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Article

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Online-Appendix zu

„Cost Allocation in Vehicle Routing Problems with Time Windows“

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Junior Management Science 9(1) (2024) 1241-1268

1 Cost allocation to customers in Solomon instances in a collaborative scenario

Instance	Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
R101.50	1	41	49	10	161	171	10	C	6.56	8.10	7.47
R101.50	2	35	17	7	50	60	10	A	16.14	24.43	19.31
R101.50	3	55	45	13	116	126	10	C	16.13	41.48	14.15
R101.50	4	55	20	19	149	159	10	A	18.20	22.39	20.18
R101.50	5	15	30	26	34	44	10	C	14.61	10.09	10.68
R101.50	6	25	30	3	99	109	10	C	10.36	11.17	9.02
R101.50	7	20	50	5	81	91	10	B	20.53	17.08	13.27
R101.50	8	10	43	9	95	105	10	C	18.44	19.20	23.19
R101.50	9	55	60	16	97	107	10	B	17.84	41.63	18.32
R101.50	10	30	60	16	124	134	10	A	27.66	23.26	14.61
R101.50	11	20	65	12	67	77	10	C	28.62	34.21	26.96
R101.50	12	50	35	19	63	73	10	A	13.70	17.19	14.94
R101.50	13	30	25	23	159	169	10	C	2.54	4.19	10.14
R101.50	14	15	10	20	32	42	10	B	20.46	35.86	29.14
R101.50	15	30	5	8	61	71	10	A	28.44	39.12	38.73
R101.50	16	10	20	19	75	85	10	B	28.64	28.32	33.08
R101.50	17	5	30	2	157	167	10	B	20.40	22.59	27.68
R101.50	18	20	40	12	87	97	10	A	20.05	22.82	16.65

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R101.50	19	15	60	17	76	86	10	A	17.64	26.57	26.40
R101.50	20	45	65	9	126	136	10	C	35.85	31.45	26.37
R101.50	21	45	20	11	62	72	10	B	14.25	21.86	14.88
R101.50	22	45	10	18	97	107	10	A	21.93	17.12	24.18
R101.50	23	55	5	29	68	78	10	B	29.00	48.40	35.74
R101.50	24	65	35	3	153	163	10	A	30.31	37.83	26.31
R101.50	25	65	20	6	172	182	10	B	25.03	33.46	30.74
R101.50	26	45	30	17	132	142	10	A	8.28	9.56	7.63
R101.50	27	35	40	16	37	47	10	A	1.90	5.25	2.08
R101.50	28	41	37	16	39	49	10	B	2.28	3.36	4.18
R101.50	29	64	42	9	63	73	10	B	25.54	38.92	26.66
R101.50	30	40	60	21	71	81	10	C	16.45	16.52	12.24
R101.50	31	31	52	27	50	60	10	B	9.21	24.64	10.74
R101.50	32	35	69	23	141	151	10	C	25.10	34.75	30.09
R101.50	33	53	52	11	37	47	10	A	13.34	21.03	15.72
R101.50	34	65	55	14	117	127	10	C	27.42	65.70	31.14
R101.50	35	63	65	8	143	153	10	A	43.12	62.28	42.46
R101.50	36	2	60	5	41	51	10	A	31.00	45.16	37.22
R101.50	37	20	20	8	134	144	10	C	12.51	22.07	16.33

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
R101.50	38	5	5	16	83	93	10	46.20	37.18	60.52
R101.50	39	60	12	31	44	54	10	23.71	47.41	25.33
R101.50	40	40	25	9	85	95	10	9.44	11.13	12.38
R101.50	41	42	7	5	97	107	10	25.21	27.51	26.08
R101.50	42	24	12	5	31	41	10	13.48	19.19	20.67
R101.50	43	23	3	7	132	142	10	25.66	41.97	35.34
R101.50	44	11	14	18	69	79	10	14.67	18.01	24.81
R101.50	45	6	38	16	32	42	10	24.13	26.24	18.11
R101.50	46	2	48	1	117	127	10	26.04	31.19	36.09
R101.50	47	8	56	27	51	61	10	19.78	30.58	19.02
R101.50	48	13	52	36	165	175	10	11.23	16.95	17.74
R101.50	49	6	68	30	108	118	10	44.82	47.25	42.01
R101.50	50	47	47	13	124	134	10	15.90	20.99	18.38
R201.50	1	41	49	10	707	848	10	7.28	12.73	7.98
R201.50	2	35	17	7	143	282	10	6.53	9.52	9.77
R201.50	3	55	45	13	527	584	10	11.44	14.24	18.29
R201.50	4	55	20	19	678	801	10	14.79	30.86	17.51
R201.50	5	15	30	26	34	209	10	8.55	15.14	13.01
R201.50	6	25	30	3	415	514	10	13.54	11.80	11.29

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R201.50	7	20	50	5	331	410	10	B	13.01	13.43	15.27
R201.50	8	10	43	9	404	481	10	B	17.85	21.05	21.62
R201.50	9	55	60	16	400	497	10	A	19.95	23.38	28.72
R201.50	10	30	60	16	577	632	10	B	18.12	26.52	17.40
R201.50	11	20	65	12	206	325	10	C	16.68	30.88	17.89
R201.50	12	50	35	19	228	345	10	C	10.37	7.95	10.16
R201.50	13	30	25	23	690	827	10	A	4.61	9.56	8.04
R201.50	14	15	10	20	32	243	10	B	10.58	34.05	17.84
R201.50	15	30	5	8	175	300	10	B	16.35	19.66	18.21
R201.50	16	10	20	19	272	373	10	A	13.95	15.61	28.22
R201.50	17	5	30	2	733	870	10	B	26.37	33.21	31.78
R201.50	18	20	40	12	377	434	10	C	10.88	17.32	9.32
R201.50	19	15	60	17	269	378	10	A	11.66	33.54	16.61
R201.50	20	45	65	9	581	666	10	A	18.24	17.33	21.04
R201.50	21	45	20	11	214	331	10	B	12.21	14.36	12.74
R201.50	22	45	10	18	409	494	10	C	11.26	38.80	16.01
R201.50	23	55	5	29	206	325	10	A	20.81	49.46	27.92
R201.50	24	65	35	3	704	847	10	C	17.26	35.93	21.82
R201.50	25	65	20	6	817	956	10	B	24.06	39.97	29.58

