

Table V-5
Determination of Cell Site Requirements
Areas with Non-Wireless Presence in Alaska

Borough / Census Area	Locations with Non- Wireless Presence	Locations with Overlap	Total Sites Required
Aleutians East	2	0	2
Aleutians West	6	0	6
Anchorage	0	0	0
Bethel	10	4	6
Bristol Bay	4	3	1
Denali	6	1	5
Dillingham	5	3	2
Fairbanks North Star	7	3	4
Haines	5	0	5
Hoonah-Angoon	5	0	5
Juneau	0	0	0
Kenai Peninsula	19	5	14
Ketchikan Gateway	2	0	2
Kodiak Island	9	2	7
Lake and Peninsula	7	1	6
Matanuska-Susitna	13	5	8
Nome	2	0	2
North Slope	1	0	1
Northwest Arctic	1	0	1
Petersburg	2	0	2
Prince of Wales-Hyder	14	0	14
Sitka	0	0	0
Skagway	0	0	0
Southeast Fairbanks	9	0	9
Valdez-Cordova	13	2	11
Wade Hampton	2	0	2
Wrangell	1	0	1
Yakutat	5	0	5
Yukon-Koyukuk	35	3	32
Total	185	32	153

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

Table V-6
Additional Cell Sites Required
to Complete 3G/4G Build-Out in Alaska

Borough / Census Area	Additional Sites to Serve FCC Eligible Areas	Additional Sites to Serve Non-Wireless Presence	Total Sites
Aleutians East	3	2	5
Aleutians West	4	6	10
Anchorage	1	0	1
Bethel	13	6	19
Bristol Bay	1	1	2
Denali	4	5	9
Dillingham	3	2	5
Fairbanks North Star	5	4	9
Haines	1	5	6
Hoonah-Angoon	3	5	8
Juneau	1	0	1
Kenai Peninsula	5	14	19
Ketchikan Gateway	13	2	15
Kodiak Island	2	7	9
Lake and Peninsula	6	6	12
Matanuska-Susitna	3	8	11
Nome	14	2	16
North Slope	26	1	27
Northwest Arctic	7	1	8
Petersburg	1	2	3
Prince of Wales-Hyder	1	14	15
Sitka	1	0	1
Skagway	1	0	1
Southeast Fairbanks	11	9	20
Valdez-Cordova	20	11	31
Wade Hampton	8	2	10
Wrangell	1	1	2
Yakutat	0	5	5
Yukon-Koyukuk	9	32	41
Total	168	153	321

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

Table V-7
Summary of Cell Site Requirements
to Complete 3G/4G Build-Out in Alaska

Borough / Census Area	FCC Eligible Served Sites	FCC Eligible Unserved Sites	Additional Area Currently Served 2G Sites	Areas with GCI Non-Wireless Presence	Total Sites
Aleutians East	5	3	6	2	16
Aleutians West	4	4	6	6	20
Anchorage	13	1	8	0	22
Bethel	22	13	13	6	54
Bristol Bay	4	1	0	1	6
Denali	6	4	6	5	21
Dillingham	10	3	8	2	23
Fairbanks North Star	5	5	6	4	20
Haines	2	1	5	5	13
Hoonah-Angoon	3	3	12	5	23
Juneau	3	1	15	0	19
Kenai Peninsula	9	5	27	14	55
Ketchikan Gateway	1	13	18	2	34
Kodiak Island	1	2	4	7	14
Lake and Peninsula	10	6	12	6	34
Matanuska-Susitna	0	3	35	8	46
Nome	17	14	12	2	45
North Slope	16	26	13	1	56
Northwest Arctic	13	7	4	1	25
Petersburg	3	1	3	2	9
Prince of Wales-Hyder	6	1	1	14	22
Sitka	0	1	1	0	2
Skagway	2	1	2	0	5
Southeast Fairbanks	10	11	11	9	41
Valdez-Cordova	33	20	51	11	115
Wade Hampton	11	8	6	2	27
Wrangell	0	1	5	1	7
Yakutat	0	0	0	5	5
Yukon-Koyukuk	11	9	1	32	53
Total	220	168	291	153	832

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

Figure VI-1
 Summary of Cost Areas For
 Upgrading / Building-Out A
 3G/4G Mobile Wireless Network in Alaska

	Network Element	Comment	Capital Costs	O&M Expenses
Cell Sites	Existing 2G Cell Site	Upgrade To 3G	Equipment and other upgrade costs	Electric power, leases and maintenance
	New 3G Cell Site	Build For 3G Requirements	Facilities, equipment, electrical and labor related costs	Electric power, leases and maintenance
	Central Network Controls	Located at Network Control Area	MSC server	Electric power, leases and maintenance
Backhaul	Satellite Backhaul	Transport leased on Satellite	Upgrade Remote VSAT Ground Station from 2G to 3G Site or New Remote VSAT Ground Station for New 3G Site Also, cost of materials, equipment, installation and labor of HUB iDirect for satellite	Cost of leasing satellite transponders
Backhaul	Terrestrial Backhaul	Leasing of terrestrial based (microwave or fiber) transport	None; leasing arrangement on microwave and	Cost of leasing ethernet capacity

