

## Appendix E

**Unserviced Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Idaho	Fremont	12,269	\$ 18,543	6.572
Idaho	Oneida	4,108	\$ 18,316	3.422
Idaho	Shoshone	13,452	\$ 18,668	5.107
Illinois	Alexander	7,846	\$ 16,149	33.192
Illinois	Bond	18,026	\$ 22,225	47.412
Illinois	Calhoun	5,314	\$ 21,849	20.936
Illinois	Cass	13,747	\$ 19,440	36.571
Illinois	Edwards	6,367	\$ 22,174	28.635
Illinois	Fayette	22,125	\$ 20,842	30.880
Illinois	Greene	13,693	\$ 21,883	25.213
Illinois	Hamilton	8,369	\$ 20,669	19.232
Illinois	Jasper	9,637	\$ 20,765	19.492
Illinois	Johnson	13,761	\$ 17,806	39.930
Illinois	Macoupin	48,165	\$ 22,993	55.774
Illinois	Menard	12,306	\$ 26,846	39.160
Illinois	Montgomery	30,179	\$ 21,226	42.880
Illinois	Pike	16,551	\$ 20,590	19.934
Illinois	Richland	15,397	\$ 22,842	42.753
Illinois	Scott	5,238	\$ 27,800	20.876
Illinois	Union	18,283	\$ 19,230	43.933
Illinois	Wabash	12,180	\$ 23,497	54.504
Illinois	Wayne	16,043	\$ 21,263	22.472
Illinois	White	14,818	\$ 23,037	29.943
Indiana	Crawford	10,832	\$ 18,157	35.436
Indiana	Parke	16,417	\$ 18,917	36.911
Kansas	Bourbon	14,627	\$ 18,663	22.959
Kansas	Chase	3,099	\$ 20,828	3.994
Kansas	Chautauqua	3,669	\$ 22,366	5.718
Kansas	Cheyenne	2,833	\$ 19,824	2.778

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Kansas	Clark	2,017	\$ 25,120	2.069
Kansas	Decatur	2,930	\$ 21,232	3.279
Kansas	Dickinson	19,460	\$ 21,707	22.950
Kansas	Elk	3,024	\$ 21,076	4.672
Kansas	Ellis	26,453	\$ 23,231	29.393
Kansas	Ellsworth	6,320	\$ 23,581	8.828
Kansas	Graham	2,555	\$ 25,096	2.844
Kansas	Gray	5,593	\$ 20,741	6.437
Kansas	Harper	5,605	\$ 21,992	6.994
Kansas	Hodgeman	1,952	\$ 22,705	2.270
Kansas	Jewell	3,292	\$ 22,651	3.621
Kansas	Lincoln	3,287	\$ 22,136	4.572
Kansas	Marshall	10,167	\$ 21,720	11.265
Kansas	Meade	4,384	\$ 22,237	4.481
Kansas	Mitchell	5,934	\$ 23,960	8.479
Kansas	Morris	6,111	\$ 22,506	8.763
Kansas	Ness	2,764	\$ 26,231	2.572
Kansas	Osborne	3,817	\$ 21,668	4.277
Kansas	Rawlins	2,463	\$ 22,617	2.303
Kansas	Republic	4,767	\$ 23,494	6.654
Kansas	Rush	3,128	\$ 22,283	4.355
Kansas	Sheridan	2,584	\$ 23,023	2.883
Kansas	Smith	3,902	\$ 22,984	4.358
Kansas	Trego	2,876	\$ 21,353	3.238
Kentucky	Bell	28,960	\$ 14,111	80.273
Kentucky	Breckinridge	19,115	\$ 18,380	33.394
Kentucky	Butler	13,349	\$ 16,965	31.183
Kentucky	Franklin	47,535	\$ 26,590	225.862
Kentucky	Hopkins	46,806	\$ 20,965	85.016

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**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Kentucky	Jackson	13,833	\$ 14,784	39.942
Kentucky	Lee	7,328	\$ 11,448	34.919
Kentucky	Logan	27,716	\$ 19,379	49.877
Kentucky	Lyon	8,380	\$ 18,970	38.850
Kentucky	Magoffin	13,505	\$ 12,449	43.644
Kentucky	McCreary	17,537	\$ 12,079	41.003
Kentucky	McLean	9,608	\$ 21,871	37.783
Kentucky	Nelson	44,479	\$ 21,877	105.244
Kentucky	Nicholas	6,820	\$ 17,198	34.688
Kentucky	Ohio	24,032	\$ 17,987	40.472
Kentucky	Owsley	4,582	\$ 11,706	23.131
Kentucky	Powell	14,117	\$ 15,830	78.369
Kentucky	Russell	17,578	\$ 17,066	69.333
Kentucky	Washington	11,562	\$ 19,889	38.464
Kentucky	Webster	14,025	\$ 19,068	41.897
Kentucky	Whitley	38,402	\$ 14,938	87.247
Louisiana	Avoyelles Parish	42,690	\$ 16,293	51.283
Louisiana	Bienville Parish	14,574	\$ 18,700	17.978
Louisiana	Caldwell Parish	10,175	\$ 18,935	19.219
Louisiana	Cameron Parish	5,383	\$ 25,681	4.100
Louisiana	Catahoula Parish	10,208	\$ 18,465	14.507
Louisiana	Claiborne Parish	15,400	\$ 17,236	20.407
Louisiana	Concordia Parish	18,726	\$ 16,090	26.909
Louisiana	East Carroll Parish	8,149	\$ 15,720	19.336
Louisiana	Franklin Parish	19,518	\$ 17,648	31.298
Louisiana	Jackson Parish	14,680	\$ 18,971	25.766
Louisiana	Madison Parish	11,393	\$ 14,124	18.255
Louisiana	Morehouse Parish	28,023	\$ 16,047	35.282
Louisiana	Red River Parish	8,946	\$ 17,722	22.980

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**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Louisiana	Richland Parish	19,965	\$ 17,891	35.750
Louisiana	Sabine Parish	24,005	\$ 20,292	27.743
Louisiana	Tensas Parish	5,872	\$ 15,991	9.746
Louisiana	Union Parish	22,304	\$ 20,386	25.415
Louisiana	Washington Parish	44,423	\$ 17,619	66.346
Louisiana	West Carroll Parish	11,029	\$ 16,086	30.687
Louisiana	West Feliciana Parish	15,526	\$ 19,179	38.241
Louisiana	Winn Parish	14,910	\$ 15,589	15.687
Michigan	Lake	11,566	\$ 15,971	20.383
Michigan	Luce	6,420	\$ 16,462	7.109
Michigan	Montmorency	10,418	\$ 18,609	19.024
Michigan	Oscoda	8,732	\$ 19,844	15.455
Michigan	Sanilac	44,193	\$ 19,402	45.853
Minnesota	Mahnomen	5,171	\$ 18,787	9.298
Missouri	Bollinger	12,096	\$ 17,625	19.486
Missouri	Caldwell	9,410	\$ 18,918	21.917
Missouri	Cooper	17,759	\$ 18,556	31.430
Missouri	Douglas	13,850	\$ 15,283	17.004
Missouri	Dunklin	31,691	\$ 16,378	58.083
Missouri	Gasconade	15,568	\$ 20,788	29.900
Missouri	Grundy	10,184	\$ 18,432	23.368
Missouri	Harrison	9,038	\$ 18,757	12.464
Missouri	Howard	9,919	\$ 19,625	21.298
Missouri	Knox	3,870	\$ 18,434	7.653
Missouri	McDonald	24,060	\$ 17,056	44.596
Missouri	Mercer	3,525	\$ 20,032	7.761
Missouri	Oregon	10,550	\$ 14,717	13.331
Missouri	Ozark	9,290	\$ 16,438	12.518
Missouri	Pemiscot	18,541	\$ 15,866	37.603

