

Digital Television Service Maps

Executive Summary

After February 17, 2009, full-power television stations will stop broadcasting in analog and instead broadcast only in digital television (DTV). Although the Commission tried to maximize the ability of TV stations to replicate their analog coverage area as closely as possible, TV stations were not required to do so. Indeed, it has always been recognized that some stations and viewers would experience changes in their coverage. As early as 1997, in adopting the initial DTV Table of Allotments, the Commission observed that not all stations would replicate their existing coverage area.

This Report provides maps showing the analog and digital coverage areas for each of the 1749 full-power TV stations in the United States. We recognize the importance of providing the public with information regarding the estimated coverage of digital signals compared with their analog signals, and expect broadcasters to make this information publicly available and a part of their local DTV education efforts.

The vast majority of TV stations throughout the country will experience a significant increase in the population that can receive their signals. Some stations, however, are expected to experience some losses in the population that will be served by digital service as compared to their existing analog service.

Specifically, our analysis found that after the transition:

Total Viewers

Approximately 89% of stations (1553 stations) will experience an overall net gain in the population that can receive their signals.

Approximately 11% of stations (196 stations) will have an overall net loss of population served.

Existing Viewers

Approximately 11% of stations (196 stations) are predicted to experience some existing population coverage losses of 2% or more as a result of changes in their service area.

In addition, approximately 7% of stations (123 stations) are predicted to experience some existing population coverage loss of 2% when including both losses due to changes in coverage and as a result of technical differences in their digital signal (digital cliff effect).

Approximately 18% of stations (319 stations) are predicted to lose coverage of 2% or more of the existing population they reached with their analog signals.

However, about half of these stations are predicted to have an overall net gain in population served.

In most instances the losses result from a broadcaster's choice to modify its service area, often to reach more overall viewers or better conform to its local market. The station may have shifted its coverage, either by a change in transmitter location antenna pattern, power, or some combination of these factors. The digital cliff effect occurs where a station's signal is predicted not to be strong enough for reception due to various technical factors associated with the DTV transition.¹ For example, this can occur where a station has changed from a VHF to a UHF channel and the radio propagation is not as reliable over hills.

Information in this Report Regarding DTV Coverage

The DTV transition is the result of a complex planning process that began more than 10 years ago. Although the Commission tried to maximize the ability of TV stations to replicate their analog coverage area as closely as possible, TV stations were not required to do so. Indeed, it has always been recognized that some stations and viewers would experience changes in their coverage as a result of the transition.

As early as 1997, in adopting the initial DTV Table of Allotments, the Commission observed that not all stations would replicate their existing coverage area. In fact, the Commission observed that 93% of all stations received a channel that provided at least 95% service area replication.²

Similarly, in 2001, the Commission noted that "each DTV channel allotment was chosen to best allow its DTV service to match the Grade B service contour of the [analog] station with which it was paired."³ The Commission also noted, however, that most commenters opposed a replication requirement and, particularly in the case of public television stations, argued it would impose an onerous financial burden. It was argued that a replication requirement would disrupt the construction of stations, run counter to the Commission's statements encouraging the use of common antenna sites and delay the development of DTV.⁴ The Commission concluded: "After considering the comments, and balancing the arguments for and against, we have decided not to require replication. . . . To require NTSC service replication by DTV stations under these circumstances would indeed be premature, would cause excessive additional expense to both commercial and noncommercial broadcasters alike, and could delay the transition."⁵

¹ We recognize that the digital cliff effect can also occur at the fringe areas of coverage. However, this cannot be quantified and for purposes of this report we apply the term "digital cliff effect" only to losses within the service area that can be quantified.

² *Sixth Report and Order*, MM Docket No. 87-268, 12 FCC Rcd 14588 at ¶ 78 (1997). In addition, the DTV Table of Allotments in Appendix B of the subsequent Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order showed that the difference in the match between the analog and digital service areas of many stations was 2% or more.

³ *First DTV Periodic Report and Order*, released January 19, 2001, 16 FCC Rcd 5946 at ¶ 18.

⁴ *Id.* at ¶ 19.