Table VI-1
Capital Costs to
Upgrade Existing Cell Sites to 3G
and Build-Out New 3G/4G Cell Sites
(Cost per Cell Site)

	New Construction of 3G/4G Site	Upgrade non-Wireless Site to 3G/4G Site	Upgrade Wireless 2G Site to 3G/4G Site	MSC Server in Anchorage for Wireless 3G/4G Sites
Facility Materials, Equipment and Electrical				
Labor for Installation				
Other Construction Costs (Contracting, etc)				
Travel and Shipping				
Regulatory Costs (FCC Permits, Site Tests, etc.)				
Total				

Table VI-2
Capital Costs
Satellite Backhaul

	Remote VSAT Ground Station (Cost per Site)	HUB iDirect Satellite (Cost for Central Hub)
Facility Materials, Equipment and Electrical		
Labor for Installation		
Other Construction Costs (Contracting, etc)		
Travel and Shipping		
Regulatory Costs (FCC Permits, Site Tests, etc)		
Total		

Table VI-3
 Present Value of 3G/4G Cell Site
 O&M Expenses
 (PV per Cell Site)

	New Construction of 3G/4G Site	Upgrade non-Wireless Site to 3G/4G Site	Upgrade Wireless 2G Site to 3G/4G Site	MSC Server in Anchorage for Wireless 3G/4G Sites
Power, Lease, Other Recurring Costs				
Contracted Maintenance				
GCI Labor				
Total				

Table VI-4
 Present Value of O&M Expenses of
 Upgraded to 3G/4G or New 3G
 VSAT Ground Stations
 (PV per Station)

	New Remote VSAT Ground Station for New 3G/4G Site	Upgrade Remote VSAT Ground Station from 2G Site to 3G/4G Site
Power, Lease, Other Recurring Costs		
Contracted Maintenance		
GCI Labor		
Total		

Table VI-5
 Present Value of O&M Expenses Of
 HUB iDirect Satellite For 3G/4G Cell Sites
 (PV for Central Hub)

Population at Non-Terrestrial Locations		3,000
Population Penetration Rate		50%
Population Served (using penetration rate)		1,500
User Traffic Rate		50%
Downstream Data Rate (per user)	<i>kbps</i>	768
Upstream Data Rate (per user)	<i>kbps</i>	256
Downstream Oversubscription Rate		
Upstream Oversubscription Rate		
Upstream Throughput Required	<i>Gbps</i>	
Downstream Throughput Required	<i>Gbps</i>	
Downstream Spectral Efficiency	<i>bits/Hz</i>	
Upstream Spectral Efficiency	<i>bits/Hz</i>	
Downstream Bandwidth Required	<i>MHz</i>	
Upstream Bandwidth Required	<i>MHz</i>	
Transponder Monthly Cost (per MHz)	\$	
Cost (per month for space segment)	\$	
Annual Cost (for space segment)	\$	
Present Value (5 Years) of Bandwidth Co	\$	5,230,343

Table VI-6
 Present Value of O&M Expenses
 for Terrestrial Backhaul
 (PV for Fiber, Microwave and per Mbps Leases)

		Microwave T1	Microwave T3	Fiber T1	Fiber T3	Terra 1Mbps	Fiber 1Mbps
Population at Non-Terrestrial Locations	<i>pops</i>	500	500	500	500	500	500
Population Penetration Rate		50%	50%	50%	50%	50%	50%
Population Served (using penetration rate)	<i>pops</i>	250	250	250	250	250	250
User Traffic Rate		50%	50%	50%	50%	50%	50%
Downstream Data Rate (per user)	<i>kbps</i>	768	768	768	768	768	768
Upstream Data Rate (per user)	<i>kbps</i>	256	256	256	256	256	256
Downstream Oversubscription Rate							
Upstream Oversubscription Rate							
Downstream Throughput Required	<i>Gbps</i>						
Upstream Throughput Required	<i>Gbps</i>						
Usable Bandwidth per Unit	<i>Gbps</i>						
Bits per Pop	<i>bits/pop</i>						
Units Required							
Cost per Unit per Month at 50 Miles	\$						
Cost (per month)	\$						
Annual Cost	\$						
Present Value (5 Years) of Bandwidth Co	\$	618,195	906,197	363,134	359,760	1,942,025	48,551

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

	Monthly Cost per T3	5 Year Present Value - T3
Usable Bandwidth per Unit (Gbps)		
Lena Pt (Juneau) - Seattle or Portland		
Anchorage - Seattle or Portland		
Anchorage - Fairbanks		
Fairbanks - Seattle or Portland		

