427	1074	1338	75.35	-24.58	1922	596	305	84.13	48.83
ring_10_2	qnn	914	158	3576	684	1122	68.62	-64.04	1356	549	351	74.12	36.07
ring_10_2	portfolioqaoa	1260	192	5427	996	1701	68.66	-70.78	2060	678	534	74.08	21.24
ring_10_2	portfoliovqe	2505	327	5427	1125	1593	70.65	-41.6	2195	1049	536	75.58	48.9
ring_10_2	random	2542	581	2127	1050	1407	33.85	-34	2042	1105	580	71.6	47.51
ring_5_4	ghz	17	17	0	3	63	nan	-2000	17	20	33	-94.12	-65
ring_5_4	dj	118	22	153	24	27	82.35	-12.5	111	49	35	68.47	28.57
ring_5_4	graphstate	150	31	75	24	69	8	-187.5	92	56	36	60.87	35.71
ring_5_4	vqe	253	31	0	3	nan	nan	nan	31	40	nan	nan	nan
ring_5_4	wstate	253	135	0	3	117	nan	-3800	135	138	102	24.44	26.09
ring_5_4	qaoa	285	34	168	48	102	39.29	-112.5	234	78	48	79.49	38.46
ring_5_4	qft	591	118	636	294	nan	nan	nan	422	310	nan	nan	nan
ring_5_4	qftentangled	608	122	636	312	nan	nan	nan	426	319	nan	nan	nan
ring_5_4	realamprandom	615	77	2544	717	nan	nan	nan	1683	457	nan	nan	nan
ring_5_4	twolocalrandom	615	77	2544	711	nan	nan	nan	1683	524	nan	nan	nan
ring_5_4	su2random	675	81	2544	744	nan	nan	nan	1709	522	nan	nan	nan
ring_5_4	qnn	914	158	1767	447	nan	nan	nan	1319	492	nan	nan	nan
ring_5_4	portfolioqaoa	1260	192	2550	684	nan	nan	nan	2020	656	nan	nan	nan
ring_5_4	portfoliovqe	2505	327	2544	783	nan	nan	nan	2033	916	nan	nan	nan
ring_5_4	random	2542	581	2646	1515	nan	nan	nan	2874	1826	nan	nan	nan
ring_7_3	ghz	17	17	0	39	84	nan	-115.38	17	50	28	-64.71	44
ring_7_3	dj	118	22	168	51	42	75	17.65	116	73	29	75	60.27
ring_7_3	graphstate	150	31	54	24	90	-66.67	-275	61	35	36	40.98	-2.86
ring_7_3	vqe	253	31	0	30	nan	nan	nan	31	70	nan	nan	nan
ring_7_3	wstate	253	135	0	27	108	nan	-300	135	150	81	40	46
ring_7_3	qaoa	285	34	228	42	177	22.37	-321.43	267	65	71	73.41	-9.23
ring_7_3	qft	591	118	1158	333	nan	nan	nan	633	380	nan	nan	nan
ring_7_3	qftentangled	608	122	1158	366	nan	nan	nan	637	407	nan	nan	nan
ring_7_3	realamprandom	615	77	2679	963	1224	54.31	-27.1	1444	612	319	77.91	47.88
ring_7_3	twolocalrandom	615	77	2679	960	1224	54.31	-27.5	1444	686	319	77.91	53.5
ring_7_3	su2random	675	81	2679	1020	nan	nan	nan	1487	684	nan	nan	nan
ring_7_3	qnn	914	158	1920	633	nan	nan	nan	1233	540	nan	nan	nan
ring_7_3	portfolioqaoa	1260	192	2679	882	nan	nan	nan	1862	804	nan	nan	nan
ring_7_3	portfoliovqe	2505	327	2679	987	0	100	100	2156	1067	327	84.83	69.35
ring_7_3	random	2542	581	1737	924	nan	nan	nan	1888	1242	nan	nan	nan
t_horizontal_5_4	ghz	17	17	27	18	36	-33.33	-100	44	32	28	36.36	12.5
t_horizontal_5_4	dj	118	22	384	33	27	92.97	18.18	137	70	40	70.8	42.86
t_horizontal_5_4	graphstate	150	31	90	27	111	-23.33	-311.11	72	32	42	41.67	-31.25
t_horizontal_5_4	vqe	253	31	63	3	51	19.05	-1600	79	40	47	40.51	-17.5
t_horizontal_5_4	wstate	253	135	63	3	42	33.33	-1300	166	135	117	29.52	13.33
t_horizontal_5_4	qaoa	285	34	348	60	207	40.52	-245	337	65	66	80.42	-1.54
t_horizontal_5_4	qft	591	118	1842	420	519	71.82	-23.57	729	278	170	76.68	38.85
t_horizontal_5_4	qftentangled	608	122	1788	408	543	69.63	-33.09	698	375	177	74.64	52.8
t_horizontal_5_4	realamprandom	615	77	5859	1020	1020	82.59	0	1927	599	234	87.86	60.93
t_horizontal_5_4	twolocalrandom	615	77	5859	879	1020	82.59	-16.04	1927	430	234	87.86	45.58
t_horizontal_5_4	su2random	675	81	5859	975	1020	82.59	-4.62	1970	514	237	87.97	53.89
t_horizontal_5_4	qnn	914	158	4041	594	1065	73.65	-79.29	1458	427	355	75.65	16.86
t_horizontal_5_4	portfolioqaoa	1260	192	5859	849	1359	76.8	-60.07	2156	650	420	80.52	35.38
t_horizontal_5_4	portfoliovqe	2505	327	5859	963	1047	82.13	-8.72	2288	809	431	81.16	46.72
t_horizontal_5_4	random	2542	581	2613	1422	1815	30.54	-27.64	2408	1155	644	73.26	44.24
t_vertical_5_4	ghz	17	17	45	15	54	-20	-260	62	32	29	53.23	9.38
t_vertical_5_4	dj	118	22	318	36	27	91.51	25	131	73	38	70.99	47.95
t_vertical_5_4	graphstate	150	31	78	24	120	-53.85	-400	68	39	49	27.94	-25.64

