IT and Telecom Consulting

Cellular RF Study
As-Is Report

University of British Columbia

Prepared by: Ellen Koskinen-Dodgson and Peter Aggus
Direct tel: 604-506-2905
ellen@tmcconsulting.ca
Company : TMC IT and Telecom Consulting Inc.
#1300 - 1500 W. Georgia Street,
Vancouver, B.C. V6G 2Z6

7 June 2012

Contents

1 Executive Summary

This document contains all the raw data accumulated during the research pertaining to the cellular site locations and to the field strength measurements made.

The data is presented in tabular form and also, where processed further, as map layouts.

If required for incorporation into GIS systems, the data can be supplied on request as Excel spreadsheets or CSV text files.

2 What Exists

2.1 Campus and Community Planning Records

The following data was supplied by Rachel Wiersma - Planning Assistant, Campus and Community Planning.

Dev Permit	Bldg Permit	Address	Project Name	Applicant	Carrier	Permit Status
DP 06009	BP 08019	6288 Stadium Road	Bell Antenna for Matthews Field	Ian McBean, Scott Land & Lease Ltd	Bell	Complete
DP 06010	BP 07032	2053 Main Mall	Bell Antenna for Henry Angus	Ian McBean, Scott Land & Lease Ltd	Bell	Complete
DP 10026	BP 10076	2725 Melfa Rd	Acadia Tower Telecommunications	Marc Parras, Wind Mobile	Wind Mobile	Complete
DP 11006	BP 12011	2725 Melfa Rd	Wind Mobile - Acadia Tower	Robert Lepage, Wind Mobile	Wind Mobile	Complete
DP 11007	BP 11016	2053 Main Mall	Henry Angus Antennae	Gina MacInnes, Telus	TELUS/Bell/Rogers/ WindMobile	Complete
DP 11021	No BP	6393 NW Marine Dr.	MoA Antenna	Brent Laoun, Altus for Telus	TELUS	Complete
DP 11022	BP 11098	2725 Melfa Rd	Acadia Antenna	Chad Marlatt, Telus	TELUS	Complete
DP 11031	BP 12036	5959 Student Union Blvd	Gage Antenna	Irv Hildebrand, for Telus	TELUS	Under Construction
DP 11034	BP 12016	6005 Walter Gage Rd	West Point Antennas	Sarah Farina, Altus for Telus	TELUS	Under Construction
DP 12008	BP 12036	1873 East Mall	Buch Tower Antennae	Ryan McKeown, Data + Audio	Dave Wireless/Mobilicity	DP Pending
DP 12009		2601 East Mall	Feric Antennae	Brent Laoun, Altus for Telus	TELUS	DP Pending
DP 12011		2525 West Mall	Totem Residence Antennae	Brent Laoun, Altus for Rogers	Rogers	DP Pending
No DP	BP 12059	2211 Wesbrook Mall	Koerner Pavilion Antennae (In-Build)	Sarah Farina, Altus for Telus	TELUS	BP Issued
No DP		6066 Thunderbird Blvd	Thunderbird Sports Centre (In-Build)	Brent Laoun, Altus for Telus	TELUS	Upcoming

2.2 Contracts & Leases Records

The following data was supplied by James Heth - Manager, Contracts & Leases.