Table VII-1
Alaska Mobile Wireless Backhaul 2012
by Census Block

Borough / Census Area	Fiber Backhaul	Remote		Total Census Blocks	Total Currently Served CB	Total Currently Served Area	Total Currently Served Population
		Terrestrial Backhaul	Satellite Backhaul				
Aleutians East	0	0	275	275	275	367	3,136
Aleutians West	0	0	267	267	267	276	5,181
Anchorage	4,281	0	0	4,281	4,281	920	291,652
Bethel	0	1,025	24	1,049	1,049	2,573	16,667
Bristol Bay	0	167	0	167	167	263	949
Denali	414	0	0	414	414	531	770
Dillingham	0	437	0	437	437	2,344	4,838
Fairbanks North Star	3,917	0	0	3,917	3,917	1,645	96,699
Haines	0	210	0	210	210	37	1,982
Hoonah-Angoon	0	274	0	274	274	1,473	1,363
Juneau	758	0	0	758	758	1,330	31,210
Kenai Peninsula	2,488	0	84	2,572	2,572	3,708	52,602
Ketchikan Gateway	443	0	0	443	443	430	13,443
Kodiak Island	423	0	0	423	423	265	12,585
Lake and Peninsula	0	167	207	374	374	5,553	1,383
Matanuska-Susitna	3,124	0	0	3,124	3,124	4,105	87,513
Nome	0	0	811	811	811	1,896	9,446
North Slope	34	0	492	526	526	1,133	8,796
Northwest Arctic	0	0	443	443	443	1,902	7,158
Petersburg	184	0	0	184	184	372	3,105
Prince of Wales-Hyder	0	166	0	166	166	366	1,872
Sitka	0	429	0	429	429	226	8,822
Skagway	0	187	0	187	187	159	957
Southeast Fairbanks	662	0	15	677	677	2,137	5,969
Valdez-Cordova	1,059	0	0	1,059	1,059	6,243	9,165
Wade Hampton	0	404	65	469	469	1,006	7,431
Wrangell	132	0	0	132	132	38	1,726
Yakutat	0	0	0	0	0	0	0
Yukon-Koyukuk	0	152	416	568	568	859	2,558
Total	17,919	3,618	3,100	24,636	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 VII-2
Breakdown of Backhaul per Borough

Borough / Census Area	Fiber					Remote Terrestrial				
	FCC Eligible Served Sites	FCC Eligible Unserved Sites	Additional Area Currently Served 2G Sites	Areas with Non-Wireless Presence	Total Fiber Terrestrial Sites	FCC Eligible Served Sites	FCC Eligible Unserved Sites	Additional Area Currently Served 2G Sites	Areas with Non-Wireless Presence	Total Remote Terrestrial Sites
Aleutians East	0	0	0	0	0	0	0	0	0	0
Aleutians West	0	0	0	0	0	0	0	0	0	0
Anchorage	13	1	8	0	22	0	0	0	0	0
Bethel	0	0	0	0	0	20	13	13	6	52
Bristol Bay	0	0	0	0	0	4	1	0	1	6
Denali	6	4	6	5	21	0	0	0	0	0
Dillingham	0	0	0	0	0	10	3	8	2	23
Fairbanks North Star	5	5	6	4	20	0	0	0	0	0
Haines	0	0	0	0	0	2	1	5	5	13
Hoonah-Angoon	0	0	0	0	0	3	3	12	5	23
Juneau	3	1	15	0	19	0	0	0	0	0
Kenai Peninsula	8	4	27	14	53	0	0	0	0	0
Ketchikan Gateway	1	13	18	2	34	0	0	0	0	0
Kodiak Island	1	2	4	7	14	0	0	0	0	0
Lake and Peninsula	0	0	0	0	0	4	4	8	5	21
Matanuska-Susitna	0	3	35	8	46	0	0	0	0	0
Nome	0	0	0	0	0	0	0	0	0	0
North Slope	2	4	3	1	10	0	0	0	0	0
Northwest Arctic	0	0	0	0	0	0	0	0	0	0
Petersburg	3	1	3	2	9	0	0	0	0	0
Prince of Wales-Hyder	0	0	0	0	0	6	1	1	14	22
Sitka	0	0	0	0	0	0	1	1	0	2
Skagway	0	0	0	0	0	2	1	2	0	5
Southeast Fairbanks	8	9	10	8	35	0	0	0	0	0
Valdez-Cordova	33	20	51	11	115	0	0	0	0	0
Wade Hampton	0	0	0	0	0	10	7	6	2	25
Wrangell	0	1	5	1	7	0	0	0	0	0
Yakutat	0	0	0	0	0	0	0	0	0	0
Yukon-Koyukuk	0	0	0	0	0	2	3	1	11	17
Total	83	68	191	63	405	63	38	57	51	209

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

Table VII-2 cont.
Breakdown of Backhaul per Borough

Borough / Census Area	Satellite					Total	
	FCC Eligible Served Sites	FCC Eligible Unserved Sites	Additional Area Currently Served 2G Sites	Areas with Non-Wireless Presence	Total Satellite Sites	Total Sites	
Aleutians East	5	3	6	2	16	16	
Aleutians West	4	4	6	6	20	20	
Anchorage	0	0	0	0	0	22	
Bethel	2	0	0	0	2	54	
Bristol Bay	0	0	0	0	0	6	
Denali	0	0	0	0	0	21	
Dillingham	0	0	0	0	0	23	
Fairbanks North Star	0	0	0	0	0	20	
Haines	0	0	0	0	0	13	
Hoonah-Angoon	0	0	0	0	0	23	
Juneau	0	0	0	0	0	19	
Kenai Peninsula	1	1	0	0	2	55	
Ketchikan Gateway	0	0	0	0	0	34	
Kodiak Island	0	0	0	0	0	14	
Lake and Peninsula	6	2	4	1	13	34	
Matanuska-Susitna	0	0	0	0	0	46	
Nome	17	14	12	2	45	45	
North Slope	14	22	10	0	46	56	
Northwest Arctic	13	7	4	1	25	25	
Petersburg	0	0	0	0	0	9	
Prince of Wales-Hyder	0	0	0	0	0	22	
Sitka	0	0	0	0	0	2	
Skagway	0	0	0	0	0	5	
Southeast Fairbanks	2	2	1	1	6	41	
Valdez-Cordova	0	0	0	0	0	115	
Wade Hampton	1	1	0	0	2	27	
Wrangell	0	0	0	0	0	7	
Yakutat	0	0	0	5	5	5	
Yukon-Koyukuk	9	6	0	21	36	53	
Total	74	62	43	39	218	832	