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Missouri	Putnam	5,213	\$ 20,422	10.066
Missouri	Reynolds	6,537	\$ 17,506	8.058
Missouri	Schuyler	4,284	\$ 18,912	13.915
Missouri	Shannon	8,716	\$ 14,548	8.683
Missouri	Shelby	6,498	\$ 17,695	12.972
Missouri	Stoddard	29,491	\$ 19,080	35.655
Missouri	Vernon	20,525	\$ 17,602	24.612
Missouri	Washington	24,418	\$ 16,081	32.146
Northern Mariana Islands	Northern Islands Municipality	6	NA	0.100
Northern Mariana Islands	Rota Municipality	3,283	NA	99.584
Northern Mariana Islands	Saipan Municipality	62,392	NA	1,400.380
Northern Mariana Islands	Tinian Municipality	3,540	NA	84.815
Mississippi	Attala	19,475	\$ 17,764	26.492
Mississippi	Benton	8,052	\$ 14,157	19.794
Mississippi	Carroll	10,043	\$ 16,644	15.999
Mississippi	Choctaw	9,062	\$ 16,921	21.623
Mississippi	Claiborne	11,408	\$ 12,179	23.436
Mississippi	Clarke	17,543	\$ 17,158	25.378
Mississippi	Covington	20,795	\$ 16,675	50.255
Mississippi	George	23,410	\$ 18,505	48.945
Mississippi	Hancock	32,145	\$ 22,168	67.407
Mississippi	Holmes	20,151	\$ 11,914	26.655
Mississippi	Humphreys	10,168	\$ 13,490	24.320
Mississippi	Issaquena	1,557	\$ 11,275	3.769
Mississippi	Itawamba	23,439	\$ 19,283	44.033
Mississippi	Jasper	18,082	\$ 17,015	26.748
Mississippi	Jefferson	8,649	\$ 13,388	16.652
Mississippi	Kemper	9,427	\$ 14,805	12.305
Mississippi	Lawrence	13,273	\$ 18,606	30.822

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**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Mississippi	Leake	23,123	\$ 14,748	39.682
Mississippi	Marion	26,593	\$ 16,502	49.034
Mississippi	Monroe	36,854	\$ 18,276	48.227
Mississippi	Montgomery	11,643	\$ 16,707	28.618
Mississippi	Neshoba	31,399	\$ 17,371	55.086
Mississippi	Newton	22,735	\$ 16,484	39.332
Mississippi	Noxubee	11,737	\$ 13,123	16.893
Mississippi	Perry	11,936	\$ 16,863	18.443
Mississippi	Pontotoc	30,217	\$ 17,482	60.756
Mississippi	Prentiss	25,514	\$ 16,678	61.490
Mississippi	Scott	29,151	\$ 15,625	47.860
Mississippi	Sharkey	5,551	\$ 15,503	12.978
Mississippi	Simpson	28,247	\$ 18,112	47.979
Mississippi	Smith	16,119	\$ 17,611	25.349
Mississippi	Stone	17,237	\$ 19,745	38.703
Mississippi	Tallahatchie	13,068	\$ 12,664	20.294
Mississippi	Tishomingo	19,185	\$ 16,892	45.234
Mississippi	Union	27,691	\$ 17,765	66.656
Mississippi	Walthall	15,968	\$ 15,701	39.542
Mississippi	Warren	49,745	\$ 21,228	84.801
Mississippi	Washington	55,577	\$ 16,018	76.765
Mississippi	Wayne	20,840	\$ 16,449	25.718
Mississippi	Webster	9,880	\$ 16,294	23.385
Mississippi	Winston	19,340	\$ 16,669	31.863
Mississippi	Yalobusha	13,235	\$ 15,918	28.333
Mississippi	Yazoo	27,508	\$ 14,328	29.917
Montana	Blaine	6,501	\$ 16,858	1.538
Montana	Carter	1,307	\$ 22,737	0.391
Montana	Daniels	1,612	\$ 24,202	1.130

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**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Montana	Fallon	2,755	\$ 27,391	1.700
Montana	Garfield	1,276	\$ 21,151	0.273
Montana	Golden Valley	1,279	\$ 18,321	1.088
Montana	Judith Basin	2,084	\$ 25,442	1.115
Montana	Liberty	1,663	\$ 18,213	1.163
Montana	McCone	1,738	\$ 21,632	0.658
Montana	Meagher	1,946	\$ 18,866	0.814
Montana	Mineral	4,320	\$ 18,787	3.542
Montana	Musselshell	4,764	\$ 19,164	2.551
Montana	Petroleum	456	\$ 22,168	0.276
Montana	Phillips	3,947	\$ 22,538	0.768
Montana	Powder River	1,718	\$ 20,064	0.521
Montana	Prairie	948	\$ 24,813	0.546
Montana	Roosevelt	10,337	\$ 16,320	4.388
Montana	Sheridan	3,234	\$ 25,050	1.929
Montana	Sweet Grass	3,859	\$ 20,672	2.080
Montana	Treasure	626	\$ 20,446	0.640
Montana	Valley	6,585	\$ 23,246	1.338
Montana	Wheatland	1,773	\$ 21,912	1.246
Montana	Wibaux	864	\$ 20,506	0.972
North Carolina	Cherokee	27,728	\$ 19,953	60.915
North Carolina	Clay	10,653	\$ 22,042	49.618
North Carolina	Cleveland	97,205	\$ 18,978	209.210
North Carolina	Davie	42,433	\$ 25,929	160.013
North Carolina	Mitchell	15,172	\$ 18,522	68.519
North Carolina	Richmond	45,846	\$ 17,635	96.726
North Carolina	Robeson	134,600	\$ 15,128	141.858
North Carolina	Rockingham	92,889	\$ 20,284	163.989
North Carolina	Rutherford	63,496	\$ 19,030	112.558

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(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
North Carolina	Transylvania	29,885	\$ 23,740	78.979
North Carolina	Yadkin	38,175	\$ 19,597	113.767
North Dakota	Billings	794	\$ 31,548	0.690
North Dakota	Burke	1,827	\$ 29,507	1.656
North Dakota	Divide	2,015	\$ 27,954	1.600
North Dakota	Grant	2,463	\$ 25,104	1.484
North Dakota	McKenzie	5,871	\$ 26,100	2.141
North Dakota	Mountrail	6,300	\$ 22,928	3.454
North Dakota	Ransom	5,458	\$ 22,344	6.326
North Dakota	Sheridan	1,338	\$ 24,287	1.377
North Dakota	Sioux	4,372	\$ 11,288	3.996
Nebraska	Boone	5,414	\$ 22,360	7.884
Nebraska	Chase	3,637	\$ 21,340	4.066
Nebraska	Dundy	2,003	\$ 25,119	2.178
Nebraska	Garfield	1,714	\$ 19,512	3.007
Nebraska	Greeley	2,299	\$ 19,017	4.034
Nebraska	Hayes	968	\$ 21,318	1.357
Nebraska	Hitchcock	2,772	\$ 20,218	3.904
Nebraska	Keya Paha	831	\$ 17,771	1.075
Nebraska	Knox	8,632	\$ 19,653	7.790
Nebraska	Logan	789	\$ 21,656	1.383
Nebraska	Loup	564	\$ 18,787	0.990
Nebraska	McPherson	462	\$ 21,747	0.538
Nebraska	Perkins	2,886	\$ 22,997	3.268
Nebraska	Wheeler	843	\$ 32,717	1.466
New Mexico	Catron	3,516	\$ 20,978	0.508
New Mexico	Hidalgo	5,069	\$ 17,581	1.471
New Mexico	Mora	4,924	\$ 20,432	2.550
Nevada	Esmeralda	725	\$ 30,763	0.202