⁵ *Id.*

Again, in 2004, when establishing the process by which stations elected their final channel for post-transition DTV operation, the Commission stated: “each DTV channel allotment was chosen to allow DTV service thereon to best match the Grade B service contour of the NTSC station with which it was paired. . . . Although we have declined to make full signal replication mandatory, we continue to believe that most DTV broadcasters eventually will replicate their NTSC coverage with DTV service.”⁶

This Report provides maps and summary statistics on the extent to which stations are predicted to 1) reach new viewers with their digital service and 2) not reach former analog viewers with their digital service. This Report also includes a map for each of the 1,749 full power DTV stations that have been broadcasting an analog signal.⁷ Each map shows predicted population coverage gains and losses on a station-by-station basis. The maps are based on statistical projections of existing analog coverage and post-transition digital coverage.

Included in this Report are maps of the entire United States for each of the top four commercial networks (ABC, CBS, FOX, and NBC) plus PBS to illustrate the nationwide gains and losses. Our analyses show that 58.3 percent of the viewers who are predicted to lose reception of one or more network affiliated stations can expect to be able to receive service from another station affiliated with that same network.

The individual station maps are grouped by the 210 Nielsen Designated Market Areas (DMAs) that television stations rely on in connection with viewing patterns.⁸ These individual station maps show areas of predicted coverage gain (denoted by green dots), loss (red triangles), and areas in which there may be loss of coverage from the station in question but where the signal is available from another station that is affiliated with the same network (orange diamonds).

Remedial Measures

The Commission has taken and is continuing to take steps to make every resource available for broadcasters to mitigate any lost service to consumers. Stations that are predicted to lose viewers have several options for restoring service, including use of so-called “translators” (including on-channel Distributed Transmission Systems (DTS) or “fill-in” stations that operate on a different channel); use of another station’s subchannel to be transmitted⁹ via multicasting; maximizing the station’s power; changing the station’s

⁶ *Second Periodic Review of the Commission’s Rules and Policies Affecting the Conversion to Digital Television*, 19 FCC Rcd 18,279 at ¶ 72 (2004).

⁷ Also included are 69 additional maps for DTV-only stations for which there is no analog comparison.

⁸ Nielsen Media Research develops the DMAs based on measured and sampled television viewing patterns. To facilitate public determination of the DMA or DMAs that are relevant, this Report also includes a list of counties and the DMAs to which they are assigned (the “DMA Key”). For example, if the area of interest is Bristol County, Rhode Island, the DMA Key shows that Bristol County is in the Providence-New Bedford DMA. It is likely that stations in neighboring DMAs will also be of interest. For example, Bristol County residents may also be interested in stations included in the Boston (Manchester) DMA.

⁹ For example, Station A may no longer reach an area which is served by another broadcaster, Station B. Station B might agree to lend or lease one of its multicast streams to Station A so that Station A’s programming would still reach its viewers over-the-air. Station A would thus be transmitted as one of Station B’s subchannels.

channel; or changing the antenna pattern. The Commission has taken steps to facilitate these remedial measures by adopting rules for stations to use DTS and expediting review of applications to maximize and requests for channel change. DTS, particularly, is a feature of digital television broadcasting that was not available with analog, and will provide broadcasters with an important tool for providing optimum signal coverage for their viewers. For some broadcasters that are changing channels or transmitting locations for their digital service, DTS may offer a good option for continuing to provide over-the-air service to current analog viewers, as well as for reaching viewers that have historically been unable to receive a good analog signal due to terrain or other interference.

The Commission also recently circulated a Notice of Proposed Rulemaking that proposes the creation of a new “replacement” digital television translator service to permit full-service television stations to continue to provide service to loss areas that have occurred as a result of their digital transition. This proposal would also allow broadcasters to apply for special temporary authority to use such translators while the rulemaking is pending.

Conclusion

The vast majority of TV stations throughout the country will experience a significant increase in the population that can receive their signals. Some stations, however, are expected to experience some losses in the population that will be served by digital service as compared to their existing analog service. In most instances the losses result from a broadcaster’s choice to modify its service area, often to reach more overall viewers or better conform to its local market.