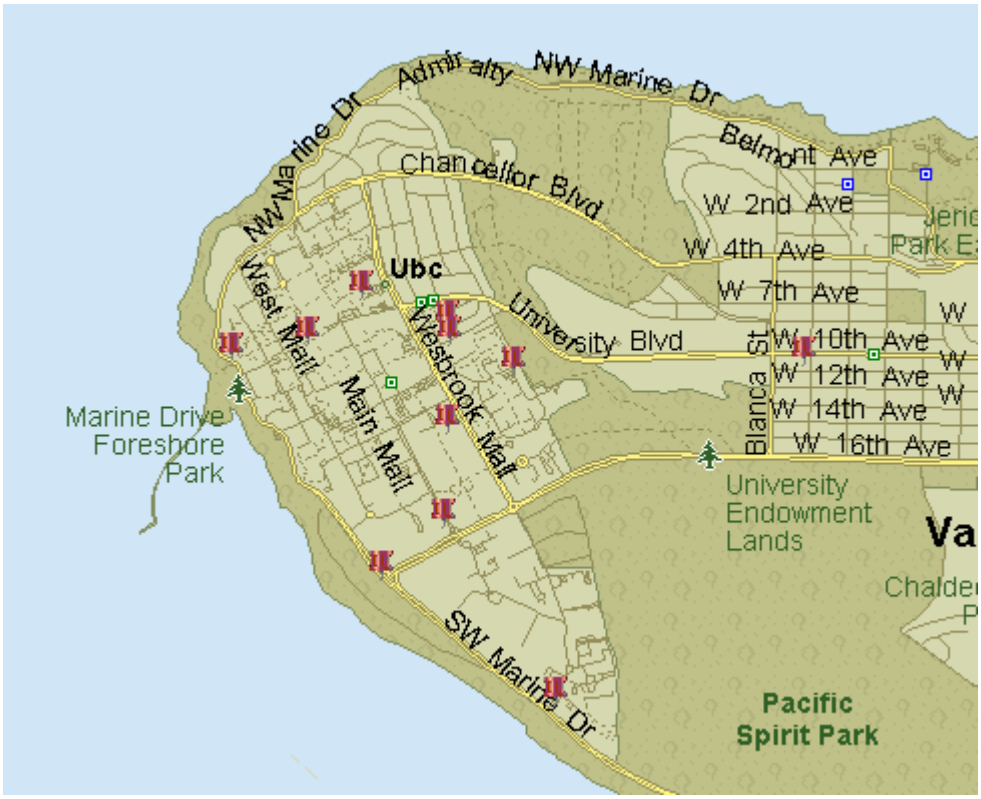
Carrier	Building
Globalive Wireless Management Corp. - Wind Mobile	Acadia Tower
	Henry Angus
Bell Mobility Inc.	Henry Angus
	Matthews Field
Rogers	Henry Angus
	Matthews Field
	Totem Residence *(in process)*
Telus	Henry Angus
	Museum of Anthropology (in-build)
	Gage Tower North *(in process)*
	Koerner Pavilion (*UBC consent only, no license*)
	FERIC Building (*UBC consent only, no license*)
Mobilicity	Buchanan Tower *(in process)*

2.3 Industry Canada Records

The following data was obtained from the Industry Canada "Technical and Administrative Frequency Lists" (TAFL). It is presented first in tabular form as retrieved and then is converted to a map layout.

Station Location	Lat - Dec	Long - Dec	Location	Bell	Rogers	Telus	Globalive
B0247-4250 WESBROOK MALL	49.24527778	-123.2330556	IC01	y			
W1513-VANCOUVER BC 11.58M S/O MARIN	49.25194444	-123.2472222	IC03		y		
W2292-VANCOUVER BC SOUTH WEST MARIN	49.25472222	-123.2422222	IC04	y	y		
W2605-VANCOUVER BC 6066 THUNDERBIRD	49.25972222	-123.2419444	IC06		y	y	
"BC1159: 2725 Melfa Rd."	49.26194444	-123.2366667	IC10			y	y
"BC1175: 4620 W.10th Ave. (Univers"	49.26333333	-123.2127778	IC13	y	y	y	y
VANCOUVER UBC 6501 NW MARINE DRIVE	49.26361111	-123.2594444	IC19			y	
"BC0159: 2053 Main Hall, UBC"	49.26444444	-123.2533333	IC24	y	y	y	
W0298A-VANCOUVER BC 2233 ALLISON RO	49.26527778	-123.2419444	IC28		y		
W5252-VANCOUVER BC 6138 STUDENT UNI	49.26694444	-123.2488889	IC33		y		

The "location" field was assigned to all sites recovered on the basis of lat/long groupings. Only the cellular sites are included in this table, hence the gaps in the numbering sequence. The tags for the carriers are based on whether the TAFL database includes an entry at that location for that carrier.



