- O&M expenses for cell sites are the ongoing costs for power, leases, labor and other recurring costs involved in running a cell site.

- Satellite backhaul operations and maintenance expenses are the monthly lease charges for using satellite capacity.

- Terrestrial backhaul operations and maintenance expenses are the monthly lease charges for using microwave, fiber and/or TERRA capacity.

- Data transport costs are the monthly lease charges for transporting from the hub point to the aggregation point in the Lower 48 states.

A summary of the unit costs involved in upgrading and/or building out cell sites and in providing terrestrial and satellite based backhaul is included in **Figure VI-1**.[17]

Cost data was based on the actual recent experiences (e.g., within the last three years) of GCI in upgrading and/or building out cell sites, ground stations and central hubs in Alaska. Backhaul lease costs are based on rates and tariffs paid by GCI for backhaul services.

Capital costs are presented as one-time expenditures and are therefore in present value terms. Operations and maintenance expenses are incurred over the course of the term of analysis and are therefore presented in present values of the cash flow over 5 years.

The derivations of the various unit costs are included in Tables VI-1 through VI-7:

- Capital Costs To Upgrade Existing Cell Sites To 768 kbps down / 256 kbps up And Build-Out New Mobile Broadband Cell Sites (Cost Per Cell Site) – **Table VI-1**;

- Capital Costs of Satellite Backhaul – **Table VI-2**;

[17] Figure IV-1 excludes transport costs, which were also excluded from the total cost estimates. Transport costs are provided separately below.

- Present Value of Cell Site O&M Expenses (PV Per Cell Site) – **Table VI-3**;

- Present Value of O&M Expenses Of Upgrading To 768 kbps down / 256 kbps up Or New VSAT Ground Stations (PV Per Station) – **Table VI-4**;

- Present Value of O&M Expenses Of HUB iDirect Satellite For Mobile Broadband Cell Sites Satellite Backhaul (PV For Central Hub) – **Table VI-5**. This table provides the cost to cover a population of 3,000. The actual backhaul costs are based on actual population covered by satellite areas and presented in Section VII;

- Present Value of O&M Expenses For Terrestrial Backhaul (PV For Fiber, Microwave and per Mbps Leases) – **Table VI-6**. This table provides unit costs based on a hypothetical population of 500 for each of the various terrestrial backhaul options. The backhaul costs used in cost estimates were based on the populations located within the specific census blocks served by a cell site.

- Undersea Cable Lease Rate per Month and Present Value of 5 Years – **Table VI-7**.

The calculations of capital costs and the present value of O&M costs for cell sites, common network and satellite ground stations – that is, the product of unit costs and the numbers of cell sites and satellite ground stations – are shown in Appendix **Table A-1** through **Table A-6**. These calculations exclude the costs of backhaul and undersea transport (each discussed below).

VII. BACKHAUL COSTS

Cell sites provide the communications link between customers and the edge of the mobile network. Traffic then needs to be transported from the cell site to network control points and eventually to its final destination. This backhaul of traffic is frequently conducted over fiber optic lines or microwave facilities in much of the continental U.S. Use of these backhaul options requires that terrestrial fiber or microwave networks be physically in place. When they are not, alternatives, notably satellites, must be used. Terrestrial backhaul facilities tend to be in place in populated

areas, where the costs of construction is justified by high utilization of facilities. Satellite transport is typically leased from satellite companies (instead of launching a dedicated satellite), and tends to be more expensive than fiber and microwave based backhaul. Despite the expense of satellite transport, the costs of constructing greenfield terrestrial backhaul options without some other external funding to serve isolated areas with low populations is rarely cost efficient.

As shown in **Table VII-1**, backhaul for the majority of census blocks in Alaska that currently receive wireless services is provided over fiber infrastructure (17,919 out of 24,636) with the remainder provided over "remote" terrestrial (3,618) or satellite (3,100).[18] Of these, **Table VII-2** provides a breakdown of the type of backhaul (terrestrial or satellite) used at the cell sites within a borough /census area. The type of backhaul was assigned to cell sites based on current usage in the case of existing cell sites and availability in the case of new cell sites.

As shown in the **Table VII-2**, 614 of the required cell sites will use terrestrial backhaul (405 sites served by fiber backhaul and 209 served by remote terrestrial backhaul). Of the 405 required fiber sites, 274 are existing sites requiring upgrades (83 in FCC eligible census blocks and 191 in non-FCC eligible census blocks) and 131 are new sites (68 in FCC eligible census blocks and 63 in non-FCC eligible census blocks). Another 209 are considered remote terrestrial, including 120 existing sites requiring upgrades and 89 new sites. Additionally, 218 of the cell sites use satellite backhaul (117 existing sites and 101 new sites). These various categories sum to the total cell site requirement (832) as discussed above. (The 136 existing cell sites that provide service at 768 kbps down / 256 kbps up all use terrestrial fiber backhaul.)

The table also breaks down the location of cell sites (existing and additional) in terms of whether it is located in the census blocks identified by the FCC as potentially eligible under Mobility Fund Phase I; areas that are currently serviced with wireless service at levels below 768 kbps down / 256 kbps up, but which do not fall under the FCC's eligibility list; or other areas with a telecom presence other than mobile wireless.

[18] "Remote" terrestrial backhaul in Alaska consists of microwave and TERRA, which uses a combination of fiber and microwave technologies.

Backhaul requirements (i.e., throughput) are estimated by considering the population served, upstream and downstream data rates, oversubscription rate, and traffic factor. The throughput requirements for satellite based backhaul were developed on a system wide basis. That is, satellite throughput was estimated based on the total population of the targeted areas served by cell sites which use satellite backhaul. This allowed the realization of scale economies, instead of incurring minimum fees for areas with low population. Our cost analysis is based on the assumption that sufficient satellite capacity exists to serve all satellite areas at average speeds of 768 Mbps down / 256 Mbps up. To the extent that limited supply drives the prices up, the cost of satellite based services would increase.

There are several options for terrestrial backhaul depending upon the location of the cell site: microwave, fiber and "TERRA," a microwave and fiber optic network connecting many communities in western Alaska to Anchorage. TERRA is owned by GCI's wholly owned subsidiary United Utilities, Inc.[19] All options, except fiber, are considered remote. Each of these terrestrial backhaul options involves leasing capacity on the backhaul carrier's network,[20] at various levels of capacity (i.e., microwave at T-1 and T-3; fiber at T-1, T-3 and 1 Mbps; and Terra at 1 Mbps). The specific terrestrial option to be used at each cell site was based on availability and cost efficiency.