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

Table VIII-1
Present Value of Undersea Transport Costs
FCC Eligible Areas

		Satellite (Anchorage)	Anchorage	Fairbanks	Juneau	Total
Downstream Throughput	<i>Gbps</i>					
Upstream Throughput	<i>Gbps</i>					
Lines Required	<i>Units</i>					
Monthly Underwater Transport Cost	<i>\$/Unit</i>					
Total Cost per Month	<i>\$</i>	\$289,000	\$272,000	\$32,000	\$48,000	\$641,000
PV (5 Years)		\$14,031,129	\$13,205,768	\$1,553,620	\$2,330,430	\$31,120,947
Population Served	<i>Pops</i>	19,306	18,077	806	2,950	41,139
Throughput per User	<i>Kbps/Pop</i>	40	40	56	46	

Table VIII-2
Present Value of Undersea Transport Costs
FCC Eligible Areas + Additional Currently Served Areas

		Satellite (Anchorage)	Anchorage	Fairbanks	Juneau	Total
Downstream Throughput	<i>Gbps</i>					
Upstream Throughput	<i>Gbps</i>					
Lines Required	<i>Units</i>					
Monthly Underwater Transport Cost	<i>\$/Unit</i>					
Total Cost per Month	<i>\$</i>	\$306,000	\$408,000	\$128,000	\$96,000	\$938,000
PV (5 Years)		\$14,856,489	\$19,808,652	\$6,214,479	\$4,660,859	\$45,540,480
Population Served	<i>Pops</i>	20,685	27,610	3,816	6,122	58,233
Throughput per User	<i>Kbps/Pop</i>	39	39	47	44	

Table VIII-3
Present Value of Undersea Transport Costs
FCC Eligible Areas + Additional Currently Served Areas + Other Areas with Presence

		Satellite (Anchorage)	Anchorage	Fairbanks	Juneau	Total
Downstream Throughput	<i>Gbps</i>					
Upstream Throughput	<i>Gbps</i>					
Lines Required	<i>Units</i>					
Monthly Underwater Transport Cost	<i>\$/Unit</i>					
Total Cost per Month	<i>\$</i>	\$306,000	\$425,000	\$128,000	\$112,000	\$971,000
PV (5 Years)		\$14,856,489	\$20,634,013	\$6,214,479	\$5,437,669	\$47,142,651
Population Served	<i>Pops.</i>	20,881	28,902	4,000	7,256	61,038
Throughput per User	<i>Kbps/Pop</i>	39	39	45	43	

Table IX-1
Estimated Marginal Revenue

Annual Revenue Increase	\$	15,699,312				
PV of Revenue Increase (5 Years)	\$	63,517,609				
		Annual Revenue Increase	PV of Revenue (5 Years)	Subscribers	Population	Ann. Rev / Pop Ann. Rev / Sub
Population currently served with wireless 2G						
FCC Eligible Areas		\$4,110,120	\$16,629,072		68,502	\$60
Additional Areas Currently Covered		\$2,051,280	\$8,299,243		34,188	\$60
Other Areas with Some Presence		\$0	\$0		0	-
Areas currently served with wireless 2G		\$6,161,400	\$24,928,315		102,690	\$60
Population currently unserved with wireless 2G						
FCC Eligible Areas		\$6,777,300	\$27,420,176		13,775	\$492
Additional Areas Currently Covered		\$0	\$0		0	-
Other Areas with Some Presence		\$2,760,612	\$11,169,118		5,611	\$492
Areas currently unserved with wireless 2G		\$9,537,912	\$38,589,294		19,386	\$492