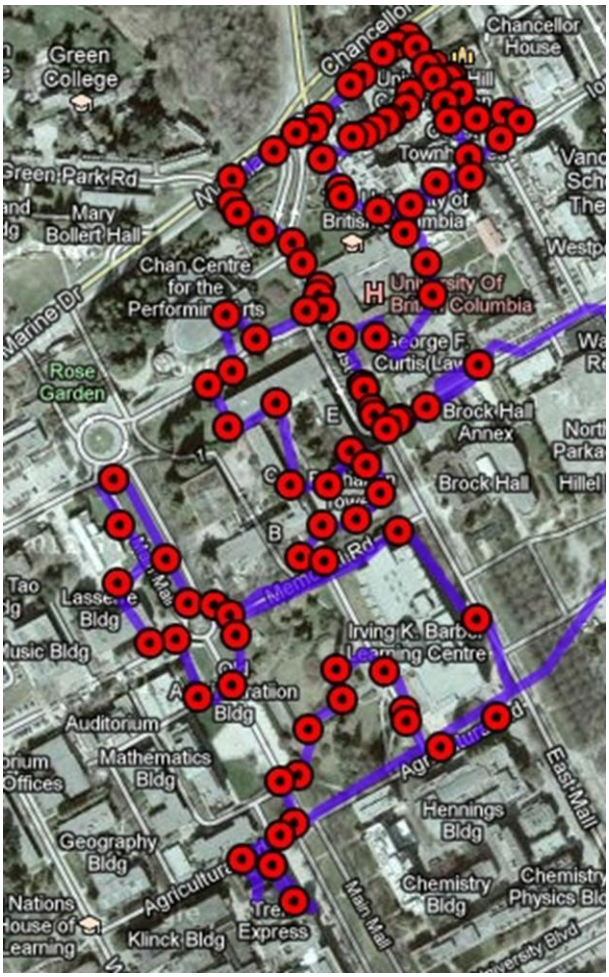
Note that the TAFL database contains a lot more stations – but this subset was selected on the basis of cellular outdoor sites.

3 Field Survey Data

The original aim of this exercise was to spend around half a day of time and minimal cost on equipment to gather a sample set of measurements that would help in discussing some of the perceived coverage issues around the campus. With the time and budget constraint it was decided to limit the geographic scope to the area around one building and the Allard Hall region was selected for us to survey.

We estimated that we could survey and document around 100 measurement points and could do measurements on two cellular systems while leaving enough time to cover the area within about 100m of the Allard Hall building.

We had some issues with doing measurements on the Telus network with the simple tools available to us without going to the extent to calibrated test gear that would be used on a full survey. However the Rogers measurements worked fine. As a compromise, we decided to drop the second set of measurements and instead to increase the geographic scope and spread our 100 measurement points over a larger area. By registering measurements only when the value changed, rather than on a fixed grid as originally planned, we were able to cover over 5km of survey track around the designated building and much of the surrounding region.



The route taken and the survey point locations are shown on the map above. We managed to take the survey around the Chancellor neighbourhood and back almost as far as the Henry Angus base station.

At each survey location we took a GPS fix and a signal strength reading. The full table of results is shown below, with the measured signal shown as a dBm figure.