Appendix: Methodology

The maps and data presented in this Report were prepared by Hammett & Edison, Inc., Consulting Engineers with whom the Commission contracted to show the gains and losses predicted for all individual licensed full-power television stations, comparing existing analog coverage and post-transition DTV coverage. In addition, coverage gains and losses of the major television networks were predicted on a nationwide basis. Analysis of the resulting maps and data was conducted by the Commission's Office of Engineering and Technology. The methodology and station data considered are:

Method of Analysis: Predictions of coverage were based upon a modified version of FCC/OET Bulletin No. 69,¹⁰ which was first published in 1997, and is the method used by Media Bureau to process most DTV station applications. All propagation models are statistical, meaning that they predict interference-free coverage with probabilities related to location, time, and confidence. Predictions of DTV coverage were computed with 90% confidence at the best 50% of locations, so precise locations of losses and/or gains should not be inferred by these predictions.

Stations and service considered: There are 1,818 full-service stations in the CONUS (the Continental United States), Alaska, Hawaii, Guam, Puerto Rico, Guam, and US Virgin Islands were considered. Of those stations, 69 have only DTV operation, so there is no analog baseline for comparison. The remaining 1,749 stations that have both digital and analog signals were included in this analysis. The authorized post-transition facilities of these stations were used in the generating the maps and data.

A significant number of stations have been granted permission to modify their final post-transition facilities. These changes often involve use of a different channel, power and antenna height. The analysis considered those stations modified stations. Some applications to modify stations' DTV post-transition facilities were not acted on at the time the analysis was conducted. Because there are no guarantees that the Commission will grant pending applications, such applications were not considered for this analysis.

Certain stations in Puerto Rico and Reading, PA will be operating distributed transmission systems in the post-transition environment. The improved coverage anticipated by those DTS systems was not included in the analysis.

Baseline for comparison: For each station considered, its predicted analog population coverage (2000 U.S. Census) using facilities authorized as of mid October 2008, was

¹⁰ The methodology in FCC/OET Bulletin 69 was followed, except that, in the rare cases that error code 3 occurs (KWX=3), the indicated signal strength is used to determine whether service is available. This approach is used in FCC/OET Bulletin 72 for calculating the availability of service using the Individual Location Longley-Rice model for purposes of the Satellite Home Viewer Improvement Act of 1999. This approach is considered a better predictor of the availability of service because it does not simply assume service is available every time error code 3 occurs, such as for locations behind hills.

used as the baseline.¹¹ On a nationwide basis, there are an average of 2.56 people in each household, so conversion from population to households can be estimated using that constant.

Thresholds of significance: In this study, a loss or gain of service exceeding 2% of the analog coverage baseline was considered significant. The population represented by this fraction varies depending upon the size of the population baseline.

Losses of Service: A service loss means that a particular geographic area that formerly received analog service from a station analog signal is not predicted to receive DTV service from its digital signal.

Net Gain of Service: A net gain of service occurs where the population newly served by a station's digital signal (population gain) is greater than the population that was served by its analog signal and cannot receive its digital signal (population loss). For most stations, the number of new potential viewers exceeds the number of analog viewers lost, so that DTV service overall generally provides a net gain in potential viewership.

¹¹ New construction permits were granted for 27 Stations that had 2% or greater losses of analog population and now will have less than a 2% loss. The analysis was adjusted for these grants and the appropriate maps have been included in the report. The grants were for: WABW-TV Albany, GA; WALB Albany, GA; WCES-TV Augusta, GA; WJSU-TV Birmingham, AL; KCVU Chico-Redding, CA; WZRB Columbia, SC; WLGA Columbus, GA; WTVA Columbus-Tupelo MS; KTVD Denver, CO; WBSF Flint-Saginaw-Bay City, MI; KKAI Kailu, HI; WTTV Bloomington IN; WXGA-TV Waycross GA; WBXX-TV Knoxville TN; WPGA-TV Macon GA; WDIQ Montgomery AL; WNCN Montgomery, AL; WNJU New York, NY; KYOU-TV Ottumwa IA; WPGX Panama City, FL; WTOG-TV Savannah, GA; KSLA-TV Shreveport, LA; WRBU St. Louis, MO; KTUL Tulsa, OK; KBTX-TV Waco, Temple-Bryan TX; WPXW Washington DC; and, WSFX-TV Wilmington, NC.