Figure X-1
Model Architecture

Input	
Mapping	Census Block/ Borough/Census Area mapping
Auction_901	FCC Mobility Fund Phase I Eligibility List for the State of Alaska
Backhaul	Backhaul data by Borough/Census Area
CB	Population/Road Miles/Area data by Census Block
Sites	Existing Sites and non-wireless Presence
CB_COV	Coverage data by Census Block
Overlap Analysis	
Overlap_GCI_NFCC	Overlap Analysis (GCI and Other Non-FCC Eligible Census Blocks)
Overlap_GCI_FCC	Overlap Analysis (GCI and Other FCC Eligible Census Blocks)
Overlap_Plan_NFCC	Overlap Analysis (Planned and GCI/Other Non-FCC Eligible Census Blocks)
Overlap_Plan_FCC	Overlap Analysis (Planned and GCI/Other FCC Eligible Census Blocks)
Coverage Analysis	
Summary_FCC	Coverage Analysis (FCC Eligible Census Blocks)
Summary_All	Coverage Analysis (FCC and Non-FCC Eligible Census Blocks)
Summary_NFCC	Coverage Analysis (Non-FCC Eligible Census Blocks)
FOR_COST	Coverage Analysis Output for Cost Analysis
Cost Assumptions	
Facility_Cost	Circuit Charges
Opex_TER	Bandwidth Cost of Operating Terrestrial Backhaul
Opex_Hub_Direct	Bandwidth Cost of Operating the Hub + Direct Satellite
Backhaul_Opex_SAT	Satellite Backhaul Operations and Maintenance
Backhaul_Capex_SAT	Satellite Backhaul Capital Expenditures
Network_Opex	Network Operations and Maintenance
Network_Capex	Network Capital Expenditures
Revenue	Marginal Revenue Calculations
Cost Summary	
II_1	Summary of Capital Costs and Present Value of O&M Costs
II_2	Cost Metrics For 3G/4G Service In Targeted Area by Network and Backhaul Costs
II_3	Summary of Transportation Costs by Hub
Summ_PV_Capital_Cost	Summary of Present Value of Capital Costs
Summ_Incr_Rev	Summary of Present Value of Incremental Revenue
Summ_PV_OandM	Summary of Present Value of O&M Costs
Summ_PV_Backhaul	Summary of Present Value of Backhaul
Summ_TOTAL	Summary of Present Value of Total Costs
Coverage Summary	
III_1	State of Alaska Demographic Data by Census Block
III_2	Alaska 3G/4G Mobile Wireless Service Coverage 2012 by Census Block
IV_1	FCC Potentially Eligible Areas in Alaska by Census Block
IV_2	Additional Areas Currently Served In Alaska not Included As FCC Potentially Eligible Areas By Census Block
IV_3	Areas Not Currently Receiving Mobile Wireless Services In Alaska but Covered By Other Telecom by Census Block
IV_4	Scope of 3G/4G Mobile Wireless Services In Alaska by Census Block
IV_5	Areas In Alaska Excluded From 3G/4G Build-Out Scope by Census Block
V_1	Analysis of Current Cell Sites In Alaska by Sites In Place In 2012
V_2	Determination of Cell Site Requirements for Areas Currently Covered by Wireless Service
V_3	Alaska Road Mile: 2010 U.S. Census
V_4	Summary of Cell Site Required for Un-served Areas Within FCC Potentially Eligible Areas
V_5	Summary of Cell Sites required for Areas with Non-Wireless Presence in Alaska
V_6	Additional Cell Sites Required to Complete 3G/4G Build-Out In Alaska
V_7	Summary of Cell Site Required to Complete 3G/4G Build-Out In Alaska
VII-1	Alaska Mobile Wireless Backhaul 2012 by Census Block
VII-2	Breakdown of Backhaul per Borough
Summ_CB	Summary of Census Blocks
Summ_Pop	Summary of Population
Detailed Output	
A_1	Capital Costs and Present Value of O&M Costs for FCC Eligible Areas
A_2	Capital Costs and Present Value of O&M Costs for FCC Eligible Areas Currently With 2G Service
A_3	Capital Costs and Present Value of O&M Costs for FCC Eligible Areas Currently With Non-Wireless Presence
A_4	Capital Costs and Present Value of O&M Costs for FCC Eligible Areas Currently Unserved
A_5	Capital Costs and Present Value of O&M Costs for Additional Areas Currently Served (2G)
A_6	Capital Costs and Present Value of O&M Costs for Areas With Non-Wireless Presence
FCC_TER_2G	Present Value of Terrestrial Backhaul Cost for FCC Eligible 2G Served Areas
FCC_TER_2G_Plan	Present Value of Terrestrial Backhaul Cost for FCC Eligible 2G Served Areas + FCC Eligible Areas With Non-Wireless Presence
A_7	Present Value of Terrestrial Backhaul Cost for FCC Eligible Areas
A_8	Present Value of Terrestrial Backhaul Cost for FCC Eligible + Additional Currently Served Areas
A_9	Present Value of Terrestrial Backhaul Cost for FCC Eligible + Additional Currently Served Areas + Other Areas with Presence
FCC_SAT_2G	Present Value of Satellite Backhaul Cost for FCC Eligible 2G Served Areas
FCC_SAT_2G_Plan	Present Value of Satellite Backhaul Cost for FCC Eligible 2G Served Areas + FCC Eligible Areas With Non-Wireless Presence
A_10	Present Value of Satellite Backhaul Cost for FCC Eligible Areas
A_11	Present Value of Satellite Backhaul Cost for FCC Eligible + Additional Currently Served Areas
A_12	Present Value of Satellite Backhaul Cost for FCC Eligible + Additional Currently Served Areas + Other Areas with Presence
VIII_1	Present Value of Undersea Transport Costs for FCC Eligible Areas
VIII_2	Present Value of Undersea Transport Costs for FCC Eligible Areas + Additional Currently Served Areas
VIII_3	Present Value of Undersea Transport Costs for FCC Eligible Areas + Additional Currently Served Areas + Other Areas with Presence

APPENDIX: DETAILED OUTPUT

Following is a list of the detailed borough / census area output contained in the model and included below.