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State	County	Population	Per Capita Income (\$2009)	Population Density
Nevada	Eureka	1,516	\$ 29,080	0.363
Nevada	Humboldt	18,761	\$ 24,711	1.945
Nevada	Lander	5,806	\$ 23,233	1.057
Nevada	Mineral	5,110	\$ 23,243	1.360
Nevada	Nye	51,813	\$ 21,283	2.855
Nevada	Pershing	6,486	\$ 16,052	1.074
Ohio	Allen	104,431	\$ 21,781	258.220
Ohio	Crawford	43,620	\$ 21,100	108.477
Ohio	Fayette	28,649	\$ 21,031	70.463
Ohio	Hocking	29,060	\$ 19,257	68.741
Ohio	Madison	42,488	\$ 24,076	91.286
Ohio	Monroe	14,176	\$ 18,248	31.119
Ohio	Muskingum	86,963	\$ 20,469	130.845
Ohio	Noble	14,325	\$ 18,703	35.902
Ohio	Perry	35,724	\$ 18,913	87.179
Ohio	Pickaway	56,526	\$ 20,906	112.622
Ohio	Pike	28,279	\$ 17,370	64.054
Ohio	Putnam	34,683	\$ 23,393	71.679
Ohio	Sandusky	61,246	\$ 22,143	149.682
Ohio	Scioto	75,773	\$ 17,547	123.758
Ohio	Seneca	56,567	\$ 20,954	102.739
Ohio	Vinton	13,727	\$ 16,056	33.151
Ohio	Williams	38,646	\$ 21,369	91.635
Oklahoma	Alfalfa	5,467	\$ 20,512	6.308
Oklahoma	Beaver	5,151	\$ 24,923	2.839
Oklahoma	Blaine	13,999	\$ 17,887	15.078
Oklahoma	Caddo	29,690	\$ 16,917	23.226
Oklahoma	Cherokee	45,470	\$ 15,850	60.543
Oklahoma	Choctaw	15,305	\$ 16,486	19.776

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(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Oklahoma	Cimarron	2,678	\$ 18,364	1.459
Oklahoma	Cotton	6,474	\$ 20,410	10.169
Oklahoma	Dewey	4,329	\$ 21,388	4.328
Oklahoma	Ellis	3,849	\$ 22,510	3.131
Oklahoma	Grady	53,754	\$ 21,359	48.825
Oklahoma	Grant	4,275	\$ 23,406	4.273
Oklahoma	Harmon	3,105	\$ 16,207	5.773
Oklahoma	Harper	3,374	\$ 24,765	3.247
Oklahoma	Haskell	12,281	\$ 18,000	21.283
Oklahoma	Hughes	13,895	\$ 17,346	17.224
Oklahoma	Jefferson	6,229	\$ 17,619	8.210
Oklahoma	Kingfisher	14,569	\$ 23,320	16.134
Oklahoma	Latimer	10,578	\$ 19,586	14.647
Oklahoma	Love	9,332	\$ 20,381	18.107
Oklahoma	Major	7,238	\$ 23,560	7.565
Oklahoma	Mayes	40,435	\$ 19,199	61.626
Oklahoma	Noble	10,950	\$ 19,984	14.961
Oklahoma	Pawnee	16,559	\$ 19,639	29.079
Oklahoma	Pushmataha	11,441	\$ 15,239	8.188
Oklahoma	Roger Mills	3,453	\$ 27,915	3.024
Oklahoma	Seminole	24,666	\$ 16,781	38.997
Oklahoma	Texas	20,293	\$ 18,870	9.961
Oklahoma	Woods	8,181	\$ 22,664	6.359
Oklahoma	Woodward	19,885	\$ 23,095	16.007
Oregon	Grant	7,214	\$ 22,082	1.593
Oregon	Lake	7,494	\$ 19,817	0.921
Oregon	Wheeler	1,311	\$ 22,289	0.764
Puerto Rico <sup>#</sup>	Adjuntas Municipio	50,024	\$ 6,022	750.069
Puerto Rico <sup>#</sup>	Aguada Municipio	33,926	\$ 6,681	1,096.984

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(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Puerto Rico <sup>#</sup>	Aguadilla Municipio	56,305	\$ 7,705	1,538.780
Puerto Rico <sup>#</sup>	Aguas Buenas Municipio	22,750	\$ 7,552	744.298
Puerto Rico <sup>#</sup>	Aibonito Municipio	23,333	\$ 8,210	745.734
Puerto Rico <sup>#</sup>	Anasco Municipio	33,472	\$ 7,321	852.273
Puerto Rico <sup>#</sup>	Arecibo Municipio	127,614	\$ 8,601	1,012.899
Puerto Rico <sup>#</sup>	Arroyo Municipio	26,567	\$ 7,574	1,766.279
Puerto Rico <sup>#</sup>	Barceloneta Municipio	23,025	\$ 8,377	1,234.148
Puerto Rico <sup>#</sup>	Barranquitas Municipio	25,573	\$ 6,394	747.332
Puerto Rico <sup>#</sup>	Bayamon Municipio	33,050	\$ 12,010	744.666
Puerto Rico <sup>#</sup>	Cabo Rojo Municipio	132,380	\$ 9,113	1,881.655
Puerto Rico <sup>#</sup>	Camuy Municipio	46,197	\$ 6,722	995.065
Puerto Rico <sup>#</sup>	Canovanas Municipio	24,502	\$ 9,901	745.952
Puerto Rico <sup>#</sup>	Carolina Municipio	44,895	\$ 13,513	990.449
Puerto Rico <sup>#</sup>	Catano Municipio	5,166	\$ 9,946	1,070.770
Puerto Rico <sup>#</sup>	Cayey Municipio	38,660	\$ 9,334	744.947
Puerto Rico <sup>#</sup>	Ceiba Municipio	118,475	\$ 8,812	4,079.244
Puerto Rico <sup>#</sup>	Ciales Municipio	49,712	\$ 6,201	745.898
Puerto Rico <sup>#</sup>	Cidra Municipio	27,142	\$ 9,285	752.000
Puerto Rico <sup>#</sup>	Coamo Municipio	58,176	\$ 7,365	745.425
Puerto Rico <sup>#</sup>	Comerio Municipio	21,245	\$ 6,440	748.302
Puerto Rico <sup>#</sup>	Corozal Municipio	31,740	\$ 6,768	745.266
Puerto Rico <sup>#</sup>	Culebra Municipio	125,961	\$ 10,096	10,841.562
Puerto Rico <sup>#</sup>	Dorado Municipio	40,035	\$ 14,176	1,716.137
Puerto Rico <sup>#</sup>	Fajardo Municipio	78,505	\$ 9,217	2,628.123
Puerto Rico <sup>#</sup>	Florida Municipio	11,329	\$ 6,859	745.600
Puerto Rico <sup>#</sup>	Guanica Municipio	59,235	\$ 6,458	1,596.264
Puerto Rico <sup>#</sup>	Guayama Municipio	79,503	\$ 8,428	1,221.814
Puerto Rico <sup>#</sup>	Guayanilla Municipio	47,892	\$ 6,901	1,130.548
Puerto Rico <sup>#</sup>	Guaynabo Municipio	20,281	\$ 19,783	747.614