The calculations of the present value of terrestrial backhaul costs are shown in Appendix **Table A-7** through **Table A-9** and the calculations of the present value of satellite backhaul costs are shown in Appendix **Table A-10** through **Table A-12.**

[19] TERRA is a terrestrial based broadband network that is owned by GCI's subsidiary United Utilities, Inc TERRA serves a range of businesses, including wireless and wireline broadband for residential, commercial, educational and health facilities. GCI plans to expand the TERRA network in stages, depending on funding. The first section of TERRA was built in the southwest corner of the State's northwestern quadrant and is referred to as "TERRA-SW", it includes 400 miles of new fiber-optic cable and 13 new microwave towers connecting 65 communities.

[20] GCI's wireless operations lease network capacity on TERRA-SW from its wholly owned subsidiary UUI, based on defined rates and terms available to any carrier on a non-discriminatory basis, subject to standard volume and term discounts.

VIII. UNDERSEA TRANSPORT COSTS

To be comprehensive in estimating the costs of providing mobile broadband services in Alaska, the cost of transport (as a category separate from backhaul) is also presented. Unlike many locations in the Lower 48 states, there is no Internet peering location in Alaska. Therefore, an additional layer of middle mile transport is required to provide broadband services. This is accomplished through undersea cables that connect Alaska with Internet peering locations in Seattle, Washington and Portland Oregon. The cost associated with this layer of transport is not included in the total estimate of providing mobile broadband service in Alaska. The PV of five years of undersea transport costs is estimated to be approximately $47 million. Adding this cost to the total estimated cost of providing mobile broadband service to the roughly 17,434 census blocks targeted in this analysis (i.e., approximately $596 million) would bring the total cost of providing mobile broadband service to these areas up to roughly $643 million, with the cost of backhaul plus undersea transport constituting about $289 million, or approximately 45% of the total cost of providing mobile broadband to these areas.

Estimates of the cost of undersea transport from points in Alaska to peering points in the Lower 48 for the three geographic segments are provided in the tables below:

- Present Value of Undersea Transport Cost FCC Eligible Areas – **Table VIII-1**;
- Present Value of Undersea Transport Cost FCC Eligible + Additional Currently Served Areas – **Table VIII-2**;
- Present Value of Undersea Transport Cost FCC Eligible + Additional Currently Served Areas + Other Areas with Presence – **Table VIII-3**.

IX. ESTIMATED MARGINAL REVENUE

Expansion of a wireless network in Alaska will produce additional revenues for the wireless carrier. Such revenues will be realized in two ways: incremental revenues resulting from the upgrading of services to mobile broadband levels from lesser speed wireless levels; and new

revenue streams resulting from the introduction of wireless service. Assuming that all three categories of census blocks were upgraded, the coverage model estimates that:

- 102,690 people currently in areas covered by wireless service would be upgraded to mobile broadband levels; and,

- 19,386 people in areas that are currently unserved would be served by mobile broadband after network deployment.

These populations, as well as the estimates of marginal revenues discussed below, are summarized in **Table IX-1**. The PV of 5 years of these marginal revenues, assuming that all would be realized is roughly $63.5 million. For context, the total estimated cost (PV) of providing mobile broadband services to the targeted areas is approximately $596 million. (The estimated PV of undersea transport costs of approximately $31 million is not included in this PV.)

A. Marginal Revenues - Upgrades to Mobile Broadband

GCI's current subscriber data indicates that data plan penetration in 2G areas is [redacted] and voice service penetration in these areas is [redacted] GCI expects the penetration for voice services will stay at the current level, but that the penetration for data services will rise to roughly [redacted] after 3G/4G service is offered.

We estimated that, in areas currently receiving wireless services at less than mobile broadband levels:

- [redacted] of the population will upgrade from a voice/text only plan to a mobile broadband data plan, bringing the penetration for data services up to [redacted] The average revenue per user (ARPU) per month for adding a mobile broadband data plan is [redacted]

- [redacted] of the [redacted] of existing data subscribers will upgrade their data plan to mobile broadband levels. Upgrading to such a data plan is an additional [redacted] per month.

The total revenue impact to GCI from new and upgrading data services customers will be $6.2 million per year. On a per population basis, this is an additional $60 per year.

B. New Revenue Streams

In areas previously unserved by wireless, all subscriber revenues are attributed to the mobile broadband network. We assume [redacted] of the population in these areas will subscribe to a data plan, and [redacted] will subscribe to a voice plan.

- [redacted] of the population in the newly served areas will have a data only plan, based on GCI's history. Specifically [redacted] of GCI customers with data plans currently have data-only plans. [redacted] of the [redacted] that will subscribe to a data service = [redacted]. The monthly ARPU for a mobile broadband data-only plan is currently [redacted] per month.

- The remainder of new data customers ([redacted] of the population of the newly served areas, or [redacted] less [redacted] will subscribe to a combination voice/text and data plan, at [redacted] per month ARPU.

- [redacted] of the population of the newly served areas will have a voice/text plan only (i.e., no data plan; [redacted] less the [redacted] that will have a data plan), and pay an ARPU of [redacted] per month.

The new revenue streams estimated to be realized from these new customers is nearly $9.5 million per year, or $492 on a per population basis.

X. OVERVIEW OF COST MODEL – USER PERSPECTIVE

The Alaska Mobile Broadband Cost Model is based in a Microsoft Excel workbook organized around eight color coded sets of tabs: four sets of tabs involve model input and assumption tabs; two sets of tabs provide summary level output; one set of tabs provides detailed model output; and a Read Me tab that also includes assumptions for discount rates, penetration and bandwidth requirements.

- **Geographic Data Inputs** are a listing of the demographic, presence of cell towers and extent of wireless services for each of the 45,292 census blocks in Alaska.

- **Infrastructure Requirements – Coverage Analysis** uses the geographic input data to determine: 1) the number of cell sites that need to be upgraded and built new and 2) the type of back haul available at specific locations. This module of the Alaska Mobile Broadband Cost Model eliminates duplicative cell towers (i.e., when more than one cell tower is serving the same geographic area) to ensure that costs of upgrading cell towers (that currently provide wireless services at speeds slower than mobile broadband levels) is not overstated. It also aggregates the cell tower requirements to cover the targeted areas into boroughs / census areas and identifies the type of backhaul available in those areas. The infrastructure requirements are used as inputs into the cost analysis.

