

## **Full-Power Digital Television Stations** **Having Significant Changes in Coverage**

### **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 focuses on the stations for which it appears more than 2% of the population covered by their analog service will not be covered by their digital service. In the great majority of cases, these stations will still be serving a greater number of new viewers than the number of viewers lost. 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.<sup>1</sup>

This Report contains maps and other information for the 319 stations where more than 2% of the population covered by their analog service will not be covered by their digital service. The population losses shown on the maps actually overstates the loss as it includes people who currently receive TV broadcasting service via cable or satellite, which accounts for about 85% of all viewers (*i.e.*, only a small fraction of the viewers counted actually rely exclusively on over-the-air signals for television reception) and include people who may be receiving service from TV translators. It is also important to note that in all of these circumstances the community of license remains covered and it is predominantly viewers who live outside the actual community of license (in some cases in neighboring communities) who may lose coverage.

There are two maps and two population lists for each station. The first map shows the station's predicted population coverage gains and losses due to a change in the service area. The maps illustrate situations in which the station has shifted its coverage, either by a change in transmitter location, antenna pattern, power, or some combination of these factors. In some cases, the digital contour is smaller than the analog contour and in other cases, the contour overlaps in part and extends in part but leaves some parts of the current analog contour area outside the digital service area. 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.

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<sup>1</sup> The Commission has developed two reports on this important topic. The first report, published separately, provides maps showing the analog and digital coverage areas for each of the 1749 full-power TV stations.

The second map shows the station's complete coverage gains and losses, including losses inside the service area due to the digital "cliff effect".<sup>2</sup> 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. 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. An additional 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).

### **Information in this Second Report**

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.<sup>3</sup>

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."<sup>4</sup> 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.<sup>5</sup> 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."<sup>6</sup>

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

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<sup>2</sup> 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.

<sup>3</sup> *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.

<sup>4</sup> *First DTV Periodic Report and Order*, released January 19, 2001, 16 FCC Rcd 5946 at ¶ 18.

<sup>5</sup> *Id.* at ¶ 19.

<sup>6</sup> *Id.*

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.”<sup>7</sup>

This Report contains maps and other information for the stations where more than 2% of the population covered by their analog service will not be covered by their digital service. The maps are grouped by the Nielsen Designated Market Areas (DMAs) that television stations rely on in connection with viewing patterns.<sup>8</sup>

There are two maps and two population lists for each station. The first map shows the station’s predicted population coverage gains and losses due to a change in the service area. The maps illustrate situations in which the station has shifted its coverage, either by a change in transmitter, location, antenna pattern, power, or some combination of these factors. In some cases, the digital contour is smaller than the analog contour and in other cases, the contour overlaps in part and extends in part but leaves some parts of the current analog contour area outside the digital service area. Following this map is a page with the detailed population coverage information associated with the map, including the analog and digital population covered by the respective service areas, the gains and losses, and the net gains or losses of population covered.

The second map shows the station’s complete coverage gains and losses, including losses inside the service area due to the digital “cliff effect”. 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. 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. Following this second map is a page with the detailed population coverage information associated with the second map, again including the analog and digital population covered by the respective service areas, the gains and losses, and the net gains or losses of population covered.

The 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 (yellow diamonds). In cases where a station is expected to operate with specific facilities (power, antenna height, antenna pattern and/or location) on February 18, 2009 but will modify those facilities to increase its coverage later in the year, only a map of the coverage associated with the ultimate facility is provided.

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<sup>7</sup> *Second Periodic Review of the Commission’s Rules and Policies Affecting the Conversion to Digital Television*, 19 FCC Rcd 18,279 at ¶ 72 (2004).

<sup>8</sup> 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.

In Appendix A we include: 1) sample maps illustrating each of the various types of losses; 2) a key showing the tab numbers used for each DMA and 3) the station maps, with all the station maps grouped by DMA and a numbered tab showing the location of each DMA.

## **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 transmitted<sup>9</sup> via multicasting; maximizing the station’s power; changing the station’s 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**

This second report shows the stations that are expected to experience a 2% or greater loss of population covered by their digital service as compared to their analog service. In many of these 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 market.

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<sup>9</sup> 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.