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Puerto Rico <sup>#</sup>	Gurabo Municipio	21,060	\$ 11,971	756.437
Puerto Rico <sup>#</sup>	Hatillo Municipio	43,806	\$ 7,695	1,048.430
Puerto Rico <sup>#</sup>	Humacao Municipio	52,980	\$ 9,662	1,183.382
Puerto Rico <sup>#</sup>	Isabela Municipio	68,480	\$ 7,246	1,236.899
Puerto Rico <sup>#</sup>	Jayuya Municipio	33,195	\$ 6,756	744.473
Puerto Rico <sup>#</sup>	Juana Diaz Municipio	79,835	\$ 7,516	1,324.167
Puerto Rico <sup>#</sup>	Juncos Municipio	19,787	\$ 8,414	744.267
Puerto Rico <sup>#</sup>	Lajas Municipio	75,388	\$ 6,784	1,254.324
Puerto Rico <sup>#</sup>	Lares Municipio	45,973	\$ 6,731	747.976
Puerto Rico <sup>#</sup>	Las Marias Municipio	34,667	\$ 6,251	748.135
Puerto Rico <sup>#</sup>	Las Piedras Municipio	25,237	\$ 8,646	744.809
Puerto Rico <sup>#</sup>	Loiza Municipio	48,980	\$ 7,575	2,519.075
Puerto Rico <sup>#</sup>	Luquillo Municipio	34,685	\$ 10,869	1,349.729
Puerto Rico <sup>#</sup>	Manati Municipio	52,639	\$ 8,544	1,165.510
Puerto Rico <sup>#</sup>	Maricao Municipio	27,316	\$ 5,558	745.724
Puerto Rico <sup>#</sup>	Maunabo Municipio	28,556	\$ 7,059	1,357.413
Puerto Rico <sup>#</sup>	Mayaguez Municipio	204,255	\$ 9,015	2,631.037
Puerto Rico <sup>#</sup>	Moca Municipio	37,542	\$ 6,158	746.546
Puerto Rico <sup>#</sup>	Morovis Municipio	28,994	\$ 5,574	745.865
Puerto Rico <sup>#</sup>	Naguabo Municipio	53,872	\$ 7,683	1,042.036
Puerto Rico <sup>#</sup>	Naranjito Municipio	20,682	\$ 6,316	761.682
Puerto Rico <sup>#</sup>	Orocovis Municipio	47,525	\$ 5,835	748.537
Puerto Rico <sup>#</sup>	Patillas Municipio	56,142	\$ 6,667	1,202.287
Puerto Rico <sup>#</sup>	Penuelas Municipio	50,598	\$ 6,349	1,140.746
Puerto Rico <sup>#</sup>	Ponce Municipio	144,144	\$ 9,291	1,256.473
Puerto Rico <sup>#</sup>	Quebradillas Municipio	25,611	\$ 6,086	1,130.700
Puerto Rico <sup>#</sup>	Rincon Municipio	40,577	\$ 8,315	2,841.282
Puerto Rico <sup>#</sup>	Rio Grande Municipio	66,722	\$ 9,589	1,098.725
Puerto Rico <sup>#</sup>	Sabana Grande Municipio	26,718	\$ 7,671	744.519

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Puerto Rico*	Salinas Municipio	85,048	\$ 6,828	1,228.791
Puerto Rico*	San German Municipio	40,695	\$ 7,784	746.571
Puerto Rico*	San Juan Municipio	56,754	\$ 15,597	1,186.931
Puerto Rico*	San Sebastian Municipio	53,064	\$ 6,589	752.963
Puerto Rico*	Santa Isabel Municipio	57,367	\$ 8,435	1,680.399
Puerto Rico*	Toa Alta Municipio	20,450	\$ 10,743	747.261
Puerto Rico*	Toa Baja Municipio	31,141	\$ 10,756	1,344.500
Puerto Rico*	Trujillo Alto Municipio	15,856	\$ 14,074	764.244
Puerto Rico*	Utua Municipio	85,770	\$ 6,469	756.025
Puerto Rico*	Vega Alta Municipio	27,931	\$ 8,699	1,006.515
Puerto Rico*	Vega Baja Municipio	50,795	\$ 8,749	1,106.838
Puerto Rico*	Vieques Municipio	196,938	\$ 7,564	3,874.548
Puerto Rico*	Villalba Municipio	27,601	\$ 6,494	778.746
Puerto Rico*	Yabucoa Municipio	62,232	\$ 7,183	1,126.306
Puerto Rico*	Yauco Municipio	51,233	\$ 7,134	751.808
South Carolina	Chester	31,441	\$ 17,798	54.160
South Carolina	Chesterfield	42,452	\$ 17,582	53.158
South Carolina	Darlington	66,563	\$ 19,794	118.620
South Carolina	Dillon	30,495	\$ 14,074	75.326
South Carolina	Fairfield	23,332	\$ 18,491	33.982
South Carolina	Florence	133,166	\$ 21,538	166.490
South Carolina	Georgetown	61,739	\$ 24,147	75.769
South Carolina	Marion	34,013	\$ 15,892	69.547
South Carolina	Marlboro	30,844	\$ 12,981	64.298
South Carolina	Williamsburg	37,001	\$ 14,636	39.620
South Dakota	Buffalo	2,169	\$ 9,820	4.609
South Dakota	Charles Mix	9,363	\$ 17,155	8.531
South Dakota	Clark	3,403	\$ 22,386	3.552
South Dakota	Corson	4,159	\$ 12,229	1.682

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
South Dakota	Deuel	4,285	\$ 22,243	6.872
South Dakota	Dewey	5,925	\$ 15,732	2.573
South Dakota	Faulk	2,253	\$ 21,613	2.253
South Dakota	Hamlin	5,653	\$ 20,972	11.153
South Dakota	Hanson	3,745	\$ 21,892	8.614
South Dakota	Harding	1,161	\$ 25,323	0.435
South Dakota	Hyde	1,517	\$ 20,482	1.762
South Dakota	Jerauld	1,987	\$ 23,358	3.750
South Dakota	Marshall	4,697	\$ 20,656	5.607
South Dakota	Potter	2,181	\$ 23,582	2.517
South Dakota	Roberts	9,969	\$ 19,263	9.052
South Dakota	Sanborn	2,496	\$ 21,260	4.387
South Dakota	Sully	1,442	\$ 26,241	1.432
South Dakota	Ziebach	2,810	\$ 11,517	1.432
Tennessee	Cannon	13,517	\$ 17,540	50.884
Tennessee	Hancock	6,711	\$ 12,810	30.190
Tennessee	Haywood	19,169	\$ 16,359	35.951
Tennessee	Houston	8,246	\$ 16,865	41.187
Tennessee	Lake	6,881	\$ 11,110	42.107
Tennessee	Lauderdale	26,429	\$ 15,890	56.178
Tennessee	Marshall	30,232	\$ 20,296	80.542
Tennessee	Scott	21,766	\$ 14,777	40.906
Texas	Atascosa	44,488	\$ 17,815	36.107
Texas	Austin	27,043	\$ 25,158	41.439
Texas	Bailey	6,453	\$ 16,578	7.806
Texas	Borden	658	\$ 38,606	0.732
Texas	Briscoe	1,503	\$ 17,389	1.670
Texas	Cherokee	48,630	\$ 17,428	46.217
Texas	Childress	7,751	\$ 15,422	10.912

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Texas	Clay	10,640	\$ 24,725	9.692
Texas	Colorado	20,747	\$ 22,135	21.545
Texas	Cottle	1,588	\$ 17,088	1.762
Texas	Crane	3,875	\$ 20,063	4.933
Texas	Dickens	2,473	\$ 17,430	2.735
Texas	Dimmit	10,499	\$ 13,077	7.889
Texas	Eastland	18,136	\$ 18,299	19.585
Texas	Edwards	1,857	\$ 26,845	0.876
Texas	Fisher	3,916	\$ 21,143	4.346
Texas	Foard	1,478	\$ 17,609	2.091
Texas	Glasscock	1,153	\$ 23,093	1.280
Texas	Goliad	7,318	\$ 26,392	8.574
Texas	Hardeman	4,076	\$ 17,751	5.862
Texas	Hemphill	3,559	\$ 30,199	3.912
Texas	Jackson	13,985	\$ 23,563	16.860
Texas	Jeff Davis	2,424	\$ 20,970	1.070
Texas	Jones	19,020	\$ 15,847	20.430
Texas	Karnes	14,983	\$ 16,388	19.969
Texas	Kenedy	420	\$ 12,892	0.288
Texas	Kent	697	\$ 29,389	0.772
Texas	King	258	\$ 32,407	0.283
Texas	Kinney	3,329	\$ 16,857	2.442
Texas	Kleberg	29,227	\$ 17,941	33.557
Texas	Knox	3,520	\$ 22,887	4.146
Texas	La Salle	6,000	\$ 14,483	4.030
Texas	Lamb	13,626	\$ 17,664	13.409
Texas	Lavaca	18,999	\$ 23,249	19.589
Texas	Leon	16,833	\$ 21,637	15.702
Texas	Live Oak	11,041	\$ 20,644	10.654