- **Cost Assumptions** are a series of tabs concerning capital costs, O&M costs and backhaul costs. These costs are set to default values (which reflect our estimate of appropriate values to be included in this analysis) which can be modified by users. Also included in this section is a **ReadMe** tab which includes additional assumptions (such as discount rate) as well as assumptions concerning bandwidth requirements for backhaul.

- **Incremental Revenue** estimates the additional revenues that may accrue to carriers by offering mobile broadband services.

- **Model Output** is organized into three sections: **Cost Summary** provides a breakdown of the total cost of providing mobile broadband in Alaska into cost elements and/or geographic summaries. **Coverage Summary** provides a breakdown of cell site requirements and the populations and road miles they cover by borough / census area. **Detailed Output** provides cost breakdowns at the geographic area and borough /census area levels.

A summary of the sections and specific tabs included in the cost model are included in **Figure X-1**, Alaska Mobile Broadband Cost Model Architecture.

Table II-1
Summary of Capital Costs and Present Value of O&M Costs
by Network and Backhaul Costs

	Network Costs to Build and Upgrade 3G Sites			Backhaul			Total
	Capital Costs	Present Value (5 Years) of O&M Costs	Total	Capital Costs	Present Value (5 Years) of O&M Costs	Total	
Common Network Costs	$18,033	$41,976	$60,009	$14,908,699	$0	$14,908,699	$14,968,708
FCC Potentially Eligible Areas	$145,379,720	$71,468,716	$216,848,436	$7,406,240	$206,018,405	$213,424,645	$430,273,081
Additional Areas Currently Served	$51,838,173	$30,881,793	$82,719,966	$1,941,880	$26,545,811	$28,487,691	$111,207,657
Areas (Non-Wireless) Presence	$21,215,532	$8,668,920	$29,884,452	$496,760	$9,373,353	$9,870,113	$39,754,565
Total Costs	**$218,451,457**	**$111,061,405**	**$329,512,862**	**$24,753,579**	**$241,937,569**	**$266,691,148**	**$596,204,010**

Note O&M bandwidth costs for satellite and terrestrial backhaul are calculated on an incremental basis. The costs for Additional Areas Currently Served and Areas (Non-Wireless) Presence assume the previously listed costs are already being incurred.

Source: U S. Census Bureau 2010 Census, GCI Cell Site Data; Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table II-2
Cost Metrics
For 3G/4G Service in Targeted Area

					Cost Metrics							
					Cell Sites		Population		Area (Square Miles)		Road Miles	
	Capital Costs	Present Value (5 Years) of O&M Costs	Backhaul Costs	Total Cost	Cell Sites	Marginal Cost Per Cell Site	Population	Cost Per Pop	Area	Cost Per Sq. Mile	Road Miles	Cost Per Road Mile
Common Network Costs	$18,033	$41,976	$14,908,699	$14,968,708	832	$17,991	122,076	$123	365,310	$41	25,048	$598
FCC Potentially Eligible Areas	$145,379,720	$71,468,716	$213,424,645	$430,273,081	476	$903,935.04	82,277	$5,230	335,694	$1,282	19,401	$22,178
Additional Areas Currently Served	$51,838,173	$30,881,793	$28,487,691	$111,207,657	291	$382,156.90	34,188	$3,253	24,956	$4,456	4,460	$24,932
Areas (Non-Wireless) Presence	$21,215,532	$8,668,920	$9,870,113	$39,754,565	65	$611,608.69	5,611	$7,085	4,660	$8,531	1,186	$33,520
Total Costs	**$218,451,457**	**$111,061,405**	**$266,691,148**	**$596,204,010**	**832**	**$716,591.36**	**122,076**	**$4,884**	**365,310**	**$1,632**	**25,048**	**$23,803**

Note: O&M bandwidth costs for satellite and terrestrial backhaul are calculated on an incremental basis. The costs for Additional Areas Currently Served and Areas (Non-Wireless) Presence assume the previously listed costs are already being incurred. The common network cost per cell site is an average cost and not a marginal cost.
Source. U.S Census Bureau 2010 Census, GCI Cell Site Data; Carrier Cell Sites from FCC ULS database; Brattle Analysis

Table II-3
Transport Costs
Summary of Transportation Costs by Hub

	Satellite (Anchorage)		Anchorage		Fairbanks		Juneau			
	Population Served	NPV (5 Years)	Population Served	NPV (5 Years)	Population Served	NPV (5 Years)	Population Served	NPV (5 Years)	Total NPV	Cumulative Total
FCC Potentially Eligible Areas	19,306	$14,031,129	18,077	$13,205,768	806	$1,553,620	2,950	$2,330,430	$31,120,947	$31,120,947
Additional Areas Currently Served	1,379	$825,361	9,533	$6,602,884	3,010	$4,660,859	3,173	$2,330,430	$14,419,534	$45,540,480
Areas (Non-Wireless) Presence	196	$0	1,292	$825,361	184	$0	1,134	$776,810	$1,602,170	$47,142,651
Total	**20,881**	**$14,856,489**	**28,902**	**$20,634,013**	**4,000**	**$6,214,479**	**7,256**	**$5,437,669**	**$47,142,651**	