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R201.50	26	45	30	17	588	667	10	B	8.54	11.71	10.82
R201.50	27	35	40	16	104	255	10	A	1.61	2.90	1.96
R201.50	28	41	37	16	114	255	10	C	1.85	2.31	2.52
R201.50	29	64	42	9	190	313	10	C	21.61	24.66	19.55
R201.50	30	40	60	21	259	354	10	A	18.70	15.16	15.37
R201.50	31	31	52	27	152	275	10	B	10.62	11.13	9.43
R201.50	32	35	69	23	660	777	10	A	24.26	29.78	26.08
R201.50	33	53	52	11	45	200	10	B	18.03	28.53	17.36
R201.50	34	65	55	14	529	614	10	A	19.33	34.41	26.06
R201.50	35	63	65	8	686	813	10	B	33.22	60.62	40.32
R201.50	36	2	60	5	41	208	10	C	22.27	30.08	32.64
R201.50	37	20	20	8	606	693	10	C	10.92	13.65	13.41
R201.50	38	5	5	16	302	405	10	A	25.44	41.91	46.89
R201.50	39	60	12	31	33	224	10	B	28.68	34.70	28.37
R201.50	40	40	25	9	360	437	10	A	8.92	9.45	12.04
R201.50	41	42	7	5	396	511	10	B	15.85	24.64	17.15
R201.50	42	24	12	5	25	172	10	A	11.32	20.06	11.47
R201.50	43	23	3	7	620	705	10	C	28.52	30.56	31.73
R201.50	44	11	14	18	233	340	10	C	10.38	34.01	10.55

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R201.50	45	6	38	16	29	189	10	C	16.26	18.81	24.74
R201.50	46	2	48	1	515	628	10	A	22.51	45.48	31.47
R201.50	47	8	56	27	85	250	10	C	13.14	19.60	22.39
R201.50	48	13	52	36	773	906	10	B	17.82	19.24	24.42
R201.50	49	6	68	30	501	540	10	B	36.27	44.45	39.93
R201.50	50	47	47	13	547	642	10	C	8.88	13.16	10.87
C101.50	1	45	68	10	912	967	90	A	4.59	15.61	6.33
C101.50	2	45	70	30	825	870	90	C	6.55	11.45	12.12
C101.50	3	42	66	10	65	146	90	A	5.22	7.49	8.83
C101.50	4	42	68	10	727	782	90	C	3.38	7.75	8.49
C101.50	5	42	65	10	15	67	90	A	3.85	6.44	7.85
C101.50	6	40	69	20	621	702	90	B	4.40	11.62	10.67
C101.50	7	40	66	20	170	225	90	B	4.48	13.97	6.46
C101.50	8	38	68	20	255	324	90	C	5.18	12.45	8.40
C101.50	9	38	70	10	534	605	90	A	5.80	12.38	15.61
C101.50	10	35	66	10	357	410	90	C	7.06	9.19	9.69
C101.50	11	35	69	10	448	505	90	B	6.85	16.85	8.48
C101.50	12	25	85	20	652	721	90	C	15.07	22.92	33.52
C101.50	13	22	75	30	30	92	90	B	8.87	16.77	18.74

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
C101.50	14	22	85	10	567	620	90	B	13.81	42.00	16.33
C101.50	15	20	80	40	384	429	90	A	10.53	24.50	17.34
C101.50	16	20	85	40	475	528	90	C	13.62	27.18	25.74
C101.50	17	18	75	20	99	148	90	C	9.62	30.56	16.71
C101.50	18	15	75	20	179	254	90	B	11.92	27.20	18.25
C101.50	19	15	80	10	278	345	90	A	13.47	30.91	20.96
C101.50	20	30	50	10	10	73	90	C	1.84	5.41	2.72
C101.50	21	30	52	20	914	965	90	B	1.03	2.64	2.59
C101.50	22	28	52	20	812	883	90	C	2.12	4.38	4.01
C101.50	23	28	55	10	732	777	90	B	3.44	4.28	7.53
C101.50	24	25	50	10	65	144	90	A	4.88	9.01	7.87
C101.50	25	25	52	40	169	224	90	A	4.67	8.01	9.28
C101.50	26	25	55	10	622	701	90	A	3.33	15.44	5.48
C101.50	27	23	52	10	261	316	90	B	5.89	6.41	13.62
C101.50	28	23	55	20	546	593	90	C	5.31	17.60	9.42
C101.50	29	20	50	10	358	405	90	B	9.80	9.74	15.90
C101.50	30	20	55	10	449	504	90	B	8.37	16.51	13.63
C101.50	31	10	35	20	200	237	90	C	11.65	17.75	22.35
C101.50	32	10	40	30	31	100	90	C	8.56	14.58	23.60

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
C101.50	33	8	40	87	158	90	C	9.01	15.15	24.65
C101.50	34	8	20	751	816	90	C	7.52	30.14	13.24
C101.50	35	5	10	283	344	90	A	10.87	30.84	13.87
C101.50	36	5	10	665	716	90	A	8.82	24.49	21.51
C101.50	37	2	20	383	434	90	C	9.75	23.82	16.66
C101.50	38	0	30	479	522	90	B	12.92	52.75	19.22
C101.50	39	0	20	567	624	90	A	13.36	24.20	25.31
C101.50	40	35	10	264	321	90	A	7.89	16.39	10.23
C101.50	41	35	10	166	235	90	B	6.73	9.14	9.12
C101.50	42	33	20	68	149	90	A	6.14	10.27	7.68
C101.50	43	33	10	16	80	90	B	3.75	7.16	6.60
C101.50	44	32	10	359	412	90	B	6.16	12.65	8.24
C101.50	45	30	10	541	600	90	A	7.18	16.14	13.46
C101.50	46	30	30	448	509	90	C	6.45	17.98	10.12
C101.50	47	30	10	1054	1127	90	B	3.77	8.05	6.91
C101.50	48	28	10	632	693	90	C	6.73	18.94	10.37
C101.50	49	28	10	1001	1066	90	A	3.65	10.33	6.12
C101.50	50	26	10	815	880	90	B	5.25	12.04	10.14
C201.50	1	52	10	311	471	90	C	11.08	18.27	21.04