Nielsen Designated Market Areas

ABC Nationwide Coverage Map
CBS Nationwide Coverage Map
Fox Nationwide Coverage Map
NBC Nationwide Coverage Map
PBS Nationwide Coverage Map

<u>Tab Number</u>	<u>DMA Name</u>	<u>State</u>
1	Abilene-Sweetwater	TX
2	Albany	GA
3	Albany-Schenectady-Troy	NY
4	Albuquerque-Santa Fe	NM
5	Alexandria	LA
6	Alpena	MI
7	Amarillo	TX
8	Anchorage	AK
9	Atlanta	GA
10	Augusta	GA
11	Austin	TX
12	Bakersfield	CA
13	Baltimore	MD
14	Bangor	ME
15	Baton Rouge	LA
16	Beaumont-Port Arthur	TX
17	Bend	OR
18	Billings	MT
19	Biloxi-Gulfport	MS
20	Binghamton	NY
21	Birmingham	AL
22	Bluefield-Beckley-Oak Hill	WV
23	Boise	ID
24	Boston	MA
25	Bowling Green	KY
26	Buffalo	NY
27	Burlington-Plattsburgh	NY
28	Butte-Bozeman	MT
29	Casper-Riverton	WY
30	Cedar Rapids-Waterloo- Iowa City-Dubuque	IA
31	Champaign-Springfield- Decatur	IL
32	Charleston	SC
33	Charleston-Huntington	WV
34	Charlotte	MN

35	Charlottesville	VA
36	Chattanooga	TN
37	Cheyenne-Scottsbluff	WY
38	Chicago	IL
39	Chico-Redding	CA
40	Cincinnati	OH
41	Clarksburg-Weston	WV
42	Cleveland-Akron	OH
43	Colorado Springs-Pueblo	CO
44	Columbia	SC
45	Columbia-Jefferson City	MO
46	Columbus	GA
47	Columbus	OH
48	Columbus-Tupelo-West Point	MS
49	Corpus Christi	TX
50	Dallas-Ft. Worth	TX
51	Davenport-Rock Island-Moline	IL
52	Dayton	OH
53	Denver	CO
54	Des Moines-Ames	IA
55	Detroit	MI
56	Dothan	AL
57	Duluth-Superior	MI
58	El Paso	TX
59	Elmira	NY
60	Erie	PA
61	Eugene	OR
62	Eureka	CA
63	Evansville	IN
64	Fairbanks	AK
65	Fargo-Valley City	ND
66	Flint-Saginaw-Bay City	MI
67	Fresno-Visalia	CA
68	Ft. Myers-Naples	FL
69	Ft. Smith-Fayetteville- Springdale-Rogers	AR
70	Ft. Wayne	IN
71	Gainesville	FL
72	Glendive	MT
73	Grand Junction-Montrose	CO
74	Grand Rapids-Kalamazoo- Battle Creek	MI
75	Great Falls	MT
76	Green Bay-Appleton	MI
77	Greensboro-High Point- Winston-Salem	NC

78	Greenville-New Bern- Washington	NC
79	Greenville-Spartanburg- Asheville	NC
80	Greenwood-Greenville	MS
81	Guam	
82	Harlingen-Weslaco- Brownsville-McAllen	MS
83	Harrisburg-Lancaster- Lebanon-York	PA
84	Harrisonburg	VA
85	Hartford and New Haven	CT
86	Hattiesburg-Laurel	MS
87	Helena	MT
88	Honolulu	HI
89	Houston	TX
90	Huntsville-Decatur	AL
91	Idaho Falls-Pocatello	ID
92	Indianapolis	IN
93	Jackson	MS
94	Jackson	TN
95	Jacksonville	FL
96	Johnstown-Altoona- State College	PA
97	Jonesboro	AR
98	Joplin-Pittsburg	MO
99	Juneau	AK
100	Kansas City	KS
101	Knoxville	TN
102	La Crosse-Eau Claire	WI
103	Lafayette	IN
104	Lake Charles	LA
105	Lansing	MI
106	Laredo	TX
107	Las Vegas	NV
108	Lexington	KY
109	Lima	OH
110	Lincoln-Hastings-Kearney	NE
111	Little Rock-Pine Bluff	AR
112	Los Angeles	CA
113	Louisville	IN
114	Louisville	KY
115	Lubbock	TX
116	Macon	GA
117	Madison	WI