Continued on next page

Table 3: Additional swap gates and circuit depth, n = 15

layout	benchmark	g	d	s_B	s_S	s_L	Δs_B	Δs_S	d_B	d_S	d_L	Δd_B	Δd_S
t_vertical_5_4	vqe	253	31	150	36	99	34	-175	94	77	48	48.94	37.66
t_vertical_5_4	wstate	253	135	126	15	84	33.33	-460	200	147	97	51.5	34.01
t_vertical_5_4	qaoa	285	34	336	66	171	49.11	-159.09	351	57	68	80.63	-19.3
t_vertical_5_4	qft	591	118	1680	369	615	63.39	-66.67	642	327	222	65.42	32.11
t_vertical_5_4	qftentangled	608	122	1764	408	621	64.8	-52.21	653	382	234	64.17	38.74
t_vertical_5_4	realamprandom	615	77	5304	1044	1098	79.3	-5.17	1919	565	261	86.4	53.81
t_vertical_5_4	twolocalrandom	615	77	5304	1059	1098	79.3	-3.68	1919	596	261	86.4	56.21
t_vertical_5_4	su2random	675	81	5304	1041	1098	79.3	-5.48	1962	604	265	86.49	56.13
t_vertical_5_4	qnn	914	158	3669	618	1077	70.65	-74.27	1449	547	344	76.26	37.11
t_vertical_5_4	portfolioqaoa	1260	192	5304	822	1440	72.85	-75.18	2150	664	430	80	35.24
t_vertical_5_4	portfoliovqe	2505	327	5304	1014	1251	76.41	-23.37	2280	881	456	80	48.24
t_vertical_5_4	random	2542	581	2475	1239	1800	27.27	-45.28	2366	1243	658	72.19	47.06