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
C201.50	2	45	70	30	213	373	90	C	5.92	11.39	13.14
C201.50	3	62	69	10	1167	1327	90	C	16.02	30.58	20.52
C201.50	4	60	66	10	1261	1421	90	A	11.64	22.45	17.66
C201.50	5	42	65	10	25	185	90	A	4.44	11.67	6.20
C201.50	6	16	42	20	497	657	90	B	3.11	7.16	8.58
C201.50	7	58	70	20	1073	1233	90	A	12.07	23.39	16.13
C201.50	8	34	60	20	2887	3047	90	A	1.47	6.94	3.51
C201.50	9	28	70	10	2601	2761	90	A	3.59	19.61	7.16
C201.50	10	35	66	10	2791	2951	90	C	3.23	6.66	6.11
C201.50	11	35	69	10	2698	2858	90	B	5.21	12.16	7.00
C201.50	12	25	85	20	2119	2279	90	C	12.38	25.87	14.39
C201.50	13	22	75	30	2405	2565	90	B	5.69	8.11	10.57
C201.50	14	22	85	10	2026	2186	90	B	9.01	15.96	17.52
C201.50	15	20	80	40	2216	2376	90	C	6.48	19.25	11.37
C201.50	16	20	85	40	1934	2094	90	B	9.59	15.48	19.76
C201.50	17	18	75	20	2311	2471	90	C	7.63	18.55	9.79
C201.50	18	15	75	20	1742	1902	90	B	5.54	8.71	16.17
C201.50	19	15	80	10	1837	1997	90	B	8.06	12.13	20.24
C201.50	20	30	50	10	10	170	90	A	0.85	2.20	1.56

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
C201.50	21	30	56	2983	3143	90	B	5.30	5.35	6.28
C201.50	22	28	52	22	182	90	A	0.67	3.04	2.57
C201.50	23	14	66	1643	1803	90	A	5.40	20.97	7.02
C201.50	24	25	50	116	276	90	C	1.38	4.86	2.74
C201.50	25	22	66	2504	2664	90	B	8.69	9.74	9.26
C201.50	26	8	62	1545	1705	90	B	5.83	8.35	16.04
C201.50	27	23	52	209	369	90	A	1.48	4.01	3.79
C201.50	28	4	55	1447	1607	90	A	6.65	19.79	10.03
C201.50	29	20	50	398	558	90	B	1.80	6.56	4.08
C201.50	30	20	55	303	463	90	C	6.59	12.23	7.20
C201.50	31	10	35	781	941	90	C	8.88	16.54	15.46
C201.50	32	10	40	593	753	90	B	3.99	9.82	11.38
C201.50	33	8	40	685	845	90	B	5.32	10.96	12.75
C201.50	34	8	45	1346	1506	90	A	7.09	14.45	9.74
C201.50	35	5	35	876	1036	90	C	8.22	19.50	15.30
C201.50	36	5	45	1253	1413	90	A	5.86	18.35	10.14
C201.50	37	2	40	971	1131	90	C	6.05	19.15	13.08
C201.50	38	0	40	1063	1223	90	B	8.78	21.64	20.96
C201.50	39	0	45	1158	1318	90	C	8.39	30.21	14.29

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance	Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
C201.50	40	36	18	10	1819	1979	90	B	12.59	42.45	20.52
C201.50	41	35	32	10	2758	2918	90	B	5.14	13.98	6.70
C201.50	42	33	32	20	2666	2826	90	A	5.13	8.09	8.68
C201.50	43	33	35	10	2573	2733	90	B	3.85	11.75	6.24
C201.50	44	32	20	10	1913	2073	90	A	11.00	26.20	21.31
C201.50	45	30	30	10	2105	2265	90	A	4.27	8.88	12.49
C201.50	46	34	25	30	2009	2169	90	C	6.01	20.06	13.59
C201.50	47	30	35	10	2480	2640	90	A	4.28	6.81	9.44
C201.50	48	36	40	10	2856	3016	90	C	0.89	6.31	1.81
C201.50	49	48	20	10	967	1127	90	C	25.06	44.72	30.27
C201.50	50	26	32	10	2292	2452	90	A	7.52	9.82	13.60
RC101.50	1	25	85	20	145	175	10	A	12.26	30.34	29.10
RC101.50	2	22	75	30	50	80	10	A	13.82	27.92	9.91
RC101.50	3	22	85	10	109	139	10	C	17.37	21.68	30.94
RC101.50	4	20	80	40	141	171	10	A	9.32	23.56	14.95
RC101.50	5	20	85	20	41	71	10	C	22.42	24.05	27.04
RC101.50	6	18	75	20	95	125	10	B	14.90	27.50	21.07
RC101.50	7	15	75	20	79	109	10	C	18.16	22.63	14.31
RC101.50	8	15	80	10	91	121	10	B	17.38	37.96	28.60

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC101.50 9	10	35	20	91	121	10	A	14.26	14.85	19.73
RC101.50 10	10	40	30	119	149	10	A	11.28	28.96	13.49
RC101.50 11	8	40	40	59	89	10	A	20.25	15.75	16.46
RC101.50 12	8	45	20	64	94	10	C	20.07	21.82	15.43
RC101.50 13	5	35	10	142	172	10	B	16.03	30.33	15.06
RC101.50 14	5	45	10	35	65	10	C	8.03	19.95	17.93
RC101.50 15	2	40	20	58	88	10	C	20.97	32.04	14.97
RC101.50 16	0	40	20	72	102	10	A	25.93	24.86	25.48
RC101.50 17	0	45	20	149	179	10	B	20.67	29.03	33.59
RC101.50 18	44	5	20	87	117	10	B	22.82	20.39	22.84
RC101.50 19	42	10	40	72	102	10	B	17.95	12.48	20.34
RC101.50 20	42	15	10	122	152	10	B	10.20	15.31	17.11
RC101.50 21	40	5	10	67	97	10	B	20.83	19.30	26.54
RC101.50 22	40	15	40	92	122	10	C	16.51	32.89	19.94
RC101.50 23	38	5	30	65	95	10	C	22.50	59.35	27.19
RC101.50 24	38	15	10	148	178	10	A	15.96	36.03	11.29
RC101.50 25	35	5	20	154	184	10	A	26.67	47.66	26.35
RC101.50 26	95	30	30	115	145	10	A	32.06	72.06	34.99
RC101.50 27	95	35	20	62	92	10	C	38.67	62.78	34.94