## Appendix E

**Unserviced Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Texas	Loving	59	\$ 40,046	0.088
Texas	Lynn	6,227	\$ 20,184	6.982
Texas	Madison	13,087	\$ 14,159	27.866
Texas	Martin	4,381	\$ 21,806	4.789
Texas	Matagorda	36,685	\$ 21,396	32.917
Texas	McMullen	989	\$ 20,247	0.889
Texas	Medina	45,915	\$ 19,096	34.581
Texas	Milam	24,788	\$ 20,870	24.380
Texas	Mitchell	9,149	\$ 15,058	10.053
Texas	Morris	12,466	\$ 20,113	48.980
Texas	Motley	1,278	\$ 18,893	1.292
Texas	Navarro	50,519	\$ 19,292	50.135
Texas	Newton	13,123	\$ 17,800	14.070
Texas	Ochiltree	10,001	\$ 21,530	10.900
Texas	Panola	22,938	\$ 21,944	28.640
Texas	Pecos	16,377	\$ 15,939	3.438
Texas	Polk	46,496	\$ 16,435	43.978
Texas	Presidio	7,671	\$ 16,813	1.990
Texas	Red River	12,922	\$ 19,516	12.305
Texas	Robertson	16,279	\$ 21,357	19.049
Texas	San Augustine	8,742	\$ 16,301	16.561
Texas	San Jacinto	24,740	\$ 19,304	43.354
Texas	San Saba	5,835	\$ 19,117	5.143
Texas	Schleicher	2,738	\$ 23,083	2.089
Texas	Shackelford	3,053	\$ 21,357	3.340
Texas	Shelby	27,008	\$ 19,127	34.010
Texas	Sherman	2,730	\$ 19,500	2.958
Texas	Stephens	9,775	\$ 19,248	10.926
Texas	Stonewall	1,435	\$ 23,143	1.562

## Appendix E

**Unserviced Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Texas	Terrell	998	\$ 24,052	0.423
Texas	Terry	12,150	\$ 20,576	13.654
Texas	Throckmorton	1,734	\$ 20,075	1.901
Texas	Titus	32,052	\$ 17,520	78.074
Texas	Trinity	14,179	\$ 19,125	20.465
Texas	Tyler	20,251	\$ 18,340	21.943
Texas	Upton	3,156	\$ 18,972	2.542
Texas	Ward	10,539	\$ 18,849	12.614
Texas	Washington	32,537	\$ 25,164	53.407
Texas	Wharton	40,984	\$ 21,033	37.595
Texas	Wheeler	4,905	\$ 26,444	5.365
Texas	Wilbarger	14,373	\$ 18,914	14.801
Texas	Wilson	41,837	\$ 22,710	51.844
Texas	Winkler	6,442	\$ 18,982	7.660
Texas	Young	18,243	\$ 24,970	19.779
Texas	Zavala	12,512	\$ 10,706	9.636
Utah	Carbon	19,366	\$ 20,055	13.099
Utah	Daggett	1,037	\$ 22,806	1.485
Utah	Emery	10,639	\$ 18,752	2.390
Utah	Grand	9,399	\$ 19,152	2.553
Utah	Millard	12,429	\$ 18,897	1.886
Utah	Rich	2,062	\$ 21,100	2.005
Utah	San Juan	15,598	\$ 14,024	1.995
Utah	Wayne	2,650	\$ 19,730	1.077
Virginia	Highland	2,566	\$ 24,632	6.170
Virginia	Surry	7,361	\$ 24,132	26.375
Virgin Islands	St. Croix Island	53,218	NA	642.117
Virgin Islands	St. John Island	4,200	NA	214.135
Virgin Islands	St. Thomas Island	51,181	NA	1,638.457

## Appendix E

**Unserved Counties Form 477 Data  
(Population, Population Density, & Average Per Capita Income)\***

State	County	Population	Per Capita Income (\$2009)	Population Density
Washington	Ferry	7,690	\$ 16,283	3.489
Washington	Pend Oreille	13,682	\$ 21,502	9.771
Wisconsin	Menominee	4,667	\$ 13,575	13.038
Wisconsin	Vernon	30,040	\$ 21,011	37.792
West Virginia	Calhoun	7,420	\$ 17,340	26.441
West Virginia	Doddridge	7,299	\$ 15,351	22.779
West Virginia	Hampshire	23,342	\$ 17,965	36.374
West Virginia	Pocahontas	8,457	\$ 18,666	8.994
West Virginia	Tucker	6,430	\$ 18,864	15.351

\* Form 477 Data, June 2010, 3 Mbps/768 Fixed Broadband Service. See *infra* App. F (Technical Appendix) for a description of demographic variables and data sources.

# As explained in the Technical Appendix, to the extent possible, we used the same population and household data for this report as was used for the National Broadband Map. However, because of shortcomings in the data from American Samoa and Puerto Rico, the population for these U.S. Territories was distributed uniformly across each of the territory's component areas. Hence the population data for these U.S. Territories used in the analysis of the SBDD Data and the Form 477 Data may not reflect actual populations for these areas. See *infra* App. F (Technical Appendix) for a description of demographic variables and data sources.

## APPENDIX F

### Technical Appendix

#### I. INTRODUCTION

1. The purpose of this Technical Appendix is to provide detailed information about the data used in this report to estimate broadband deployment and evaluate availability. We also provide an overview of the limitations of the data and discuss the sensitivity of our estimates to these limitations. As explained in the body of the report, we estimate that as many as 26 million Americans remain unserved by broadband.<sup>1</sup> This estimate is based on more comprehensive and granular data than any of the Commission's prior broadband reports.<sup>2</sup> This report relies primarily on the SBDD Data used to create the National Broadband Map to estimate broadband deployment across the nation.<sup>3</sup> Although Form 477 Data reports subscribership which is an imperfect proxy for deployment, to maintain consistency with past reports we have also included an analysis of Form 477 Data.<sup>4</sup> SBDD Data provide information about areas where broadband has been deployed and the maximum advertised speed that a broadband service provider can deliver within a typical service interval (7 to 10 business days),<sup>5</sup> regardless of whether there are subscribers or whether such a service is offered commercially. In contrast, Form 477 Data show the number of subscribers to a broadband provider's given advertised speed tier, but do not show the areas where broadband is deployed or whether a broadband provider's network can offer speeds higher than those subscribed to by consumers.

2. A number of limitations apply to both data sources:

- As with any large data set, both sources have errors or inconsistencies that can lead to inaccurate estimates.
- Each source reports data aggregated to some minimum geographic area (largely census blocks for SBDD, and census tracts for Form 477).<sup>6</sup> Because no information is reported below that level of aggregation, most of our analyses necessarily depend on the simplifying assumption that all end-user locations in a reported geographic area have access to the reported type and speed of broadband.
- Both data sources reflect advertised, or "up to" speeds, which may differ from actual speeds that consumers receive. Those differences may vary by technology, carrier, or time of day.
- Because the SBDD Data measure a provider's ability to provide service at a defined speed in a census block, while the Form 477 Data measure the number of subscribers to a particular

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<sup>1</sup> We define broadband as "as a transmission service that actually enables an end user to download content at speeds of at least 4 megabits per second (Mbps) and to upload content at speeds of at least 1 Mbps over the broadband provider's network (4 Mbps/1 Mbps)." *See supra Seventh Broadband Progress Report* n.2 & para. 15.

<sup>2</sup> This is the second consecutive year that we have been able to make this claim, unequivocally. *See 2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9566, para. 16. These improvements result from the Commission's continuing efforts, and the efforts of other federal and state entities, to "improve the quality of Federal and State data regarding the availability and quality of broadband services." *See* BDIA § 102, 122 Stat. at 4096.

<sup>3</sup> *See supra Seventh Broadband Progress Report* para. 21.