118	Mankato	MN
119	Marquette	MI
120	Medford-Klamath Falls	OR
121	Memphis	TN
122	Meridian	MS
123	Miami-Ft Lauderdale	FL
124	Milwaukee	WI
125	Minneapolis-St. Paul	MN
126	Minot-Bismarck-Dickinson	ND
127	Missoula	MT
128	Mobile-Pensacola	AL
129	Monroe-El Dorado	AR
130	Monterey-Salinas	CA
131	Montgomery-Selma	AL
132	Myrtle Beach-Florence	SC
133	Nashville	TN
134	New Orleans	LA
135	New York	NY
136	Norfolk-Portsmouth- Newport News	VA
137	North Platte	NE
138	Odessa-Midland	TX
139	Oklahoma City	OK
140	Omaha	NE
141	Orlando-Daytona Beach- Melbourne	FL
142	Ottumwa-Kirksville	IA
143	Paducah-Cape Girardeau- Harrisburg	KY
144	Palm Springs	FL
145	Panama City	FL
146	Parkersburg	WV
147	Peoria-Bloomington	IL
148	Philadelphia	PA
149	Phoenix	AZ
150	Pittsburgh	PA
151	Portland	OR
152	Portland-Auburn	ME
153	Presque Isle	ME
154	Providence-New Bedford	RI
155	Puerto Rico	
156	Quincy-Hannibal-Keokuk	IL
157	Raleigh-Durham	NC
158	Rapid City	SD
159	Reno	NV
160	Richmond-Petersburg	VA

161	Roanoke-Lynchburg	VA
162	Rochester	NY
163	Rochester-Mason City-Austin	IA
164	Rockford	IL
165	Sacramento-Stockton- Modesto	CA
166	Salisbury	MD
167	Salt Lake City	UT
168	San Angelo	TX
169	San Antonio	TX
170	San Diego	CA
171	San Francisco-Oakland- San Jose	CA
172	Santa Barbara-Santa Maria- San Luis Obispo	CA
173	Savannah	GA
174	Seattle Tacoma	WA
175	Sherman-Ada	OK
176	Shreveport	LA
177	Sioux City	IA
178	Sioux Falls	SD
179	South Bend	IN
180	Spokane	WA
181	Springfield	MO
182	Springfield-Holyoke	MA
183	St. Joseph	MO
184	St. Louis	MO
185	Syracuse	NY
186	Tallahassee-Thomasville	FL
187	Tampa-St. Petersburg	FL
188	Terre Haute	IN
189	Toledo	OH
190	Topeka	KS
191	Traverse City-Cadillac	MI
192	Tri-Cities	TN-VA
193	Tucson	AZ
194	Tulsa	OK
195	Twin Falls	ID
196	Tyler-Longview	TX
197	U.S. Virgin Islands	NY
198	Utica	NY
199	Victoria	TX
200	Waco-Temple-Bryan	TX
201	Washington	DC
202	Watertown	NY
203	Wausau-Rhineland	WI

204	West Palm Beach- Ft. Pierce	FL
205	Wheeling-Steubenville	WV
206	Wichita Falls-Lawton	TX
207	Wichita-Hutchinson Plus	KS
208	Wilkes Barre-Scranton	PA
209	Wilmington	NC
210	Yakima-Pasco-Richland- Kennewick	WA
211	Youngstown	OH
212	Yuma-El Centro	AZ
213	Zanesville	OH