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC101.50 28	92	30	10	62	92	10	A	27.24	28.96	25.16
RC101.50 29	90	35	10	67	97	10	B	24.14	44.10	26.95
RC101.50 30	88	30	10	74	104	10	C	20.18	54.35	24.56
RC101.50 31	88	35	20	61	91	10	A	21.82	27.49	23.32
RC101.50 32	87	30	10	131	161	10	B	17.69	33.40	25.55
RC101.50 33	85	25	10	51	81	10	A	25.03	28.94	26.12
RC101.50 34	85	35	30	111	141	10	B	13.22	35.48	20.24
RC101.50 35	67	85	20	139	169	10	C	20.65	23.08	28.23
RC101.50 36	65	85	40	43	73	10	A	23.46	68.11	27.03
RC101.50 37	65	82	10	124	154	10	C	15.72	15.61	19.17
RC101.50 38	62	80	30	75	105	10	C	15.20	22.71	17.17
RC101.50 39	60	80	10	37	67	10	B	12.77	17.43	14.49
RC101.50 40	60	85	30	85	115	10	B	18.07	33.99	17.92
RC101.50 41	58	75	20	92	122	10	B	16.08	20.45	19.02
RC101.50 42	55	80	10	33	63	10	B	11.70	14.35	10.98
RC101.50 43	55	85	20	128	158	10	C	19.46	19.55	25.56
RC101.50 44	55	82	10	64	94	10	C	17.06	19.36	20.21
RC101.50 45	20	82	10	37	67	10	C	17.14	19.34	13.12
RC101.50 46	18	80	10	113	143	10	C	14.09	16.71	26.30

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC101.50 47	2	45	10	45	75	10	A	13.90	21.02	23.89
RC101.50 48	42	5	10	151	181	10	A	23.87	45.41	21.01
RC101.50 49	42	12	10	104	134	10	B	10.51	13.28	17.62
RC101.50 50	72	35	30	116	146	10	A	26.30	46.03	15.58
RC201.50 1	25	85	20	673	793	10	B	17.76	22.99	21.04
RC201.50 2	22	75	30	152	272	10	B	6.76	11.73	15.15
RC201.50 3	22	85	10	471	591	10	C	15.58	25.58	17.93
RC201.50 4	20	80	40	644	764	10	B	11.78	15.18	16.03
RC201.50 5	20	85	20	73	193	10	B	17.67	26.12	22.58
RC201.50 6	18	75	20	388	508	10	B	9.57	14.42	16.38
RC201.50 7	15	75	20	300	420	10	B	8.29	18.91	15.44
RC201.50 8	15	80	10	367	487	10	C	14.19	29.01	20.02
RC201.50 9	10	35	20	371	491	10	C	14.47	18.28	17.38
RC201.50 10	10	40	30	519	639	10	A	13.24	28.32	15.14
RC201.50 11	8	40	40	195	315	10	A	7.38	16.18	14.52
RC201.50 12	8	45	20	223	343	10	A	10.43	16.09	13.44
RC201.50 13	5	35	10	653	773	10	C	17.28	22.45	23.97
RC201.50 14	5	45	10	35	155	10	A	6.73	20.74	17.39
RC201.50 15	2	40	20	174	294	10	C	10.68	17.20	23.85

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC201.50 16	0	40	20	255	375	10	C	9.70	22.28	20.51
RC201.50 17	0	45	20	703	823	10	B	23.12	50.01	26.01
RC201.50 18	44	5	20	335	455	10	A	15.13	28.75	28.94
RC201.50 19	42	10	40	254	374	10	A	10.58	20.84	17.58
RC201.50 20	42	15	10	537	657	10	B	8.23	19.03	16.43
RC201.50 21	40	5	10	215	335	10	B	13.72	34.27	19.45
RC201.50 22	40	15	40	375	495	10	A	11.38	20.33	18.44
RC201.50 23	38	5	30	201	321	10	C	13.51	57.91	22.02
RC201.50 24	38	15	10	681	801	10	A	9.68	16.80	16.90
RC201.50 25	35	5	20	784	904	10	A	21.42	32.57	30.41
RC201.50 26	95	30	30	529	649	10	B	23.02	61.39	30.31
RC201.50 27	95	35	20	146	266	10	A	18.50	55.99	28.34
RC201.50 28	92	30	10	149	269	10	C	13.57	36.32	25.49
RC201.50 29	90	35	10	194	314	10	C	10.67	32.24	26.31
RC201.50 30	88	30	10	246	366	10	B	8.72	32.17	25.19
RC201.50 31	88	35	20	165	285	10	B	9.84	31.19	18.33
RC201.50 32	87	30	10	621	741	10	C	30.92	42.68	32.01
RC201.50 33	85	25	10	80	200	10	C	16.03	28.82	28.43
RC201.50 34	85	35	30	487	607	10	A	12.20	58.84	25.63

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC201.50 35	67	85	20	657	777	10	B	18.02	43.48	24.98
RC201.50 36	65	85	40	43	163	10	A	19.43	32.74	26.66
RC201.50 37	65	82	10	557	677	10	C	11.86	30.51	20.43
RC201.50 38	62	80	30	278	398	10	C	10.48	20.63	20.19
RC201.50 39	60	80	10	64	184	10	C	9.32	16.26	15.30
RC201.50 40	60	85	30	329	449	10	A	16.49	30.62	15.09
RC201.50 41	58	75	20	376	496	10	B	11.07	39.98	14.86
RC201.50 42	55	80	10	33	153	10	C	7.30	15.75	12.34
RC201.50 43	55	85	20	574	694	10	A	16.26	33.30	26.50
RC201.50 44	55	82	10	217	337	10	A	10.52	20.55	15.14
RC201.50 45	20	82	10	37	157	10	C	15.76	24.98	17.85
RC201.50 46	18	80	10	489	609	10	A	10.85	48.92	17.65
RC201.50 47	2	45	10	105	225	10	A	10.84	21.07	16.90
RC201.50 48	42	5	10	732	852	10	B	17.98	30.78	24.13
RC201.50 49	42	12	10	440	560	10	B	9.32	23.29	13.18
RC201.50 50	72	35	30	507	627	10	C	20.51	30.31	21.14
R109.50 1	41	49	10	133	198	10	A	5.21	9.51	6.90
R109.50 2	35	17	7	22	87	10	C	8.67	13.81	9.82
R109.50 3	55	45	13	98	143	10	A	16.56	15.94	14.47