<sup>4</sup> *See supra id.* para. 22.

<sup>5</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557.

<sup>6</sup> SBDD Data are generally reported at the census block level and, in most instances, we treat the entire block as either served or unserved. Some SBDD Data are reported at the road-segment or address-point level, which provides some information at the sub-census-block level.

speed of service within a census tract, our analysis of these data sources to estimate unserved areas are substantially different and comparisons of them are of limited value.

- Neither data source includes information about some key factors, such as service quality or affordability that might affect our evaluation of broadband availability.<sup>7</sup>

3. The limitations of the available data require that we caveat our broadband deployment estimates as described herein. As the available data improve, so will the Commission's ability to estimate the deployment and availability of broadband in the United States.

## II. DATA SOURCES AND THEIR LIMITATIONS

### A. SBDD Data

#### 1. State Broadband Data and Development Grant Program

4. On February 17, 2011, NTIA launched the National Broadband Map, "a comprehensive, interactive, and searchable nationwide inventory map of existing broadband service capability and availability" that shows the geographic extent to which customers have access to broadband in each state.<sup>8</sup> The Map is maintained by NTIA in collaboration with the Commission, and in partnership with each state and territory and the District of Columbia.<sup>9</sup>

5. In 2009, NTIA began the process of collecting broadband data through the SBDD Program,<sup>10</sup> a matching grant program that implements the purposes of the Recovery Act and the BDIA.<sup>11</sup> Under the SBDD Program, NTIA awarded grants to assist states in gathering and verifying state-specific data on broadband services.<sup>12</sup> Awardees collect data on the availability, speed, and location of broadband services, as defined by NTIA.<sup>13</sup> Although participation by broadband providers is voluntary, most of the

<sup>7</sup> See *supra* Seventh Broadband Progress Report paras. 19, 24, 28.

<sup>8</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32546. For purposes of the National Broadband Map, NTIA defined a broadband service "available at an address if the provider does, or could, within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream and greater than 200 kbps upstream to end-users at that address." *Id.* at 32557.

<sup>9</sup> Posting of Anne Neville, SBDD Program Director, to BroadbandUSA (NTIA Blog), *NTIA Launches National Broadband Map*, <http://www2.ntia.doc.gov/node/764> (Feb. 17, 2011).

<sup>10</sup> On July 2, 2009, NTIA released the *NTIA State Mapping NOFA* setting forth the parameters to "fund projects that gather comprehensive and accurate State-level broadband mapping data, develop State-level broadband maps, [and] aid in the development and maintenance of a national broadband map, and fund statewide initiatives for broadband planning." *NTIA State Mapping NOFA*, 47 Fed. Reg. at 32547; see also Press Release, NTIA, *NTIA Announces First State Broadband Mapping Grants* (Oct. 5, 2009), [http://www.ntia.doc.gov/press/2009/BTOP\\_MappingAwards\\_091005.html](http://www.ntia.doc.gov/press/2009/BTOP_MappingAwards_091005.html).

<sup>11</sup> See U.S.C. §§ 1304(e)(10), (g), 1305(l); National Broadband Map, About >> State Broadband Programs, (State Broadband Programs) <http://www.broadbandmap.gov/about/state-broadband-programs>.

<sup>12</sup> BroadbandUSA, *Connecting America's Communities, State Broadband Data & Development Program*, <http://www2.ntia.doc.gov/SBDD> ("Since the program's inception, NTIA has awarded a total of \$293 million to 56 grantees, one each from the 50 states, 5 territories, and the District of Columbia, or their designees. Grantees will use this funding to support the efficient and creative use of broadband technology to better compete in the digital economy.").

<sup>13</sup> See NTIA, *OVERVIEW OF GRANT AWARDS* at 2.

4,600 potential broadband providers contacted have chosen to support the effort.<sup>14</sup>

6. These data were used by the NTIA and the Commission to create the National Broadband Map.<sup>15</sup> Awardees are required to update the data twice a year, over a five-year period, which will be used by NTIA and the Commission to update the Map.<sup>16</sup> NTIA and the Commission have instituted a data validation process to help ensure data integrity.<sup>17</sup>

## 2. Information Collected

7. NTIA collected statewide data about the availability, speed, and location of broadband service. Awardees were required to submit this data in compliance with the *NTIA State Mapping NOFA*, in a format specified by NTIA.<sup>18</sup> Awardees were required to submit availability, speed, and location of broadband service at the most granular level possible, including specific addresses or census block data and shapefiles for services employing wireless technologies.<sup>19</sup> To assist awardees, NTIA defined “broadband service,” “end-user,” “facilities-based” providers, “advertised speed tiers,” “typical upstream and download speed,” and how to determine if a service is “available” or whether an area is unserved, as follows:

- **Broadband Service.** A “broadband service” is defined as “the provision, on either a commercial or non-commercial basis, of data transmission technology that provides two-way data transmission to and from the Internet with advertised speeds of at least 768 kbps downstream and greater than 200 kbps upstream to end users, or providing sufficient capacity in a middle mile project to support the provision of broadband service to end-users within the project area (768 kbps/200 kbps).”<sup>20</sup>
- **End User.** An “end user” of broadband service is a residential or business party, institution or State or local government entity that may use broadband service for its own purposes and that does not resell such service to other entities or incorporate such service into retail Internet-access services. Internet Service Providers (ISPs) are not “end users.”<sup>21</sup>
- **Facilities-Based Provider.** An entity is a “facilities-based” provider of broadband-service connections to end-user locations if any of the following conditions are met:

(1) it owns the portion of the physical facility that terminates at the end-user

<sup>14</sup> See National Broadband Map, About >> Technical Mapping, <http://broadbandmap.gov/nbm/about/technical-overview>; National Broadband Map, [www.broadbandmap.gov](http://www.broadbandmap.gov). Potential broadband providers were entities the awardees initially identified as being likely to provide broadband in their geographic area. On further investigation, some potential broadband providers were not actually providing broadband. See, e.g., Data Delivery Report 1 (Colorado Broadband Data and Development Program, White Paper, Oct. 1, 2010), available at [http://www.broadbandmap.gov/download/white-papers/co\\_201010.pdf](http://www.broadbandmap.gov/download/white-papers/co_201010.pdf).

<sup>15</sup> See NTIA, OVERVIEW OF GRANT AWARDS at 2.

<sup>16</sup> See, e.g., *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32552.

<sup>17</sup> See National Broadband Map, About >> Technical Mapping, <http://www.broadbandmap.gov/about>.

<sup>18</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557 (Appendix A: Technical Appendix); *NTIA State Mapping NOFA Clarification*, 74 Fed. Reg. at 40569.

<sup>19</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557. A shapefile is a popular data format used to represent geographic areas in geographic information systems software.

<sup>20</sup> *Id.*

<sup>21</sup> *Id.*

location;

(2) it obtains UNEs, special access lines, or other leased facilities that terminate at the end-user location and provisions/equips them as broadband; or

(3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed spectrum.<sup>22</sup>

- **Advertised Speed Tiers.** Awardees are required to report services provided in nine tiers of advertised download speeds and 11 tiers of advertised upload speeds, for 99 possible combinations.<sup>23</sup>
- **Typical Upstream and Download Speed.** Awardees report the actual upstream and downstream speeds most subscribers can achieve consistently during expected periods of heavy network usage if subscribing to the maximum advertised downstream speed.<sup>24</sup>
- **Broadband “Availability.”** Broadband service is available at an address if the provider does, or could, within a typical service interval (7 to 10 business days) and without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds of at least 768 kbps downstream and greater than 200 kbps upstream to end-users at that address.<sup>25</sup>
- **Unserved Areas.** An “unserved area” is one composed of one or more contiguous census blocks where at least 90 percent of households lack access to facilities-based terrestrial broadband service, either fixed or mobile, at the minimum broadband transmission speed set forth in the definition of broadband above. A household has access to a broadband service if the household can readily subscribe to that service upon request.<sup>26</sup>

### 3. Limitations

8. Our initial analysis of the SBDD Data reveals some potential gaps and inaccuracies in the data that may affect the accuracy of our estimates of broadband deployment. These issues may result from a variety of factors. For instance, the Government Accountability Office (GAO) pointed out that issues may arise because data is compiled and verified by different entities in each state, territory, and the

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<sup>22</sup> *Id.*

<sup>23</sup> *Id.* at 32559. The breakpoints for reporting speed are 200 kbps, 768 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 10 Mbps, 25 Mbps, 50 Mbps, 100 Mbps, and 1 gigabits per second (Gbps). *See id.*

<sup>24</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32558.