LOCAL TIME	LATITUDE	LONGITUDE	ALTITUDE	Data Point	RX	Range
15:48:33	49.270577	-123.249715	118.098	1	87	2
15:55:37	49.269441	-123.252097	66.289009	2	95	2
15:56:55	49.269151	-123.252655	65.303024	3	94	2
15:57:30	49.269059	-123.252928	64.14827	4	97	3
15:57:40	49.269053	-123.252968	64.870766	5	92	2
15:57:59	49.268989	-123.253083	67.984657	6	91	2
15:59:20	49.269097	-123.253203	60.882915	7	90	2
15:59:41	49.269139	-123.253236	59.782234	8	91	2
15:59:57	49.269277	-123.253309	59.325169	9	94	2
16:00:07	49.269305	-123.253332	61.088589	10	95	2
16:01:16	49.269645	-123.253565	69.450951	11	95	2
16:03:05	49.269636	-123.253199	70.554367	12	95	2
16:04:07	49.269931	-123.252596	80.300278	13	95	2
16:05:06	49.270152	-123.252655	85.58239	14	95	2
16:05:56	49.270366	-123.252883	83.462143	15	95	2
16:06:48	49.270723	-123.252546	92.987213	16	95	2
16:07:44	49.271019	-123.251861	90.984543	17	95	2
16:08:15	49.271148	-123.251648	89.223122	18	95	2
16:09:07	49.27121	-123.25181	81.905052	19	97	3
16:09:39	49.271162	-123.252124	76.25441	20	84	2
16:09:57	49.271174	-123.252112	74.725723	21	91	2
16:10:24	49.271345	-123.252282	73.466843	22	102	3
16:10:58	49.27146	-123.252381	68.884491	23	102	3
16:11:21	49.271447	-123.252414	68.498375	24	93	2
16:11:48	49.271549	-123.252564	65.122223	25	101	3
16:11:57	49.271529	-123.25265	63.894844	26	106	3
16:12:26	49.27167	-123.252763	61.849655	27	98	3
16:12:43	49.271737	-123.252845	61.204411	28	97	3
16:13:10	49.271685	-123.252967	62.797413	29	101	3
16:13:25	49.271629	-123.253119	62.213531	30	90	2
16:13:57	49.271478	-123.253334	57.828079	31	100	3
16:14:16	49.271399	-123.253474	57.749123	32	103	3
16:14:50	49.271174	-123.253795	57.576225	33	94	2
16:15:38	49.270885	-123.253765	57.157261	34	94	2
16:16:06	49.271043	-123.253446	57.155647	35	105	3
16:16:17	49.271052	-123.253317	57.265804	36	103	3
16:16:29	49.271097	-123.253215	57.560616	37	102	3
16:16:44	49.27115	-123.253075	57.96286	38	103	3
16:16:50	49.271164	-123.253035	58.179661	39	92	2
16:17:05	49.271246	-123.252867	58.714432	40	107	3
16:17:19	49.271341	-123.25283	59.456066	41	95	2
16:17:56	49.271441	-123.252566	61.720127	42	105	3
16:18:36	49.271276	-123.252463	64.434929	43	99	3
16:18:57	49.271154	-123.252408	66.100578	44	97	3
16:19:23	49.270895	-123.252213	68.339226	45	98	3
16:19:39	49.270763	-123.252173	69.812691	46	98	3
16:21:18	49.27056	-123.252833	81.010727	47	87	2
16:21:56	49.270521	-123.253177	85.109154	48	79	2
16:22:39	49.270624	-123.253564	77.498772	49	79	2
16:22:53	49.27067	-123.253572	78.015076	50	90	2
16:23:43	49.27109	-123.253861	73.378899	51	86	2
16:24:03	49.27106	-123.254045	69.99572	52	80	2
16:24:26	49.270947	-123.254287	70.639305	53	81	2
16:25:05	49.270738	-123.254725	67.758125	54	93	2
16:25:28	49.270575	-123.25473	58.950207	55	85	2
16:25:55	49.2705	-123.254675	58.474236	56	95	2
16:26:21	49.270386	-123.25441	59.803574	57	87	2
16:26:45	49.270299	-123.254095	65.06163	58	87	2
16:27:04	49.270163	-123.253976	63.861588	59	87	2