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R109.50	4	55	20	19	123	184	10	C	12.26	26.36	16.78
R109.50	5	15	30	26	20	93	10	A	9.13	13.01	10.18
R109.50	6	25	30	3	76	131	10	B	12.67	9.21	9.98
R109.50	7	20	50	5	61	110	10	B	14.90	14.65	14.04
R109.50	8	10	43	9	75	124	10	C	15.35	18.89	21.08
R109.50	9	55	60	16	74	129	10	A	17.59	25.25	15.86
R109.50	10	30	60	16	107	150	10	C	19.12	20.19	16.99
R109.50	11	20	65	12	42	101	10	B	18.43	29.24	23.13
R109.50	12	50	35	19	38	97	10	C	7.49	11.23	10.28
R109.50	13	30	25	23	131	196	10	B	3.88	3.60	7.11
R109.50	14	15	10	20	32	114	10	B	12.06	15.50	26.00
R109.50	15	30	5	8	35	96	10	A	19.10	26.99	18.23
R109.50	16	10	20	19	52	107	10	C	15.10	30.02	16.01
R109.50	17	5	30	2	124	189	10	C	23.91	23.12	29.84
R109.50	18	20	40	12	69	114	10	B	13.88	12.54	10.34
R109.50	19	15	60	17	52	109	10	A	12.71	20.51	19.28
R109.50	20	45	65	9	105	156	10	C	17.02	20.58	22.76
R109.50	21	45	20	11	37	96	10	B	9.10	14.95	10.69
R109.50	22	45	10	18	76	127	10	C	14.00	31.94	14.84

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
R109.50	23	55	5	29	43	102	10	24.04	36.15	23.24
R109.50	24	65	35	3	124	190	10	21.08	25.46	25.96
R109.50	25	65	20	6	121	186	10	21.50	26.58	32.91
R109.50	26	45	30	17	112	161	10	7.78	8.74	7.67
R109.50	27	35	40	16	8	75	10	1.48	2.84	2.17
R109.50	28	41	37	16	11	76	10	1.88	2.56	4.11
R109.50	29	64	42	9	37	98	10	20.07	41.44	20.78
R109.50	30	40	60	21	49	102	10	17.70	28.48	13.95
R109.50	31	31	52	27	24	85	10	6.47	12.02	9.54
R109.50	32	35	69	23	116	175	10	20.06	24.37	25.89
R109.50	33	53	52	11	24	92	10	11.34	13.38	16.18
R109.50	34	65	55	14	96	147	10	21.94	43.65	27.75
R109.50	35	63	65	8	116	178	10	32.72	36.01	32.29
R109.50	36	2	60	5	41	112	10	20.12	27.78	35.64
R109.50	37	20	20	8	113	164	10	9.55	21.86	11.04
R109.50	38	5	5	16	60	115	10	31.10	38.94	43.37
R109.50	39	60	12	31	33	110	10	20.51	27.16	22.72
R109.50	40	40	25	9	65	114	10	10.62	10.18	7.06
R109.50	41	42	7	5	72	131	10	16.07	20.99	17.45

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R109.50	42	24	12	5	25	91	10	A	11.91	18.98	11.58
R109.50	43	23	3	7	111	162	10	B	26.29	23.42	36.95
R109.50	44	11	14	18	45	102	10	B	12.12	17.08	23.27
R109.50	45	6	38	16	29	99	10	A	18.83	21.55	16.21
R109.50	46	2	48	1	92	151	10	C	19.70	26.04	22.98
R109.50	47	8	56	27	34	105	10	B	16.01	31.30	13.98
R109.50	48	13	52	36	128	192	10	C	14.01	21.01	13.53
R109.50	49	6	68	30	93	132	10	A	30.45	39.26	44.53
R109.50	50	47	47	13	102	155	10	B	11.36	13.33	12.16
R209.50	1	41	49	10	636	919	10	C	8.09	9.24	7.37
R209.50	2	35	17	7	74	351	10	C	9.79	15.81	10.41
R209.50	3	55	45	13	498	613	10	C	10.08	15.06	10.35
R209.50	4	55	20	19	470	965	10	A	12.37	18.07	14.32
R209.50	5	15	30	26	20	370	10	A	7.86	11.91	9.81
R209.50	6	25	30	3	266	663	10	B	4.90	7.16	6.39
R209.50	7	20	50	5	292	449	10	A	8.38	11.44	11.18
R209.50	8	10	43	9	288	597	10	A	8.41	9.73	13.99
R209.50	9	55	60	16	254	643	10	A	9.77	16.16	18.34
R209.50	10	30	60	16	496	713	10	C	10.21	11.91	14.36

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R209.50	11	20	65	12	33	510	10	B	11.58	19.11	19.86
R209.50	12	50	35	19	170	403	10	C	7.21	11.97	8.86
R209.50	13	30	25	23	426	978	10	B	7.12	10.91	6.19
R209.50	14	15	10	20	32	454	10	B	8.75	16.45	14.36
R209.50	15	30	5	8	30	529	10	C	11.61	30.94	14.03
R209.50	16	10	20	19	222	423	10	B	9.46	16.65	12.42
R209.50	17	5	30	2	409	959	10	C	14.85	24.65	15.56
R209.50	18	20	40	12	349	462	10	B	10.33	7.09	9.38
R209.50	19	15	60	17	215	432	10	B	10.85	21.42	14.12
R209.50	20	45	65	9	538	709	10	A	11.45	21.32	15.92
R209.50	21	45	20	11	156	389	10	B	8.67	11.61	12.36
R209.50	22	45	10	18	280	623	10	A	7.79	14.58	11.58
R209.50	23	55	5	29	36	513	10	A	19.54	28.31	26.81
R209.50	24	65	35	3	633	918	10	C	23.19	31.91	22.27
R209.50	25	65	20	6	400	956	10	B	16.50	35.94	21.01
R209.50	26	45	30	17	548	707	10	B	6.77	8.00	8.54
R209.50	27	35	40	16	5	612	10	A	1.57	1.67	1.81
R209.50	28	41	37	16	44	325	10	A	2.98	7.61	4.58
R209.50	29	64	42	9	129	374	10	B	21.56	33.25	21.09

