Online-Appendix zu

„Cost Allocation in Vehicle Routing Problems with Time Windows"

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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

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

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

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

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

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

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

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	40	87	158	90	C	9.01	15.15	24.65
C101.50	34	8	45	20	751	816	90	C	7.52	30.14	13.24
C101.50	35	5	35	10	283	344	90	A	10.87	30.84	13.87
C101.50	36	5	45	10	665	716	90	A	8.82	24.49	21.51
C101.50	37	2	40	20	383	434	90	C	9.75	23.82	16.66
C101.50	38	0	40	30	479	522	90	B	12.92	52.75	19.22
C101.50	39	0	45	20	567	624	90	A	13.36	24.20	25.31
C101.50	40	35	30	10	264	321	90	A	7.89	16.39	10.23
C101.50	41	35	32	10	166	235	90	B	6.73	9.14	9.12
C101.50	42	33	32	20	68	149	90	A	6.14	10.27	7.68
C101.50	43	33	35	10	16	80	90	B	3.75	7.16	6.60
C101.50	44	32	30	10	359	412	90	B	6.16	12.65	8.24
C101.50	45	30	30	10	541	600	90	A	7.18	16.14	13.46
C101.50	46	30	32	30	448	509	90	C	6.45	17.98	10.12
C101.50	47	30	35	10	1054	1127	90	B	3.77	8.05	6.91
C101.50	48	28	30	10	632	693	90	C	6.73	18.94	10.37
C101.50	49	28	35	10	1001	1066	90	A	3.65	10.33	6.12
C101.50	50	26	32	10	815	880	90	B	5.25	12.04	10.14
C201.50	1	52	75	10	311	471	90	C	11.08	18.27	21.04

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

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

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

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

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

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

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

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

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

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

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

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	45	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

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	115	498	10	C	15.64	18.93	14.70
R209.50	31	31	52	27	91	336	10	C	8.58	10.69	8.68
R209.50	32	35	69	23	602	835	10	B	19.54	39.28	24.51
R209.50	33	53	52	11	24	646	10	B	6.63	15.03	10.80
R209.50	34	65	55	14	487	656	10	A	15.33	25.21	23.28
R209.50	35	63	65	8	439	948	10	C	20.98	38.01	24.43
R209.50	36	2	60	5	41	710	10	A	12.12	30.93	20.30
R209.50	37	20	20	8	563	736	10	C	9.57	21.41	11.89
R209.50	38	5	5	16	147	560	10	B	22.67	30.90	30.82
R209.50	39	60	12	31	33	797	10	C	12.43	31.63	18.89
R209.50	40	40	25	9	243	554	10	B	4.94	4.70	6.42
R209.50	41	42	7	5	225	682	10	B	9.37	17.12	13.84
R209.50	42	24	12	5	25	616	10	A	4.81	12.68	8.82
R209.50	43	23	3	7	578	747	10	B	23.91	30.75	26.65
R209.50	44	11	14	18	72	501	10	A	8.18	20.71	11.33
R209.50	45	6	38	16	29	669	10	A	6.12	13.46	12.71
R209.50	46	2	48	1	458	685	10	C	16.52	19.96	30.53
R209.50	47	8	56	27	34	362	10	A	12.76	17.63	25.23
R209.50	48	13	52	36	694	962	10	C	21.39	20.49	25.64

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

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

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

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

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

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

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	30	95	30	90	169	10	A	23.77	34.22	31.73
RC108.50	27	35	95	20	57	172	10	C	22.89	50.72	28.71
RC108.50	28	30	92	10	55	174	10	A	18.51	26.05	19.42
RC108.50	29	35	90	10	52	174	10	B	16.96	31.78	19.30
RC108.50	30	30	88	10	52	147	10	C	16.98	40.09	21.00
RC108.50	31	35	88	20	50	172	10	A	16.11	23.39	19.76

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

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

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