LOCAL TIME	LATITUDE	LONGITUDE	ALTITUDE	Data Point	RX	Range
16:27:53	49.269994	-123.2538	66.708603	60	85	2
16:28:05	49.269927	-123.25382	65.70858	61	105	3
16:28:32	49.269834	-123.253755	66.731483	62	85	2
16:29:14	49.269816	-123.253938	65.615349	63	85	2
16:30:00	49.269627	-123.254474	63.803551	64	85	2
16:30:43	49.269798	-123.254804	68.026909	65	85	2
16:31:30	49.269404	-123.254732	81.370491	66	85	2
16:32:02	49.269301	-123.254994	83.70665	67	85	2
16:32:38	49.269005	-123.25477	83.57058	68	85	2
16:33:19	49.26918	-123.254263	80.06884	69	85	2
16:34:09	49.268607	-123.254119	77.111412	70	74	1
16:34:56	49.268602	-123.253706	64.641396	71	74	1
16:35:18	49.268842	-123.253472	65.015129	72	83	2
16:35:38	49.268736	-123.253298	61.369659	73	83	2
16:36:19	49.268548	-123.253138	56.726109	74	73	1
16:36:50	49.268364	-123.253414	55.98521	75	84	2
16:37:10	49.268319	-123.25376	57.544022	76	84	2
16:38:08	49.268094	-123.254008	60.011368	77	92	2
16:38:51	49.268073	-123.253749	66.01181	78	86	2
16:40:36	49.267698	-123.254762	67.16964	79	75	1
16:41:41	49.267763	-123.254927	70.209961	80	87	2
16:42:07	49.267777	-123.255197	67.778328	81	87	2
16:42:54	49.268083	-123.25545	54.968735	82	87	2
16:43:58	49.26864	-123.256005	29.111992	83	87	2
16:45:06	49.268325	-123.255935	36.54147	84	87	2
16:46:02	49.26792	-123.255957	46.307816	85	87	2
16:46:53	49.267497	-123.255622	55.216286	86	81	2
16:47:26	49.267522	-123.255328	63.951981	87	76	1
16:48:12	49.267118	-123.255098	61.670197	88	74	1
16:48:40	49.267197	-123.254729	62.835026	89	74	1
16:49:18	49.267549	-123.254689	66.799965	90	81	2
16:51:38	49.268282	-123.252947	76.4907	91	81	2
16:52:55	49.267659	-123.252117	76.110222	92	74	1
16:54:05	49.266974	-123.25191	84.655273	93	74	1
16:55:14	49.266766	-123.252514	75.039764	94	74	1
16:55:47	49.266953	-123.252859	69.352821	95	76	1
16:55:59	49.267017	-123.252891	68.485634	96	80	2
16:56:28	49.267304	-123.2531	63.706074	97	80	2
16:57:01	49.267308	-123.253617	63.663063	98	80	2
16:57:53	49.267103	-123.253559	63.542809	99	77	2
16:58:25	49.266897	-123.253921	66.36908	100	77	2
16:59:08	49.266579	-123.254018	66.03019	101	76	1
16:59:34	49.266524	-123.254216	68.080124	102	84	2
17:00:01	49.266237	-123.254063	73.02211	103	76	1
17:00:20	49.266154	-123.254231	76.313011	104	87	2
17:00:56	49.265987	-123.254633	77.889954	105	93	2
17:01:33	49.265947	-123.254299	81.975021	106	77	2
17:02:03	49.265686	-123.254067	80.627632	107	83	2

The last figure in the table, “Range” is calculated from the receive level to classify the signal measurement by Using that as a guideline the raw data measurements were classified into colours – indicating areas with unreliable signal level (red), acceptable for outdoor use (yellow) and good signal (green). The Henry Angus cell site is show as a cyan spot at the bottom of the map.