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
R209.50	30	40	60	21	498	10	C	15.64	18.93	14.70
R209.50	31	31	52	27	336	10	C	8.58	10.69	8.68
R209.50	32	35	69	23	835	10	B	19.54	39.28	24.51
R209.50	33	53	52	11	646	10	B	6.63	15.03	10.80
R209.50	34	65	55	14	656	10	A	15.33	25.21	23.28
R209.50	35	63	65	8	948	10	C	20.98	38.01	24.43
R209.50	36	2	60	5	710	10	A	12.12	30.93	20.30
R209.50	37	20	20	8	736	10	C	9.57	21.41	11.89
R209.50	38	5	5	16	560	10	B	22.67	30.90	30.82
R209.50	39	60	12	31	797	10	C	12.43	31.63	18.89
R209.50	40	40	25	9	554	10	B	4.94	4.70	6.42
R209.50	41	42	7	5	682	10	B	9.37	17.12	13.84
R209.50	42	24	12	5	616	10	A	4.81	12.68	8.82
R209.50	43	23	3	7	747	10	B	23.91	30.75	26.65
R209.50	44	11	14	18	501	10	A	8.18	20.71	11.33
R209.50	45	6	38	16	669	10	A	6.12	13.46	12.71
R209.50	46	2	48	1	685	10	C	16.52	19.96	30.53
R209.50	47	8	56	27	362	10	A	12.76	17.63	25.23
R209.50	48	13	52	36	962	10	C	21.39	20.49	25.64

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
R209.50	49	6	68	30	444	597	10	C	21.68	41.06	34.71
R209.50	50	47	47	13	499	690	10	A	6.43	7.26	7.86
C108.50	1	45	68	10	830	1049	90	A	5.28	12.91	13.18
C108.50	2	45	70	30	756	939	90	C	7.54	11.71	14.89
C108.50	3	42	66	10	16	336	90	A	5.01	7.65	9.62
C108.50	4	42	68	10	643	866	90	C	4.02	8.08	10.08
C108.50	5	42	65	10	15	226	90	A	4.21	7.63	8.78
C108.50	6	40	69	20	499	824	90	B	4.05	12.22	7.07
C108.50	7	40	66	20	87	308	90	B	3.86	9.92	7.69
C108.50	8	38	68	20	150	429	90	C	4.89	12.90	5.46
C108.50	9	38	70	10	429	710	90	A	3.57	11.48	8.58
C108.50	10	35	66	10	279	488	90	C	7.04	9.94	7.50
C108.50	11	35	69	10	363	590	90	B	7.45	19.18	7.13
C108.50	12	25	85	20	547	826	90	C	13.53	25.59	23.97
C108.50	13	22	75	30	30	280	90	B	9.21	17.87	17.22
C108.50	14	22	85	10	489	698	90	B	12.48	39.09	24.17
C108.50	15	20	80	40	318	495	90	A	10.24	24.71	20.37
C108.50	16	20	85	40	394	609	90	C	13.29	27.87	18.17
C108.50	17	18	75	20	33	226	90	C	11.04	30.55	21.53

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
C108.50	18	15	75	20	68	365	90	12.41	25.05	21.06
C108.50	19	15	80	10	176	447	90	12.37	27.58	23.91
C108.50	20	30	50	10	10	265	90	1.86	2.34	2.93
C108.50	21	30	52	20	836	1043	90	1.43	2.86	2.93
C108.50	22	28	52	20	704	991	90	2.61	4.23	3.94
C108.50	23	28	55	10	664	845	90	3.57	4.27	5.01
C108.50	24	25	50	10	15	333	90	3.39	6.69	5.19
C108.50	25	25	52	40	88	305	90	3.63	7.38	5.88
C108.50	26	25	55	10	502	821	90	2.91	8.41	4.33
C108.50	27	23	52	10	179	398	90	4.72	6.76	5.46
C108.50	28	23	55	20	476	663	90	5.03	12.69	7.42
C108.50	29	20	50	10	288	475	90	9.71	8.92	9.87
C108.50	30	20	55	10	368	585	90	8.50	9.98	10.97
C108.50	31	10	35	20	144	293	90	13.46	15.17	15.82
C108.50	32	10	40	30	31	309	90	9.20	10.23	13.99
C108.50	33	8	40	40	33	313	90	9.74	11.46	14.07
C108.50	34	8	45	20	655	912	90	8.42	22.79	17.57
C108.50	35	5	35	10	191	436	90	10.77	30.51	19.77
C108.50	36	5	45	10	588	793	90	9.35	20.84	15.18

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
C108.50	37	2	40	20	305	512	90	8.97	19.84	19.24
C108.50	38	0	40	30	414	587	90	12.26	46.78	21.64
C108.50	39	0	45	20	481	710	90	13.24	24.01	21.57
C108.50	40	35	30	10	180	405	90	7.59	11.74	11.46
C108.50	41	35	32	10	63	338	90	5.16	9.80	8.22
C108.50	42	33	32	20	19	345	90	4.82	8.51	8.27
C108.50	43	33	35	10	16	273	90	4.19	7.32	7.60
C108.50	44	32	30	10	278	493	90	6.12	14.09	13.04
C108.50	45	30	30	10	453	688	90	6.27	13.66	15.77
C108.50	46	30	32	30	355	602	90	5.35	20.48	12.12
C108.50	47	30	35	10	837	1127	90	3.47	10.03	7.15
C108.50	48	28	30	10	539	786	90	5.39	16.27	11.67
C108.50	49	28	35	10	867	1126	90	3.37	10.86	6.69
C108.50	50	26	32	10	719	976	90	4.99	14.45	12.11
C208.50	1	52	75	10	71	711	90	12.38	18.87	27.78
C208.50	2	45	70	30	20	660	90	6.69	11.94	19.63
C208.50	3	62	69	10	927	1567	90	15.15	26.59	17.95
C208.50	4	60	66	10	1021	1661	90	10.88	25.39	20.24
C208.50	5	42	65	10	15	655	90	5.06	14.76	13.18