Figure III-1
State of Alaska
Cost Model Schematic

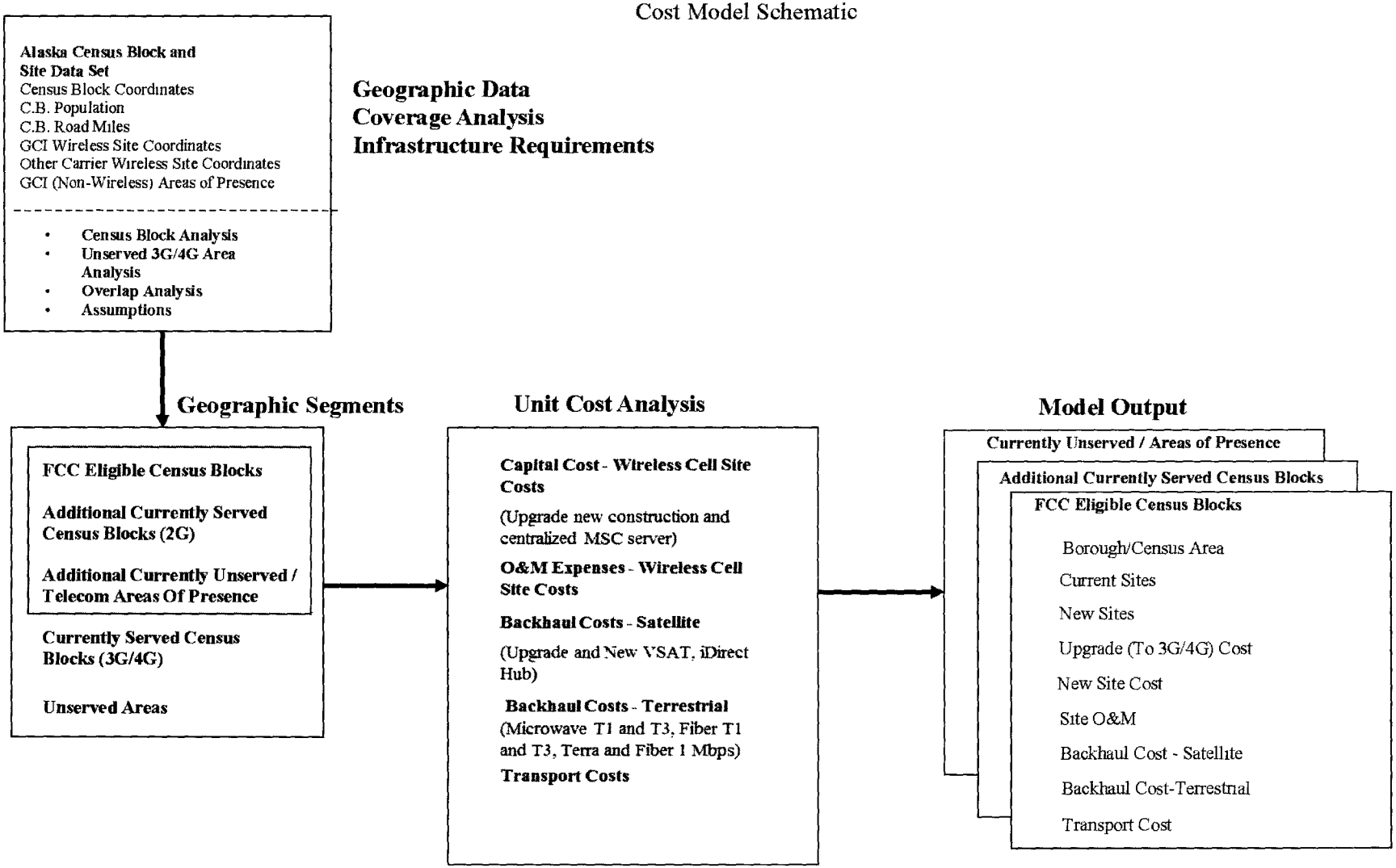

Table III-1
State of Alaska
Demographics Data
by Census Block

Borough / Census Area	No. of Census Blocks	Population	Area *(miles²)*	Road Miles *(miles)*
Aleutians East	1,105	3,141	6,982	170
Aleutians West	1,206	5,561	4,390	540
Anchorage	4,337	291,826	1,705	1,854
Bethel	1,710	17,013	40,570	1,305
Bristol Bay	177	997	504	130
Denali	690	1,826	12,751	1,004
Dillingham	816	4,847	18,569	239
Fairbanks North Star	4,499	97,581	7,338	3,102
Haines	758	2,508	2,319	261
Hoonah-Angoon	873	2,150	7,525	1,062
Juneau	928	31,275	2,702	745
Kenai Peninsula	4,024	55,400	16,075	3,056
Ketchikan Gateway	904	13,477	4,858	418
Kodiak Island	1,561	13,592	6,550	314
Lake and Peninsula	837	1,631	23,652	404
Matanuska-Susitna	4,590	88,995	24,608	4,707
Nome	1,471	9,492	22,962	2,022
North Slope	1,263	9,430	88,695	3,792
Northwest Arctic	793	7,523	35,573	878
Petersburg	705	3,815	3,282	619
Prince of Wales-Hyder	1,614	5,559	3,923	877
Sitka	1,325	8,881	2,870	637
Skagway	198	968	452	71
Southeast Fairbanks	1,994	7,029	24,769	2,257
Valdez-Cordova	2,194	9,636	34,240	2,356
Wade Hampton	952	7,459	17,081	436
Wrangell	428	2,369	2,541	295
Yakutat	683	662	7,649	475
Yukon-Koyukuk	2,657	5,588	145,505	5,937
Total	45,292	710,231	570,641	39,962

Source: U S. Census Bureau 2010 Census; GCI Cell Site Data; Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table III-2
Alaska Mobile Wireless Service Coverage 2012
by Census Block

	Census Block			% with 3G/4G Served				% Unserved			
Borough / Census Area	2G Served	3G/4G Served	Unserved	% CB served	% Population served	% Area served	% Road Miles served	% CB Unserved	% Population Unserved	% Area Unserved	% Road Miles Unserved
Aleutians East	275	0	830	0%	0%	0%	0%	75%	0%	95%	36%
Aleutians West	267	0	939	0%	0%	0%	0%	78%	7%	94%	69%
Anchorage	138	4,143	56	96%	100%	27%	96%	1%	0%	46%	1%
Bethel	1,049	0	661	0%	0%	0%	0%	39%	2%	94%	74%
Bristol Bay	167	0	10	0%	0%	0%	0%	6%	5%	48%	15%
Denali	414	0	276	0%	0%	0%	0%	40%	58%	96%	73%
Dillingham	437	0	379	0%	0%	0%	0%	46%	0%	87%	36%
Fairbanks North Star	158	3,759	582	84%	99%	14%	69%	13%	1%	78%	28%
Haines	210	0	548	0%	0%	0%	0%	72%	21%	98%	70%
Hoonah-Angoon	266	8	599	1%	0%	0%	0%	69%	37%	80%	47%
Juneau	84	674	170	73%	99%	8%	50%	18%	0%	51%	31%
Kenai Peninsula	694	1,878	1,452	47%	84%	5%	48%	36%	5%	77%	25%
Ketchikan Gateway	52	391	461	43%	100%	4%	31%	51%	0%	91%	63%
Kodiak Island	21	402	1,138	26%	92%	3%	54%	73%	7%	96%	34%
Lake and Peninsula	374	0	463	0%	0%	0%	0%	55%	15%	77%	51%
Matanuska-Susitna	729	2,395	1,466	52%	94%	4%	41%	32%	2%	83%	40%
Nome	811	0	660	0%	0%	0%	0%	45%	0%	92%	74%
North Slope	519	7	737	1%	0%	0%	0%	58%	7%	99%	89%
Northwest Arctic	443	0	350	0%	0%	0%	0%	44%	5%	95%	56%
Petersburg	50	134	521	19%	79%	1%	19%	74%	19%	89%	68%
Prince of Wales-Hyder	151	15	1,448	1%	0%	0%	0%	90%	66%	91%	83%
Sitka	4	425	896	32%	99%	8%	48%	68%	1%	92%	52%
Skagway	187	0	11	0%	0%	0%	0%	6%	1%	65%	22%
Southeast Fairbanks	677	0	1,317	0%	0%	0%	0%	66%	15%	91%	69%
Valdez-Cordova	1,059	0	1,135	0%	0%	0%	0%	52%	5%	82%	55%
Wade Hampton	469	0	483	0%	0%	0%	0%	51%	0%	94%	49%
Wrangell	132	0	296	0%	0%	0%	0%	69%	27%	99%	16%
Yakutat	0	0	683	0%	0%	0%	0%	100%	100%	100%	100%
Yukon-Koyukuk	568	0	2,089	0%	0%	0%	0%	79%	54%	99%	94%
Total	10,405	14,231	20,656	31%	83%	1%	21%	46%	3%	93%	58%