A. FCC ELIGIBLE AREAS

- Capital Costs and Present Value of O&M Costs For FCC Eligible Areas (Excluding Backhaul Costs) – **Table A-1**;
- Capital Costs and Present Value of O&M Costs For FCC Eligible Areas Currently With 2G Service (Excluding Backhaul Costs) – **Table A-2**;
- Capital Costs and Present Value of O&M Costs For FCC Eligible Areas Currently With Non-Wireless Presence (Excluding Backhaul Costs) – **Table A-3**;
- Capital Costs and Present Value of O&M Costs For FCC Eligible Areas Currently Unserved (Excluding Backhaul Costs) – **Table A-4**.

B. AREAS OTHER THAN FCC ELIGIBLE AREAS

- Capital Costs and Present Value of O&M Costs Additional Areas Currently Served (2G) (Excluding Backhaul Costs) – **Table A-5**;
- Capital Costs and Present Value of O&M Costs Areas With Non-Wireless Presence (Excluding Backhaul Costs) – **Table A-6**.

Cost details concerning the derivation of terrestrial and satellite backhaul costs by borough / census area are also available.

C. TERRESTRIAL BACKHAUL

- Present Value of Terrestrial Backhaul Cost FCC Eligible Areas – **Table A-7**;

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- Present Value of Terrestrial Backhaul Cost FCC Eligible + Additional Currently Served Areas – **Table A-8**;
- Present Value of Terrestrial Backhaul Costs FCC Eligible + Additional Currently Served Areas + Other Areas with Presence – **Table A-9**.

D. SATELLITE BACKHAUL

- Present Value of Satellite Backhaul Cost FCC Eligible Areas – **Table A-10**;
- Present Value of Satellite Backhaul Cost FCC Eligible + Additional Currently Served Areas – **Table A-11**;
- Present Value of Satellite Backhaul Cost FCC Eligible + Additional Currently Served Areas + Other Areas with Presence – **Table A-12**.

Table A-1
Capital Costs and Present Value of O&M Costs
for FCC Eligible Areas
 (Excluding Backhaul Costs)

Borough / Census Area	Total FCC Eligible Sites									
	Terrestrial Sites		Satellite Sites		Capital			Present Value (5 years) of O&M		
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
Aleutians East	0	0	8	3,089						
Aleutians West	0	0	11	5,556						
Anchorage	14	455	0	0						
Bethel	37	15748	2	226						
Bristol Bay	5	997	0	0						
Denali	13	903	0	0						
Dillingham	14	4814	0	0						
Fairbanks North Star	13	523	0	0						
Haines	6	1338	0	0						
Hoonah-Angoon	10	776	0	0						
Juneau	4	106	0	0						
Kenai Peninsula	18	1745	2	516						
Ketchikan Gateway	14	30	0	0						
Kodiak Island	5	864	0	88						
Lake and Peninsula	11	861	9	680						
Matanuska-Susitna	4	868	0	0						
Nome	0	0	32	9,471						
North Slope	7	51	36	6,703						
Northwest Arctic	0	0	20	6,881						
Petersburg	5	717	0	0						
Prince of Wales-Hyder	15	2253	0	0						
Sitka	1	56	0	0						
Skagway	3	31	0	0						
Southeast Fairbanks	24	1038	5	258						
Valdez-Cordova	55	738	0	0						
Wade Hampton	19	6817	2	513						
Wrangell	1	592	0	0						
Yakutat	0	0	3	661						
Yukon-Koyukuk	14	1345	34	3,970						
Total	312	43,664	164	38,613	145,379,720	7,406,240	152,785,960	71,468,716	8,656,308	80,125,024

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

Table A-2
Capital Costs and Present Value of O&M Costs
for FCC Eligible Areas Currently with 2G Service
 (Excluding Backhaul Costs)

Borough / Census Area	FCC Eligible Areas with Existing 2G Sites									
	Terrestrial Sites		Satellite Sites		Capital			Present Value (5 Years) of O&M		
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
Aleutians East	0	0	5	3,089						
Aleutians West	0	0	4	5,181						
Anchorage	13	415	0	0						
Bethel	20	15,443	2	210						
Bristol Bay	4	949	0	0						
Denali	6	713	0	0						
Dillingham	10	4,807	0	0						
Fairbanks North Star	5	0	0	0						
Haines	2	848	0	0						
Hoonah-Angoon	3	456	0	0						
Juneau	3	87	0	0						
Kenai Peninsula	8	379	1	475						
Ketchikan Gateway	1	5	0	0						
Kodiak Island	1	68	0	0						
Lake and Peninsula	4	736	6	572						
Matanuska-Susitna	0	344	0	0						
Nome	0	0	17	9,425						
North Slope	2	0	14	6,427						
Northwest Arctic	0	0	13	6,827						
Petersburg	3	18	0	0						
Prince of Wales-Hyder	6	377	0	0						
Sitka	0	0	0	0						
Skagway	2	21	0	0						
Southeast Fairbanks	8	315	2	77						
Valdez-Cordova	33	595	0	0						
Wade Hampton	10	6,796	1	512						
Wrangell	0	0	0	0						
Yakutat	0	0	0	0						
Yukon-Koyukuk	2	414	9	1,921						
Total	146	33,785	74	34,717	39,190,371	3,341,840	42,532,211	23,347,060	697,029	24,044,089