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
C208.50	6	16	42	20	257	897	90	B	3.34	6.78	5.20
C208.50	7	58	70	20	833	1473	90	A	9.84	25.17	23.50
C208.50	8	34	60	20	2647	3287	90	A	2.14	7.80	0.72
C208.50	9	28	70	10	2361	3001	90	A	4.11	22.18	4.95
C208.50	10	35	66	10	2551	3191	90	C	3.92	6.23	6.47
C208.50	11	35	69	10	2458	3098	90	B	5.58	12.53	9.24
C208.50	12	25	85	20	1879	2519	90	C	11.17	23.03	16.83
C208.50	13	22	75	30	2165	2805	90	B	5.50	8.69	4.93
C208.50	14	22	85	10	1786	2426	90	B	9.01	15.59	16.31
C208.50	15	20	80	40	1976	2616	90	C	6.79	18.26	7.84
C208.50	16	20	85	40	1694	2334	90	B	10.13	16.08	11.02
C208.50	17	18	75	20	2071	2711	90	C	5.73	16.56	8.66
C208.50	18	15	75	20	1502	2142	90	B	6.30	10.05	10.90
C208.50	19	15	80	10	1597	2237	90	B	8.89	11.78	14.08
C208.50	20	30	50	10	10	650	90	A	1.36	2.73	-0.63
C208.50	21	30	56	20	2648	3288	90	B	4.98	4.49	2.66
C208.50	22	28	52	20	12	652	90	A	1.00	3.29	2.93
C208.50	23	14	66	10	1403	2043	90	A	5.66	19.90	5.00
C208.50	24	25	50	10	15	655	90	C	1.87	5.65	2.92

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
C208.50	25	22	66	40	2264	2904	90	B	8.75	10.02	8.67
C208.50	26	8	62	10	1305	1945	90	B	6.49	1.55	4.80
C208.50	27	23	52	10	17	657	90	A	1.61	4.62	4.13
C208.50	28	4	55	20	1207	1847	90	A	6.51	17.94	8.66
C208.50	29	20	50	10	158	798	90	B	2.35	5.96	5.23
C208.50	30	20	55	10	63	703	90	C	6.89	9.63	6.97
C208.50	31	10	35	20	541	1181	90	C	8.68	15.32	12.44
C208.50	32	10	40	30	353	993	90	B	4.49	10.24	11.83
C208.50	33	8	40	40	445	1085	90	B	5.34	10.39	11.98
C208.50	34	8	45	20	1106	1746	90	A	6.68	12.37	8.02
C208.50	35	5	35	10	636	1276	90	C	9.20	19.24	12.62
C208.50	36	5	45	10	1013	1653	90	A	5.84	15.75	9.81
C208.50	37	2	40	20	731	1371	90	C	7.10	19.31	17.58
C208.50	38	0	40	30	823	1463	90	B	9.66	20.51	22.25
C208.50	39	0	45	20	918	1558	90	C	8.70	21.74	21.75
C208.50	40	36	18	10	1579	2219	90	B	13.09	44.63	25.88
C208.50	41	35	32	10	2518	3158	90	B	6.02	14.28	6.88
C208.50	42	33	32	20	2426	3066	90	A	5.39	8.09	6.07
C208.50	43	33	35	10	2333	2973	90	B	3.69	11.29	7.15

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost	
C208.50	44	32	20	10	1673	2313	90	A	12.07	26.49	23.29
C208.50	45	30	30	10	1865	2505	90	A	5.64	8.99	8.31
C208.50	46	34	25	30	1769	2409	90	C	7.55	19.96	16.10
C208.50	47	30	35	10	2240	2880	90	A	5.45	7.64	7.51
C208.50	48	36	40	10	2616	3256	90	C	0.98	6.29	4.09
C208.50	49	48	20	10	727	1367	90	C	19.73	38.88	31.05
C208.50	50	26	32	10	2052	2692	90	A	9.14	8.68	5.87
RC108.50	1	25	85	20	49	191	10	A	9.64	28.16	14.25
RC108.50	2	22	75	30	30	168	10	A	5.27	16.44	11.27
RC108.50	3	22	85	10	95	152	10	C	11.11	16.99	18.36
RC108.50	4	20	80	40	69	193	10	A	8.00	21.75	14.26
RC108.50	5	20	85	20	40	189	10	C	10.11	16.11	16.56
RC108.50	6	18	75	20	60	159	10	B	8.04	24.90	12.57
RC108.50	7	15	75	20	54	133	10	C	10.59	14.49	14.49
RC108.50	8	15	80	10	67	144	10	B	12.65	34.38	15.71
RC108.50	9	10	35	20	57	154	10	A	11.97	15.11	14.62
RC108.50	10	10	40	30	106	161	10	A	11.48	16.75	22.47
RC108.50	11	8	40	40	33	152	10	A	8.61	11.61	11.57
RC108.50	12	8	45	20	32	148	10	C	7.96	15.34	10.37

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC108.50 13	5	35	10	53	191	10	B	11.74	32.59	20.47
RC108.50 14	5	45	10	35	194	10	C	8.01	16.85	16.80
RC108.50 15	2	40	20	39	163	10	C	10.11	27.26	13.85
RC108.50 16	0	40	20	41	141	10	A	13.56	23.18	22.86
RC108.50 17	0	45	20	51	189	10	B	12.39	32.23	17.69
RC108.50 18	44	5	20	73	130	10	B	13.15	22.09	18.37
RC108.50 19	42	10	40	40	148	10	B	7.33	13.75	15.33
RC108.50 20	42	15	10	94	179	10	B	7.90	15.09	13.50
RC108.50 21	40	5	10	45	161	10	B	9.21	20.56	22.95
RC108.50 22	40	15	40	64	149	10	C	8.08	30.45	13.79
RC108.50 23	38	5	30	45	164	10	C	10.21	47.18	22.25
RC108.50 24	38	15	10	51	194	10	A	6.61	21.32	14.85
RC108.50 25	35	5	20	45	183	10	A	13.43	34.17	24.85
RC108.50 26	95	30	30	90	169	10	A	23.77	34.22	31.73
RC108.50 27	95	35	20	57	172	10	C	22.89	50.72	28.71
RC108.50 28	92	30	10	55	174	10	A	18.51	26.05	19.42
RC108.50 29	90	35	10	52	174	10	B	16.96	31.78	19.30
RC108.50 30	88	30	10	52	147	10	C	16.98	40.09	21.00
RC108.50 31	88	35	20	50	172	10	A	16.11	23.39	19.76