Source: U.S. Census Bureau 2010 Census; GCI Cell Site Data; Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Figure III-2
Cell Site Requirement Schematic

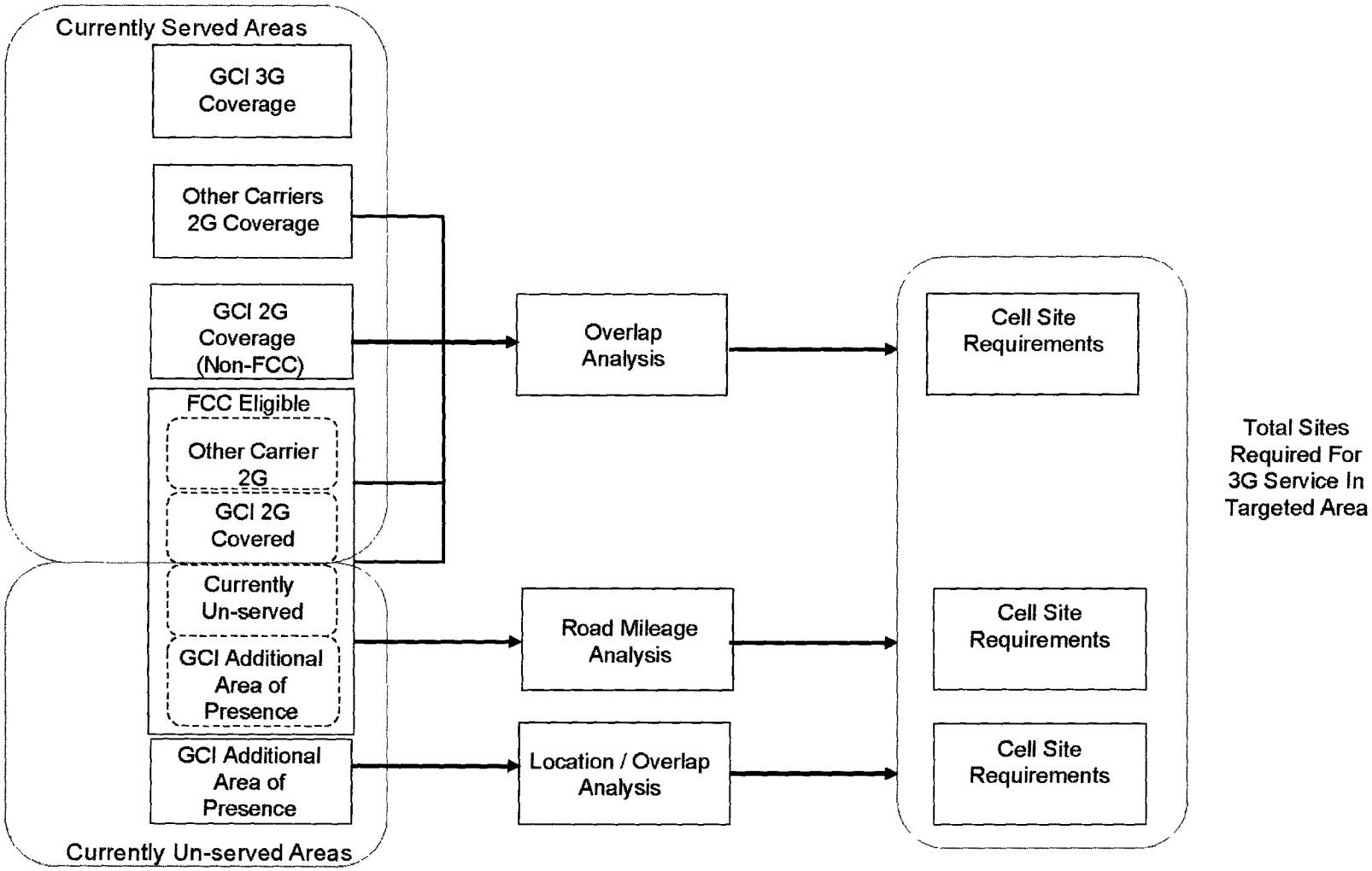

Figure III-3
Determination of Backhaul Costs

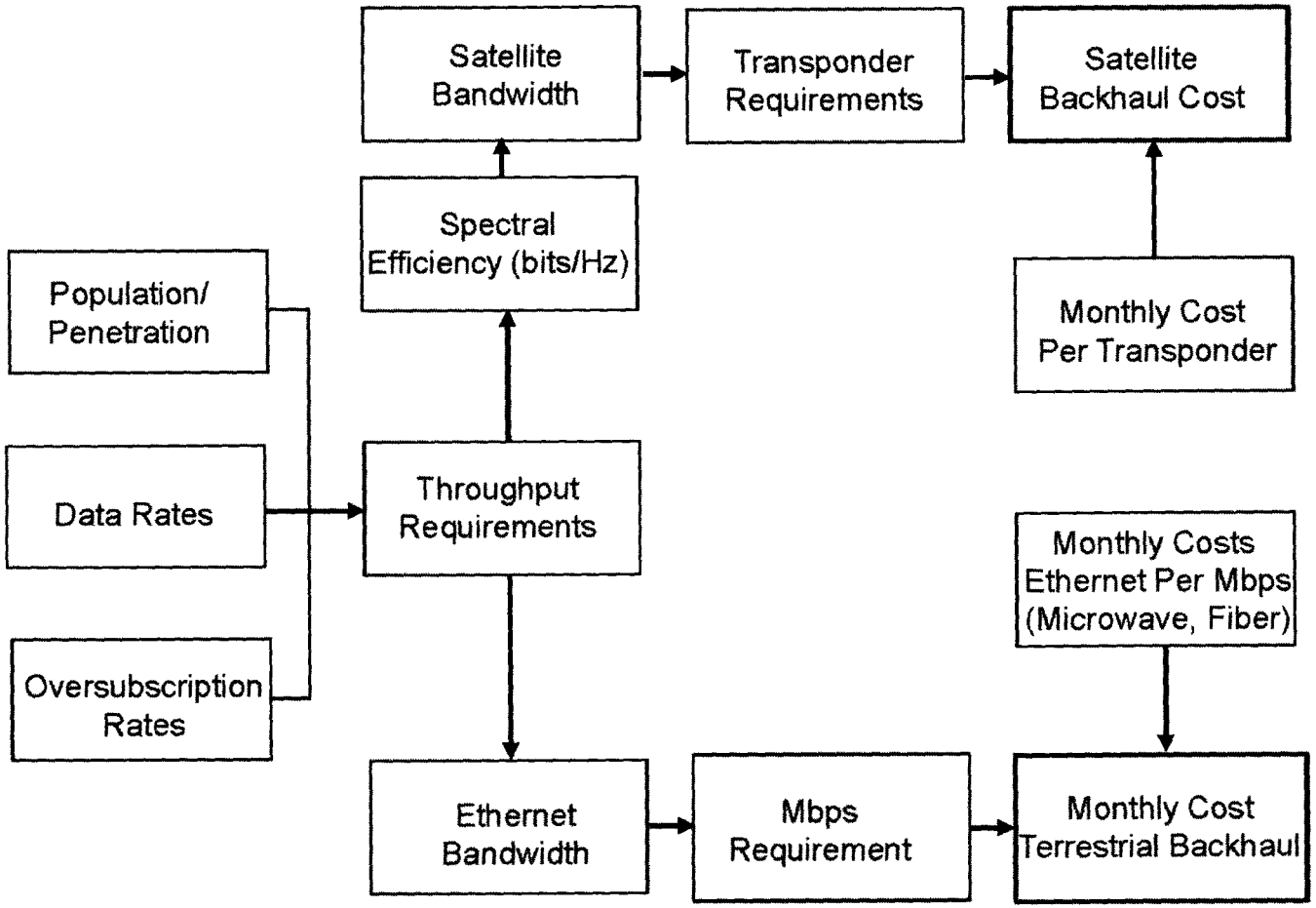

Table IV-1
FCC Potentially Eligible Areas in Alaska
by Census Block

Borough / Census Area	3G/4G Served	2G Served	Non-Wireless Presence	Currently Unserved	Wireless Served	Wireless Unserved	Total	Area	Population
					(Census Blocks)			(miles^2)	
Aleutians East	0	99	1	5	99	6	105	2,837	3,089
Aleutians West	0	186	24	58	186	82	268	645	5,556
Anchorage	5	7	0	4	12	4	16	910	495
Bethel	0	524	66	138	524	204	728	21,921	15,973
Bristol Bay	0	109	0	4	109	4	113	344	997
Denali	0	275	46	69	275	115	390	8,299	903
Dillingham	0	208	13	5	208	18	226	1,434	4,814
Fairbanks North Star	13	20	93	121	33	214	247	4,621	1,001
Haines	0	29	81	8	29	89	118	680	1,338
Hoonah-Angoon	0	35	35	24	35	59	94	5,749	776
Juneau	1	1	0	11	2	11	13	909	131
Kenai Peninsula	16	116	52	83	132	135	267	8,598	2,802
Ketchikan Gateway	11	9	4	28	20	32	52	870	106
Kodiak Island	11	3	35	35	14	70	84	1,296	960
Lake and Peninsula	0	171	22	19	171	41	212	3,764	1,541
Matanuska-Susitna	0	63	26	152	63	178	241	247	868
Nome	0	533	3	269	533	272	805	14,451	9,471
North Slope	0	296	7	294	296	301	597	77,792	6,754
Northwest Arctic	0	268	1	88	268	89	357	20,108	6,881
Petersburg	4	11	46	23	15	69	84	1,698	903
Prince of Wales-Hyder	0	26	230	29	26	259	285	1,875	2,253
Sitka	18	0	0	12	18	12	30	2,723	465
Skagway	0	18	0	6	18	6	24	208	31
Southeast Fairbanks	0	36	124	197	36	321	357	17,663	1,296