<sup>25</sup> *Id.* at 32557.

<sup>26</sup> *Id.* at 32549. We note that grantees do not submit data on unserved areas, only on served areas, and that we treat any area without data provided as unserved. *See infra* para. 14 of this appendix. The *NTIA State Mapping NOFA Clarification* states that grantees must submit to NTIA “for each facilities-based provider of broadband service in their state, a list of all census blocks of no greater than two square miles in which broadband service is available to end users.” *NTIA State Mapping NOFA Clarification*, 74 Fed. Reg. at 40570. A different format is specified for census blocks larger than two square miles. *Id.* It is unclear whether grantees (or broadband providers who submitted data to the grantees) relied on the threshold in the definition of “unserved areas” in deciding whether a block is one in which broadband service is available to end users. Thus, different grantees could report a block as served if: anyone in that block is served; only everyone in that block is served; the fraction of unserved is below 90% as specified in the definition of “unserved areas;” or something else.

District of Columbia.<sup>27</sup> In addition, some misinterpretation of reporting instructions can be expected whenever a new data collection is implemented. NTIA and the Commission are working to refine the SBDD collection process to reduce error rates.

**a. Non-Reporting and Misreporting of Data May Affect Estimates of Which Areas Are Unserved**

9. Our identification of unserved areas may be overstated to the extent that providers did not submit data or submitted incomplete data.<sup>28</sup> The data do not distinguish instances in which a provider affirmatively reports it does not provide service in a census block from instances in which the data collected for that census block are incomplete. Our analysis treats blocks in which no entity reports providing service as unserved, although we recognize that the data for a block may be incomplete because none of the providers of broadband service in that block were contacted by or responded to the NTIA grant awardee.

10. First, we do not have information from broadband providers that elected not to participate in the SBDD Program or that were not contacted by a grant awardee.<sup>29</sup> NTIA received responses from roughly 3,400 of the 4,600 providers it contacted.<sup>30</sup> The impact of non-reporting by these 1,200 providers on the calculation of the unserved population is uncertain.

11. Second, we do not have complete data for some broadband providers for some of the areas in which other sources indicate they provide services. For example, the SBDD Data show only very limited coverage for Verizon in Washington, D.C. and York, Pennsylvania, even though Verizon is a leading broadband provider in these areas. Similarly, SBDD Data currently do not show any provider of cable-based broadband in San Juan, Puerto Rico, even though OneLink Communications claims to offer service there.<sup>31</sup> We do not know the reason for these omissions nor the extent to which they occur in other areas. The missing data could cause us to report some areas as having little or no broadband when, in fact, services are deployed.

12. Third, some awardees did not submit data on the speed of broadband service for all of their service areas. For example, data for areas of southern Indiana suggest that broadband is available, but because speed data were not submitted these areas appear “unserved” when the data is queried for

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<sup>27</sup> See GAO, CURRENT BROADBAND MEASURES HAVE LIMITATIONS, AND NEW MEASURES ARE PROMISING BUT NEED IMPROVEMENT, GAO-10-49, at 36–38 (Oct. 2009) (noting limitations in the SBDD Program), available at <http://www.gao.gov/new.items/d1049.pdf>.

<sup>28</sup> For the purposes of this analysis, we focus only on whether an area has access to at least one broadband provider. To the extent that a particular provider does not report but has a broadband footprint that overlaps with one or more other providers that do report, our analysis should not be affected.

<sup>29</sup> See ID Insight Feb. 15, 2011 Comments, WC Docket No. 11-16, at 1 (criticizing that only 50–75 percent of providers participated, which means 25–50 percent did not). Though imperfect, the SBDD data are the best data available to the Commission for the purpose of this analysis.

<sup>30</sup> This number of responses represents the number of unique state/operating-unit pairs (each operating unit files data for each state in which it operates). For Form 477, the Commission receives responses from approximately 4,650 unique state/operating-unit pairs. The disparity between the number of responses received for the SBDD Data (3,400) and Form 477 Data (4,650) suggests that NTIA is not receiving responses from approximately 1,200 Form 477 filers, a group that may or may not overlap with those contacted by NTIA (at least some of whom are potential but not actual providers of broadband). Some Form 477 filers with multiple operating companies in a given state, who have multiple Form 477 filings, may also have submitted a single data set to SBDD grantees.

<sup>31</sup> See OneLink, Internet, <http://www.onelinkpr.com/?Lang=EN#/men/internet/> (offering 4 Mbps and 6 Mbps broadband packages).

broadband service exceeding a given threshold.<sup>32</sup> Consequently, the data understate the deployment of broadband services in which the data are incomplete.

13. Finally, it is also possible that providers over-reported where they have deployed broadband. Such over-reporting would lead us to overstate the availability of broadband services. We lack data showing the impact of this issue on our identification of unserved areas though grantees are tasked with verifying the data they report.<sup>33</sup>

**b. “Served Areas” Data May Not Accurately Represent the Number of Served Households**

14. The SBDD Data do not attempt to measure broadband availability by household. Rather, grantees generally report whether broadband service is available in a census block.<sup>34</sup> The *NTIA State Mapping NOFA* indicates that broadband service is available if a broadband service provider does, or could, provide broadband service to an end user within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources.<sup>35</sup> Thus, the SBDD data will indicate that broadband service is available in a census block even when broadband may be unavailable at some residences.

15. Furthermore, the SBDD Data do not differentiate between providers that offer service to residential and business customers. Therefore the SBDD Data indicate that some residential areas are served by competitive local exchange carriers (LECs) that do not actually provide services to residential customers (e.g., some residential areas in Washington, D.C. show service available from business-focused providers).<sup>36</sup> This feature of the data may inflate estimates of residential broadband deployment.

**c. Data on Advertised Speed May Not Accurately Represent Consumers’ Actual Broadband Speed**

16. The SBDD Data may not accurately represent consumers’ broadband speed options for three reasons. First, the SBDD Program does not collect data for the speed tier that corresponds directly to the broadband speed threshold of 4 Mbps downstream, 1 Mbps upstream (4 Mbps/1Mbps) adopted in this report. Thus, as explained in the report, we use 3 Mbps downstream, 768 kbps upstream (3 Mbps/768 kbps) as a proxy for that speed.<sup>37</sup>

17. Second, the SBDD Program collects data on the maximum advertised speed available in an

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<sup>32</sup> See National Broadband Map, Maximum Advertised Speed, [www.broadbandmap.gov/speed](http://www.broadbandmap.gov/speed).

<sup>33</sup> See, e.g., State Broadband Programs.

<sup>34</sup> Wireless service providers may instead submit shapefiles that indicate their service areas; also, for census blocks that are larger than two square miles, providers may submit data by address or street segment. See *supra* para. 7 of this appendix.

<sup>35</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557. We note that in analyzing SBDD Data to determine the number of unserved Americans, we did not simply subtract the population of the areas that SBDD Data indicate have broadband available from the total U.S. population; because SBDD Data contain address and street segment data for census blocks that are larger than two square miles, we are able to use SBDD Data to estimate the population that has broadband available within those large blocks rather than simply declaring the entire population of those blocks “served” or “unserved” for the purpose of our analysis.