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC108.50 32	87	30	10	61	178	10	B	16.56	29.73	16.84
RC108.50 33	85	25	10	51	178	10	A	19.98	23.62	26.72
RC108.50 34	85	35	30	83	168	10	B	16.15	28.08	17.99
RC108.50 35	67	85	20	57	185	10	C	14.43	22.72	20.71
RC108.50 36	65	85	40	43	186	10	A	11.69	58.65	19.06
RC108.50 37	65	82	10	95	182	10	C	11.48	18.08	16.14
RC108.50 38	62	80	30	38	141	10	C	9.34	18.35	18.61
RC108.50 39	60	80	10	36	193	10	B	7.51	17.82	12.64
RC108.50 40	60	85	30	61	138	10	B	11.38	27.03	24.15
RC108.50 41	58	75	20	49	164	10	B	7.13	15.50	12.25
RC108.50 42	55	80	10	33	180	10	B	6.79	17.04	12.28
RC108.50 43	55	85	20	100	185	10	C	13.14	16.34	21.31
RC108.50 44	55	82	10	35	142	10	C	9.31	16.45	15.81
RC108.50 45	20	82	10	37	192	10	C	7.36	12.55	13.67
RC108.50 46	18	80	10	71	184	10	C	8.26	12.66	14.09
RC108.50 47	2	45	10	38	191	10	A	9.06	16.54	15.26
RC108.50 48	42	5	10	50	184	10	A	10.04	30.71	19.16
RC108.50 49	42	12	10	99	138	10	B	11.20	16.73	18.37
RC108.50 50	72	35	30	83	178	10	A	13.53	17.64	14.24

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC208.50 1	25	85	20	388	911	10	B	10.22	18.33	17.98
RC208.50 2	22	75	30	30	546	10	B	9.91	14.94	13.59
RC208.50 3	22	85	10	353	708	10	C	7.79	21.66	12.51
RC208.50 4	20	80	40	425	913	10	B	11.62	14.61	16.06
RC208.50 5	20	85	20	40	630	10	B	8.96	20.53	17.18
RC208.50 6	18	75	20	228	667	10	B	5.37	10.75	9.39
RC208.50 7	15	75	20	161	558	10	B	9.13	21.02	16.45
RC208.50 8	15	80	10	229	624	10	C	8.53	18.46	16.26
RC208.50 9	10	35	20	213	648	10	C	6.37	16.61	8.91
RC208.50 10	10	40	30	404	753	10	A	9.35	12.74	16.11
RC208.50 11	8	40	40	33	511	10	A	7.09	13.45	11.90
RC208.50 12	8	45	20	46	519	10	A	7.09	11.96	13.45
RC208.50 13	5	35	10	395	911	10	C	13.93	40.06	21.76
RC208.50 14	5	45	10	35	697	10	A	5.71	12.18	12.29
RC208.50 15	2	40	20	39	528	10	C	9.87	21.35	15.93
RC208.50 16	0	40	20	94	535	10	C	12.36	24.55	19.62
RC208.50 17	0	45	20	394	909	10	B	18.30	42.80	15.07
RC208.50 18	44	5	20	218	571	10	A	11.32	21.75	14.54
RC208.50 19	42	10	40	85	542	10	A	9.43	15.82	22.31

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC208.50 20	42	15	10	391	802	10	B	8.99	20.51	23.62
RC208.50 21	40	5	10	45	517	10	B	13.12	31.22	13.72
RC208.50 22	40	15	40	229	640	10	A	5.26	12.08	20.07
RC208.50 23	38	5	30	45	523	10	C	13.04	47.63	24.60
RC208.50 24	38	15	10	389	914	10	A	9.70	13.40	22.73
RC208.50 25	35	5	20	386	904	10	A	15.10	25.55	13.41
RC208.50 26	95	30	30	389	788	10	B	18.39	48.99	37.94
RC208.50 27	95	35	20	57	600	10	A	14.26	44.30	22.61
RC208.50 28	92	30	10	55	575	10	C	11.65	24.74	24.99
RC208.50 29	90	35	10	52	536	10	C	11.57	23.09	19.21
RC208.50 30	88	30	10	90	521	10	B	12.73	28.61	19.23
RC208.50 31	88	35	20	50	534	10	B	10.84	26.21	19.86
RC208.50 32	87	30	10	425	898	10	C	16.69	24.22	27.42
RC208.50 33	85	25	10	51	602	10	C	11.06	19.71	17.61
RC208.50 34	85	35	30	342	751	10	A	9.83	31.90	16.66
RC208.50 35	67	85	20	410	905	10	B	13.37	36.52	35.17
RC208.50 36	65	85	40	43	617	10	A	9.17	24.69	12.61
RC208.50 37	65	82	10	410	823	10	C	9.64	22.27	31.35
RC208.50 38	62	80	30	114	561	10	C	8.05	15.02	11.84

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Appendix 1: Cost allocation to customers in Solomon instances in a collaborative scenario – continued from previous page.

Instance Node	X coordinate	Y coordinate	Demand	Earliest service time	Latest service time	Service time	Carrier	Collaboration Cost	Stand-alone Cost	Other carriers' lowest Cost
RC208.50 39	60	80	10	36	658	10	C	5.16	13.20	10.88
RC208.50 40	60	85	30	191	586	10	A	7.35	19.32	12.33
RC208.50 41	58	75	20	201	670	10	B	4.19	15.44	9.33
RC208.50 42	55	80	10	33	568	10	C	7.60	13.01	10.12
RC208.50 43	55	85	20	429	838	10	A	11.19	35.60	30.01
RC208.50 44	55	82	10	49	504	10	A	11.14	21.64	14.98
RC208.50 45	20	82	10	37	597	10	C	6.66	17.76	12.07
RC208.50 46	18	80	10	315	782	10	A	6.04	29.88	13.20
RC208.50 47	2	45	10	38	606	10	A	7.50	16.63	18.40
RC208.50 48	42	5	10	396	904	10	B	12.24	23.89	26.35
RC208.50 49	42	12	10	341	658	10	B	4.16	15.78	20.56
RC208.50 50	72	35	30	351	782	10	C	14.88	16.56	13.36