Valdez-Cordova	0	124	21	130	124	151	275	22,162	738
Wade Hampton	0	240	3	84	240	87	327	8,554	7,330
Wrangell	0	0	0	5	0	5	5	206	592
Yakutat	0	0	72	38	0	110	110	7,534	661
Yukon-Koyukuk	0	391	536	789	391	1,325	1,716	98,100	5,315
Total	79	3,798	1,541	2,728	3,877	4,269	8,146	336,196	84,040

Source U S. Census Bureau 2010 Census, GCI Cell Site Data, Carrier Cell Sites from FCC ULS database, Brattle Analysis.

Table IV-2
Additional Areas Currently Served in Alaska
Not Included as FCC Potentially Eligible Areas
by Census Block

Borough / Census Area	3G/4G Served	2G Served	Total Served	Area	Population
Aleutians East	0	176	176	280	47
Aleutians West	0	81	81	56	0
Anchorage	4,138	131	4,269	537	291,197
Bethel	0	525	525	1,573	1,014
Bristol Bay	0	58	58	66	0
Denali	0	139	139	148	57
Dillingham	0	229	229	2,053	31
Fairbanks North Star	3,746	138	3,884	1,096	96,221
Haines	0	181	181	4	1,134
Hoonah-Angoon	8	231	239	1,149	907
Juneau	673	83	756	1,273	31,098
Kenai Peninsula	1,862	578	2,440	2,587	51,207
Ketchikan Gateway	380	43	423	336	13,362
Kodiak Island	391	18	409	97	12,509
Lake and Peninsula	0	203	203	5,343	75
Matanuska-Susitna	2,395	666	3,061	4,028	87,169
Nome	0	278	278	914	21
North Slope	7	223	230	456	2,369
Northwest Arctic	0	175	175	649	331
Petersburg	130	39	169	235	2,901
Prince of Wales-Hyder	15	125	140	74	1,495
Sitka	407	4	411	34	8,413
Skagway	0	169	169	13	936
Southeast Fairbanks	0	641	641	933	5,577
Valdez-Cordova	0	935	935	4,105	8,570
Wade Hampton	0	229	229	191	123
Wrangell	0	132	132	38	1,726
Yakutat	0	0	0	0	0
Yukon-Koyukuk	0	177	177	181	223
Total	14,152	6,607	20,759	28,446	618,713