<sup>36</sup> For example, data show that companies such as Covad, Atlantech, CBeyond, and XO will serve residential areas of Washington, D.C. The SBDD Data may also indicate that certain business locations have broadband available from providers of purely residential broadband services. This possibility would not affect any conclusions in this report.

<sup>37</sup> See *supra* Seventh Broadband Progress Report para. 25.

area,<sup>38</sup> which may exceed the maximum speed to which customers subscribe, i.e., the advertised or theoretical “up to” speeds that an end-user may receive. These subscription speeds, in turn, represent the maximum speed under optimal conditions, which may be higher than typical speeds experienced by end users.<sup>39</sup> For example, the actual performance speed for mobile wireless services can be affected by the end user’s signal strength and the level of interference, which in turn can be affected by many factors that vary moment to moment, including proximity of the end user to the cell site, terrain, and obstructions. Similarly, the actual performance speed for a cable modem end user can be affected by the number of end users on shared last-mile networks.

18. The gap between the maximum speed a network can support and the speed a user will experience under typical conditions is particularly significant when the reporting threshold is close to the maximum speed. For example, the *NTIA State Mapping NOFA* allows a mobile network capable of delivering 7 Mbps to report providing service at 6 Mbps. However, if 7 Mbps represents the total capacity in a sector, the reality is that only one user could stream 6 Mbps of data at a given time. If there were many active users in a sector at the same time, each could burst up to the maximum of 7 Mbps (signal-to-interference and noise ratio permitting) but each could receive only hundreds of kbps of sustained throughput. In the cable modem context, a DOCSIS 3.0 provider, using four channels for downstream capacity, could provide approximately 150 Mbps of shared capacity. Under the NTIA guidelines, a DOCSIS 3.0 provider may reasonably report offering 100 Mbps service, but as with the example above only a very limited number of users could actually access 100 Mbps on a sustained basis. For the threshold of interest in this report—3 Mbps downstream and 768 kbps upstream—these effects are likely significant for mobile broadband, but less so for other technologies for which the top speed is not as close to the 3 Mbps/768 kbps threshold.

19. Third and finally, the *NTIA State Mapping NOFA* for a grantee to report an area as served requires that a provider be able to deliver service in a typical service interval,<sup>40</sup> with the reported speed reflecting the maximum advertised upstream and downstream speed. However, it is possible that some providers focused more on the service they could deliver within a typical service interval than their current advertised retail offerings in determining what speed they would submit to the grantee.<sup>41</sup> Moreover, the rules specified by NTIA allow providers to submit speed data “across each service area,” and service areas generally consist of multiple census blocks.<sup>42</sup> Reporting entities may have taken different approaches to this issue such that the speed reported for a given service area may not represent the advertised speed of the service deployed in every census block within that service area. That is,

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<sup>38</sup> See generally *supra* para. 7 of this appendix.

<sup>39</sup> Actual speed experienced at any given moment may differ from typical speeds. “Typical speeds” often reflect a mean or median of the actual speeds experienced, over a discrete time frame.

<sup>40</sup> *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32548 (defining “available”).

<sup>41</sup> See, e.g., National Broadband Map, About >> Technical Overview >> Data Review, <http://www.broadbandmap.gov/about/technical-overview/data-review> (describing the record-level check of SBDD Data displayed on the National Broadband Map, including a check of speed against third-party sources for each provider in each location, and the “Data Review” for each provider in each area after searching for information about a given location).

<sup>42</sup> *NTIA State Mapping NOFA Clarification*, 74 Fed. Reg. at 40570. In fact, grantees reported speed for 96% of records filed by census block at the block level for the June, 2010 data filing, with the remaining speed records supplied at a larger geography. However, even among records with speed data filed at the census block level, it is unclear from the data to which we have ready access whether speeds for each provider were determined and reported at the census-block level, or determined at a larger area and reported at the census-block level. See *id.* (“Awardees . . . may satisfy [the speed reporting] requirement by providing such speeds across each service area or local franchise area, by Metropolitan or Rural Statistical Area.”).

within a provider's service area, the advertised speed of the service may be less than the speed reported to NTIA in some census blocks while exceeding the reported speed in other census blocks. This issue may cause us to under-identify unserved areas (to the extent speeds above the benchmark are over-reported) or the converse.

## B. Form 477 Data

20. Consistent with prior broadband progress reports, we also estimate broadband deployment by analyzing the Commission's Form 477 residential broadband data.<sup>43</sup> The Commission is considering changes to improve the quality of data collected on Form 477,<sup>44</sup> while streamlining and minimizing burdens imposed on service providers.<sup>45</sup> Future broadband progress reports may therefore benefit from further improved data.

### 1. Information Collected on Form 477

21. Twice a year, the Commission requires all facilities-based providers of broadband connections to report how many subscribers purchase various broadband services in certain geographic areas.<sup>46</sup> The Commission collects speed data for eight tiers of advertised download speeds and nine tiers of advertised upload speeds, resulting in 72 possible combinations.<sup>47</sup> The reporting obligations vary by type of provider:

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<sup>43</sup> See *Seventh Broadband Progress Report* para. 28. Created in 2000, Form 477 is the Commission's primary tool for collecting data about broadband and local telephone networks and services, including interconnected VoIP services. *Modernizing Form 477 NPRM*, 26 FCC Rcd at 1510, para. 2.

<sup>44</sup> See generally *Modernizing Form 477 NPRM*, 26 FCC Rcd 1508. We note that the National Broadband Plan recommends that the Commission collect and analyze detailed market-by-market information on broadband pricing and competition. NATIONAL BROADBAND PLAN at 43-44.

<sup>45</sup> See, e.g., 47 U.S.C. § 1301(3) ("Improving Federal data on the deployment and adoption of broadband service will assist in the development of broadband technology across all regions of the Nation."); see also *Modernizing Form 477 NPRM*, 26 FCC Rcd at 1509, para. 1.

<sup>46</sup> See *Modernizing Form 477 NPRM*, 26 FCC Rcd at 1512-13, paras. 8-9 (providing general discussion of the current Form 477). We recognize there are some providers who do not file the Form 477. For purposes of Form 477, "an entity is a 'facilities-based' provider of broadband connections to end user locations if any of the following conditions are met: (1) it owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the end user location and provisions/equips them as broadband, or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed spectrum." See FCC, FCC FORM 477, INSTRUCTIONS FOR LOCAL TELEPHONE COMPETITION AND BROADBAND REPORTING, OMB 3060-0816, at 2 (2010) (FCC FORM 477), available at <http://www.fcc.gov/Forms/Form477/477inst.pdf>. Other data on Form 477 are not analyzed for the 706 report, such as the number of voice subscriptions. See *Modernizing Form 477 NPRM*, 26 FCC Rcd at 1510, para. 2 ("The form requires providers of broadband service, local telephone service, interconnected Voice over Internet Protocol (VoIP) service, and mobile telephone service to report the number of subscribers they have in their respective service areas."), citing *Local Telephone Competition and Broadband Reporting*, Report and Order, WC Docket No. 04-141, 19 FCC Rcd 22340, 22342-43, para. 3 (2004) (*2004 Broadband Data Gathering Order*).

<sup>47</sup> The Commission's broadband reporting tiers consist of an upload speed tier of 200 kbps or less and upload and download speeds of: (1) greater than 200 kbps but less than 768 kbps; (2) equal to or greater than 768 kbps but less than 1.5 Mbps; (3) equal to or greater than 1.5 Mbps but less than 3.0 Mbps; (4) equal to or greater than 3.0 Mbps but less than 6.0 Mbps; (5) equal to or greater than 6.0 Mbps but less than 10.0 Mbps; (6) equal to or greater than 10.0 Mbps but less than 25.0 Mbps; (7) equal to or greater than 25.0 Mbps but less than 100.0 Mbps; and (8) equal to or greater than 100 Mbps—for a total of 72 speed-tier combinations. See FCC FORM 477; *2008 Broadband Data Gathering Order*, 23 FCC Rcd at 9700-01, para. 20.