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

Table A-3
Capital Costs and Present Value of O&M Costs
for FCC Eligible Areas Currently with Non-Wireless Presence
 (Excluding Backhaul Costs)

Borough / Census Area	FCC Eligible Areas with Non-Wireless Presence									
	Terrestrial Sites		Satellite Sites		Capital			All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$			
Aleutians East	0	0	0	0						
Aleutians West	0	0	3	74						
Anchorage	0	0	0	0						
Bethel	4	276	0	15						
Bristol Bay	0	0	0	0						
Denali	3	32	0	0						
Dillingham	1	2	0	0						
Fairbanks North Star	3	313	0	0						
Haines	3	444	0	0						
Hoonah-Angoon	4	311	0	0						
Juneau	0	0	0	0						
Kenai Peninsula	6	1,314	0	40						
Ketchikan Gateway	0	0	0	0						
Kodiak Island	2	409	0	45						
Lake and Peninsula	3	122	1	106						
Matanuska-Susitna	1	9	0	0						
Nome	0	0	1	0						
North Slope	1	0	0	0						
Northwest Arctic	0	0	0	0						
Petersburg	1	609	0	0						
Prince of Wales-Hyder	8	1,755	0	0						
Sitka	0	0	0	0						
Skagway	0	0	0	0						
Southeast Fairbanks	7	527	1	132						
Valdez-Cordova	2	5	0	0						
Wade Hampton	2	0	0	0						
Wrangell	0	0	0	0						
Yakutat	0	0	3	661						
Yukon-Koyukuk	9	785	19	1,728						
Total	60	6,912	28	2,801	28,722,566	1,264,480	29,987,046	11,736,384	2,476,220	14,212,604

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

Table A-4
Capital Costs and Present Value of O&M Costs
for FCC Eligible Areas Currently Unserved
 (Excluding Backhaul Costs)

Borough / Census Area	FCC Eligible Areas that are Unserved									
	Terrestrial Sites		Satellite Sites		Capital			Present Value (5 Years) of O&M		
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
Aleutians East	0	0	3	0						
Aleutians West	0	0	4	301						
Anchorage	1	40	0	0						
Bethel	13	29	0	1						
Bristol Bay	1	48	0	0						
Denali	4	158	0	0						
Dillingham	3	5	0	0						
Fairbanks North Star	5	210	0	0						
Haines	1	46	0	0						
Hoonah-Angoon	3	9	0	0						
Juneau	1	19	0	0						
Kenai Peninsula	4	52	1	1						
Ketchikan Gateway	13	25	0	0						
Kodiak Island	2	387	0	43						
Lake and Peninsula	4	3	2	2						
Matanuska-Susitna	3	515	0	0						
Nome	0	0	14	46						
North Slope	4	51	22	276						
Northwest Arctic	0	0	7	54						
Petersburg	1	90	0	0						
Prince of Wales-Hyder	1	121	0	0						
Sitka	1	56	0	0						
Skagway	1	10	0	0						
Southeast Fairbanks	9	196	2	49						
Valdez-Cordova	20	138	0	0						
Wade Hampton	7	21	1	1						
Wrangell	1	592	0	0						
Yakutat	0	0	0	0						
Yukon-Koyukuk	3	146	6	321						
Total	106	2,967	62	1,095	77,466,782	2,799,920	80,266,702	36,385,272	5,483,059	41,868,331

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

Table A-5
Capital Costs and Present Value of O&M Costs
Additional Areas Currently Served (2G)
 (Excluding Backhaul Costs)

Borough / Census Area	Additional Areas Currently Served									
	Terrestrial Sites		Satellite Sites		Capital			Satellite		
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
Aleutians East	0	0	6	47						
Aleutians West	0	0	6	0						
Anchorage	8	303	0	0						
Bethel	13	1014	0	0						
Bristol Bay	0	0	0	0						
Denali	6	57	0	0						
Dillingham	8	31	0	0						
Fairbanks North Star	6	148	0	0						
Haines	5	1134	0	0						
Hoonah-Angoon	12	907	0	0						
Juneau	15	62	0	0						
Kenai Peninsula	27	5030	0	156						
Ketchikan Gateway	18	0	0	0						
Kodiak Island	4	0	0	0						
Lake and Peninsula	8	12	4	63						
Matanuska-Susitna	35	3770	0	0						
Nome	0	0	12	21						
North Slope	3	295	10	2,072						
Northwest Arctic	0	0	4	331						
Petersburg	3	85	0	0						
Prince of Wales-Hyder	1	1495	0	0						
Sitka	1	0	0	0						
Skagway	2	936	0	0						
Southeast Fairbanks	10	5577	1	0						
Valdez-Cordova	51	8570	0	0						
Wade Hampton	6	58	0	65						
Wrangell	5	1726	0	0						
Yakutat	0	0	0	0						
Yukon-Koyukuk	1	221	0	2						
Total	248	31,430	43	2,758	51,838,173	1,941,880	53,780,053	30,881,793	405,030	31,286,823

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

Table A-6
Capital Costs and Present Value of O&M Costs
Areas with Non-Wireless Presence
 (Excluding Backhaul Costs)