Source: U.S. Census Bureau 2010 Census; GCI Cell Site Data, Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table IV-3
Areas Not Currently Receiving Mobile Wireless Services in Alaska
But Covered By Other Telecom
by Census Block

Borough / Census Area	**Non-Wireless Presence** *(Census Block)*	**Area** *(Square Miles)*	**Population**
Aleutians East	23	1	0
Aleutians West	49	3	5
Anchorage	1	0	0
Bethel	58	201	9
Bristol Bay	1	0	0
Denali	106	173	795
Dillingham	42	12	0
Fairbanks North Star	86	104	268
Haines	270	531	29
Hoonah-Angoon	82	323	463
Juneau	0	0	0
Kenai Peninsula	183	324	1,159
Ketchikan Gateway	33	6	4
Kodiak Island	181	94	64
Lake and Peninsula	42	59	6
Matanuska-Susitna	297	758	339
Nome	32	30	0
North Slope	0	0	0
Northwest Arctic	1	69	309
Petersburg	57	3	0
Prince of Wales-Hyder	469	271	1,751
Sitka	55	0	0
Skagway	0	0	0
Southeast Fairbanks	187	374	124
Valdez-Cordova	141	378	249
Wade Hampton	12	20	0
Wrangell	45	1	20
Yakutat	57	8	1
Yukon-Koyukuk	250	916	16
Total	2,760	4,660	5,611

Source: U S Census Bureau 2010 Census; GCI Cell Site Data, Carrier Cell Sites from FCC ULS database, Brattle Analysis.

Table IV-4
Scope of 3G/4G Mobile Wireless Services in Alaska
by Census Block

Borough / Census Area	FCC Eligible Areas	Non-FCC Currently Served 2G	Non-FCC Non-Wireless Presence	Non-FCC Currently Served 3G/4G	Not Targeted	Total
			(Census Blocks)			
Aleutians East	105	176	23	0	801	1,105
Aleutians West	268	81	49	0	808	1,206
Anchorage	16	131	1	4,138	51	4,337
Bethel	728	525	58	0	399	1,710
Bristol Bay	113	58	1	0	5	177
Denali	390	139	106	0	55	690
Dillingham	226	229	42	0	319	816
Fairbanks North Star	247	138	86	3,746	282	4,499
Haines	118	181	270	0	189	758
Hoonah-Angoon	94	231	82	8	458	873
Juneau	13	83	0	673	159	928
Kenai Peninsula	267	578	183	1,862	1,134	4,024
Ketchikan Gateway	52	43	33	380	396	904
Kodiak Island	84	18	181	391	887	1,561
Lake and Peninsula	212	203	42	0	380	837
Matanuska-Susitna	241	666	297	2,395	991	4,590
Nome	805	278	32	0	356	1,471
North Slope	597	223	0	7	436	1,263
Northwest Arctic	357	175	1	0	260	793
Petersburg	84	39	57	130	395	705
Prince of Wales-Hyder	285	125	469	15	720	1,614
Sitka	30	4	55	407	829	1,325
Skagway	24	169	0	0	5	198
Southeast Fairbanks	357	641	187	0	809	1,994
Valdez-Cordova	275	935	141	0	843	2,194
Wade Hampton	327	229	12	0	384	952
Wrangell	5	132	45	0	246	428
Yakutat	110	0	57	0	516	683
Yukon-Koyukuk	1,716	177	250	0	514	2,657
Total	8,146	6,607	2,760	14,152	13,627	45,292

Source. U.S. Census Bureau 2010 Census; GCI Cell Site Data, Carrier Cell Sites from FCC ULS database, Brattle Analysis.

Table IV-5
Areas in Alaska Excluded From 3G/4G Build-Out Scope
by Census Block

Borough / Census Area	Census Blocks	Area	Population	% of Total Population
Aleutians East	801	3,864	5	0 2%
Aleutians West	808	3,686	0	0 0%
Anchorage	51	258	134	0 0%
Bethel	399	16,875	17	0.1%
Bristol Bay	5	94	0	0.0%
Denali	55	4,132	71	3.9%
Dillingham	319	15,069	2	0.0%
Fairbanks North Star	282	1,518	91	0.1%
Haines	189	1,104	7	0.3%
Hoonah-Angoon	458	304	4	0.2%
Juneau	159	520	46	0.1%
Kenai Peninsula	1,134	4,566	232	0.4%
Ketchikan Gateway	396	3,646	5	0.0%
Kodiak Island	887	5,063	59	0.4%
Lake and Peninsula	380	14,485	9	0.6%
Matanuska-Susitna	991	19,575	619	0.7%
Nome	356	7,567	0	0 0%
North Slope	436	10,447	307	3.3%
Northwest Arctic	260	14,747	2	0.0%
Petersburg	395	1,346	11	0 3%
Prince of Wales-Hyder	720	1,703	60	1 1%
Sitka	829	114	3	0.0%
Skagway	5	231	1	0 1%
Southeast Fairbanks	809	5,799	32	0 5%
Valdez-Cordova	843	7,595	79	0.8%
Wade Hampton	384	8,317	6	0 1%
Wrangell	246	2,297	31	1 3%
Yakutat	516	108	0	0.0%
Yukon-Koyukuk	514	46,309	34	0 6%
Total	13,627	201,339	1,867	0.3%

Source: U S Census Bureau 2010 Census; GCI Cell Site Data; Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table V-1
Analysis of Current Cell Sites in Alaska
by Sites in Place In 2012