Borough / Census Area	Areas with a Non-Wireless Presence									
	Terrestrial Sites		Satellite Sites		Capital			Present Value (5 Years) of O&M		
	Sites	Population Covered	Sites	Population Covered	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$	All Cell Sites Cost \$	Satellite VSAT Cost \$	Total \$
Aleutians East	0	0	2	0						
Aleutians West	0	0	3	5						
Anchorage	0	0	0	0						
Bethel	2	9	0	0						
Bristol Bay	1	0	0	0						
Denali	2	795	0	0						
Dillingham	1	0	0	0						
Fairbanks North Star	1	268	0	0						
Haines	2	29	0	0						
Hoonah-Angoon	1	463	0	0						
Juneau	0	0	0	0						
Kenai Peninsula	8	1125	0	34						
Ketchikan Gateway	2	4	0	0						
Kodiak Island	5	58	0	6						
Lake and Peninsula	2	4	0	2						
Matanuska-Susitna	7	339	0	0						
Nome	0	0	1	0						
North Slope	0	0	0	0						
Northwest Arctic	0	0	1	309						
Petersburg	1	0	0	0						
Prince of Wales-Hyder	6	1751	0	0						
Sitka	0	0	0	0						
Skagway	0	0	0	0						
Southeast Fairbanks	1	100	0	24						
Valdez-Cordova	9	249	0	0						
Wade Hampton	0	0	0	0						
Wrangell	1	20	0	0						
Yakutat	0	0	2	1						
Yukon-Koyukuk	2	5	2	11						
Total	54	5,219	11	392	21,215,532	496,760	21,712,292	8,668,920	972,801	9,641,721

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

Table A-7
Present Value of Terrestrial Backhaul Cost
FCC Eligible Areas

Burrough	Total	Anchorage	Bethel	Bristol Bay	Denali	Dillingham	Fairbanks	North Star	Haines	Hoonah- Angoon (Excludes Angoon Village)	Angoon (Hoonah- Angoon)	Juneau	Kenai Peninsula	Ketchikan Gateway	Kodiak Island
										Fiber 1Mbps 10	Terra 1Mbps 80		Terra 1Mbps 80	Fiber 1Mbps 120	Terra 1Mbps 80
Population at Terrestrial Locations	<i>pops</i>	43,664	455	15,748	997	903	4,814	523	1,338	716	60	106	1,745	30	864
Population Penetration Rate		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Population Served (using penetration rate)	<i>pops</i>	21,832	228	7,874	499	452	2,407	262	669	358	30	53	872	15	432
User Traffic Rate		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Downstream Data Rate (per user)	<i>kbps</i>	768	768	768	768	768	768	768	768	768	768	768	768	768	768
Upstream Data Rate (per user)	<i>kbps</i>	256	256	256	256	256	256	256	256	256	256	256	256	256	256
Downstream Oversubscription Rate															
Upstream Oversubscription Rate															
Downstream Throughput Required	<i>Gbps</i>														
Upstream Throughput Required	<i>Gbps</i>														
Usable Bandwidth per Unit	<i>Gbps</i>														
Bits per Pop	<i>bits/pop</i>														
Units Required		768													
Cost per Unit per Month	\$														
Cost (per month)	\$	2,678,504													
Annual Cost	\$	32,142,046													
Present Value (5 Years) of Bandwidth Cost	\$	130,043,017													

Table A-7 Cont.
Present Value of Terrestrial Backhaul Cost
FCC Eligible Areas

Burrough:	Total	Lake and	Matanuska-	North Slope	Petersburg	Prince of	Sitka	Skagway	Southeast	Tok	Valdez-	Wade	Wrangell	Yukon-	
		Peninsula	Susitna			Wales-Hydr			Fairbanks (excludes Tok)	(Southeast Fairbanks)	Cordova	Hampton		Koyukuk	
Terrestrial Backhaul Type		Terra	Fiber 1Mbps	Fiber T3	Fiber T3	Microwave T1	Microwave T1	Microwave T1	Fiber 1Mbps	Microwave T1	Fiber 1Mbps	Terra 1Mbps	Fiber T3	Microwave T3	
Average Miles		80	80	500	120	200	120	120	150	200	150	80	200	80	
Population at Terrestrial Locations	pops	43,664	861	868	51	717	2,253	56	31	697	341	738	6,317	592	1,345
Population Penetration Rate	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Population Served (using penetration rate)	pops	21,832	430	434	26	359	1,127	28	16	348	171	369	3,409	296	672
User Traffic Rate	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Downstream Data Rate (per user)	kbps	768	768	768	768	768	768	768	768	768	768	768	768	768	768
Upstream Data Rate (per user)	kbps	256	256	256	256	256	256	256	256	256	256	256	256	256	256
Downstream Oversubscription Rate															
Upstream Oversubscription Rate															
Downstream Throughput Required	Gbps														
Upstream Throughput Required	Gbps														
Usable Bandwidth per Unit	Gbps														
Bits per Pop	bits/pop														
Units Required		768													
Cost per Unit per Month	\$														
Cost (per month)	\$	2,678,504													
Annual Cost	\$	32,142,046													
Present Value (5 Years) of Bandwidth Cost	\$	130,043,017													