Borough / Census Area	FCC Eligible Served Sites	Additional Area Currently Served 2G Sites	Additional Area Currently Served 3G/4G Sites	Total Sites
Aleutians East	5	6	0	11
Aleutians West	4	6	0	10
Anchorage	13	8	51	72
Bethel	22	13	0	35
Bristol Bay	4	0	0	4
Denali	6	6	0	12
Dillingham	10	8	0	18
Fairbanks North Star	5	6	21	32
Haines	2	5	0	7
Hoonah-Angoon	3	12	0	15
Juneau	3	15	8	26
Kenai Peninsula	9	27	17	53
Ketchikan Gateway	1	18	5	24
Kodiak Island	1	4	6	11
Lake and Peninsula	10	12	0	22
Matanuska-Susitna	0	35	23	58
Nome	17	12	0	29
North Slope	17	13	0	30
Northwest Arctic	13	4	0	17
Petersburg	3	3	1	7
Prince of Wales-Hyder	6	1	0	7
Sitka	1	1	2	4
Skagway	2	2	0	4
Southeast Fairbanks	10	11	0	21
Valdez-Cordova	33	51	0	84
Wade Hampton	11	6	0	17
Wrangell	0	5	0	5
Yakutat	0	0	0	0
Yukon-Koyukuk	11	1	0	12
Total	222	291	134	647

Source. U.S. Census Bureau 2010 Census; GCI Cell Site Data, Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table V-2
Determination of Cell Site Requirements
Areas Currently Covered by Wireless Service

Borough / Census Area	FCC Eligible 2G Served Sites	Additional Area Currently Served 2G Sites	Currently Served 3G/4G Sites	Total Sites	Total Census Blocks Covered	Total Area	Total Population
Aleutians East	5	6	0	11	275	367	3,136
Aleutians West	4	6	0	10	267	276	5,181
Anchorage	13	8	51	72	4,281	920	291,652
Bethel	22	13	0	35	1,049	2,573	16,667
Bristol Bay	4	0	0	4	167	263	949
Denali	6	6	0	12	414	531	770
Dillingham	10	8	0	18	437	2,344	4,838
Fairbanks North Star	5	6	21	32	3,917	1,645	96,699
Haines	2	5	0	7	210	37	1,982
Hoonah-Angoon	3	12	0	15	274	1,473	1,363
Juneau	3	15	8	26	758	1,330	31,210
Kenai Peninsula	9	27	17	53	2,572	3,708	52,602
Ketchikan Gateway	1	18	5	24	443	430	13,443
Kodiak Island	1	4	6	11	423	265	12,585
Lake and Peninsula	10	12	0	22	374	5,553	1,383
Matanuska-Susitna	0	35	23	58	3,124	4,105	87,513
Nome	17	12	0	29	811	1,896	9,446
North Slope	16	13	1	30	526	1,133	8,796
Northwest Arctic	13	4	0	17	443	1,902	7,158
Petersburg	3	3	1	7	184	372	3,105
Prince of Wales-Hyder	6	1	0	7	166	366	1,872
Sitka	0	1	3	4	429	226	8,822
Skagway	2	2	0	4	187	159	957
Southeast Fairbanks	10	11	0	21	677	2,137	5,969
Valdez-Cordova	33	51	0	84	1,059	6,243	9,165
Wade Hampton	11	6	0	17	469	1,006	7,431
Wrangell	0	5	0	5	132	38	1,726
Yakutat	0	0	0	0	0	0	0
Yukon-Koyukuk	11	1	0	12	568	859	2,558
Total	220	291	136	647	24,636	42,154	688,978

Source U.S. Census Bureau 2010 Census; GCI Cell Site Data, Carrier Cell Sites from FCC ULS database; Brattle Analysis.

Table V-3
Alaska Road Miles
2010 U.S. Census

Borough / Census Area	S1100/S1200/ S1400 *(Miles)*	Other Types of Roads *(Miles)*	Total Roads *(Miles)*
Aleutians East	67	103	170
Aleutians West	431	109	540
Anchorage	1,681	173	1,854
Bethel	206	1,099	1,305
Bristol Bay	86	44	130
Denali	606	398	1,004
Dillingham	119	120	239
Fairbanks North Star	2,220	882	3,102
Haines	138	124	261
Hoonah-Angoon	232	830	1,062
Juneau	324	420	745
Kenai Peninsula	2,410	646	3,056
Ketchikan Gateway	109	309	418
Kodiak Island	249	65	314
Lake and Peninsula	146	258	404
Matanuska-Susitna	2,909	1,798	4,707
Nome	448	1,574	2,022
North Slope	558	3,233	3,792
Northwest Arctic	181	697	878
Petersburg	396	223	619
Prince of Wales-Hyder	720	157	877
Sitka	380	258	637
Skagway	45	26	71
Southeast Fairbanks	1,500	757	2,257
Valdez-Cordova	1,399	958	2,356
Wade Hampton	89	348	436
Wrangell	89	206	295
Yakutat	245	229	475
Yukon-Koyukuk	1,809	4,128	5,937
Total	19,790	20,172	39,962

Source. U.S. Census Bureau 2010 Census, GCI Cell Site Data; Carrier Cell Sites from FCC ULS database, Brattle Analysis

Table V-4
Determination of Cell Site Requirements
Un-served Areas within FCC Potentially Eligible Areas

Borough / Census Area	FCC Eligible Unserved Sites	Total Area	Total Population	Total Road Miles	Avg Road Miles/ Site
Aleutians East	3	2,747	0	41	14
Aleutians West	4	288	301	204	51
Anchorage	1	526	40	3	3
Bethel	13	20,546	30	476	37
Bristol Bay	1	147	48	20	20
Denali	4	7,829	158	332	83
Dillingham	3	1,131	5	27	9
Fairbanks North Star	5	3,567	210	390	78
Haines	1	12	46	5	5
Hoonah-Angoon	3	5,305	9	167	56
Juneau	1	852	19	12	12
Kenai Peninsula	5	7,141	53	234	47
Ketchikan Gateway	13	775	25	209	16
Kodiak Island	2	1,015	430	43	21
Lake and Peninsula	6	3,420	5	107	18
Matanuska-Susitna	3	166	515	236	79
Nome	14	13,423	46	946	68
North Slope	26	77,072	327	3,205	123
Northwest Arctic	7	18,555	54	350	50
Petersburg	1	1,543	90	38	38
Prince of Wales-Hyder	1	1,044	121	75	75
Sitka	1	2,531	56	15	15
Skagway	1	62	10	14	14
Southeast Fairbanks	11	14,759	245	1,102	100
Valdez-Cordova	20	19,844	138	551	28
Wade Hampton	8	7,711	22	187	23
Wrangell	1	206	592	6	6
Yakutat	0	4,770	0	167	-
Yukon-Koyukuk	9	95,622	467	3,968	441
Total	168	312,607	4,062	13,128	78

Source: U S Census Bureau 2010 Census; GCI Cell Site Data. Carrier Cell Sites from FCC ULS database, Brattle Analysis.