APPENDIX A

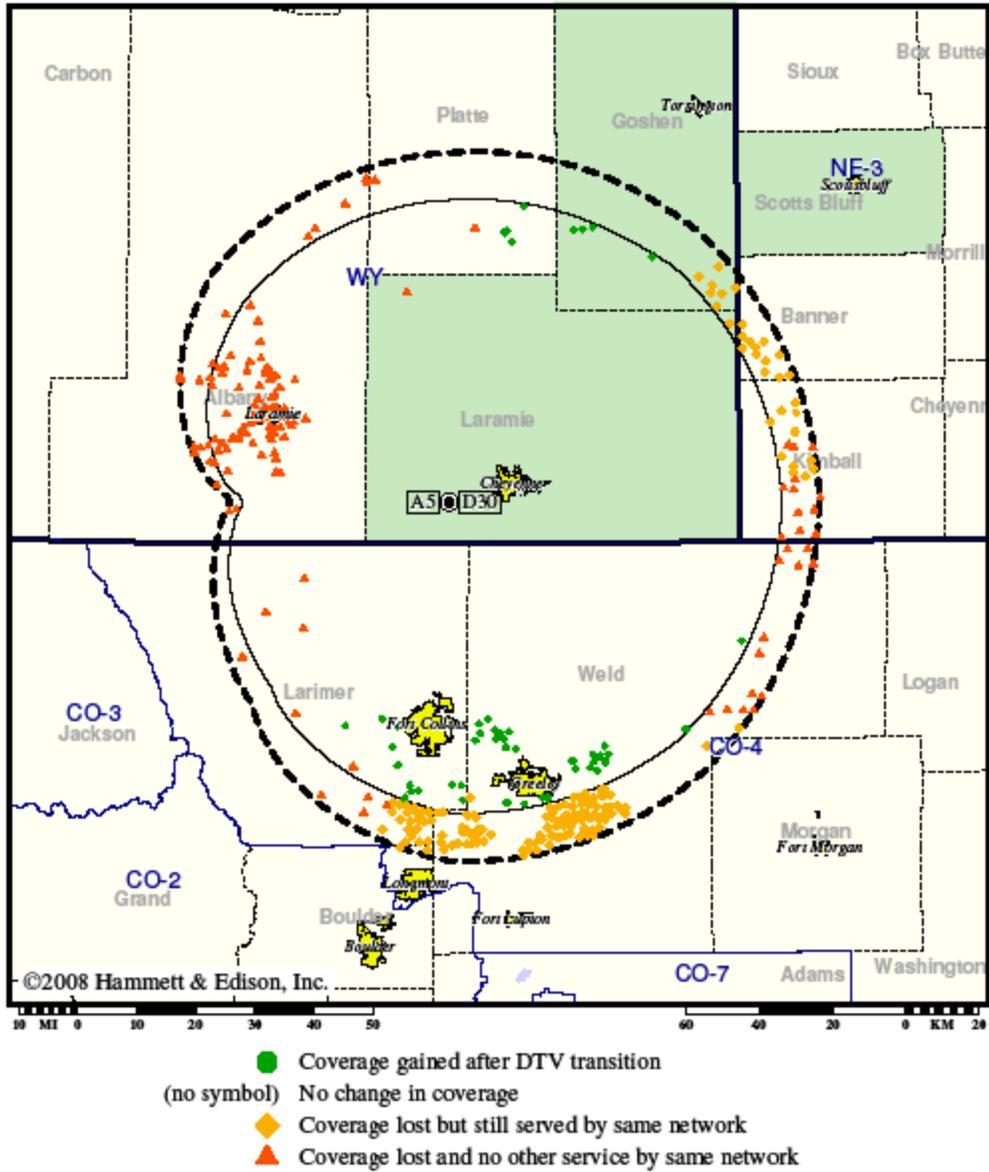
**Examples of Reasons That Stations Lose Coverage**

Station KGWN-TV • Analog Channel 5, DTV Channel 30 • Cheyenne, WY

Expected Change In Coverage: Post-Transition Appendix B Facility

Appendix B (solid): 630 kW ERP at 189 m HAAT, Network: CBS  
vs. Analog (dashed): 100 kW ERP at 189 m HAAT, Network: CBS

Market: Cheyenne, WY-Scottsbluff, NE



KGWN-TV Appendix B

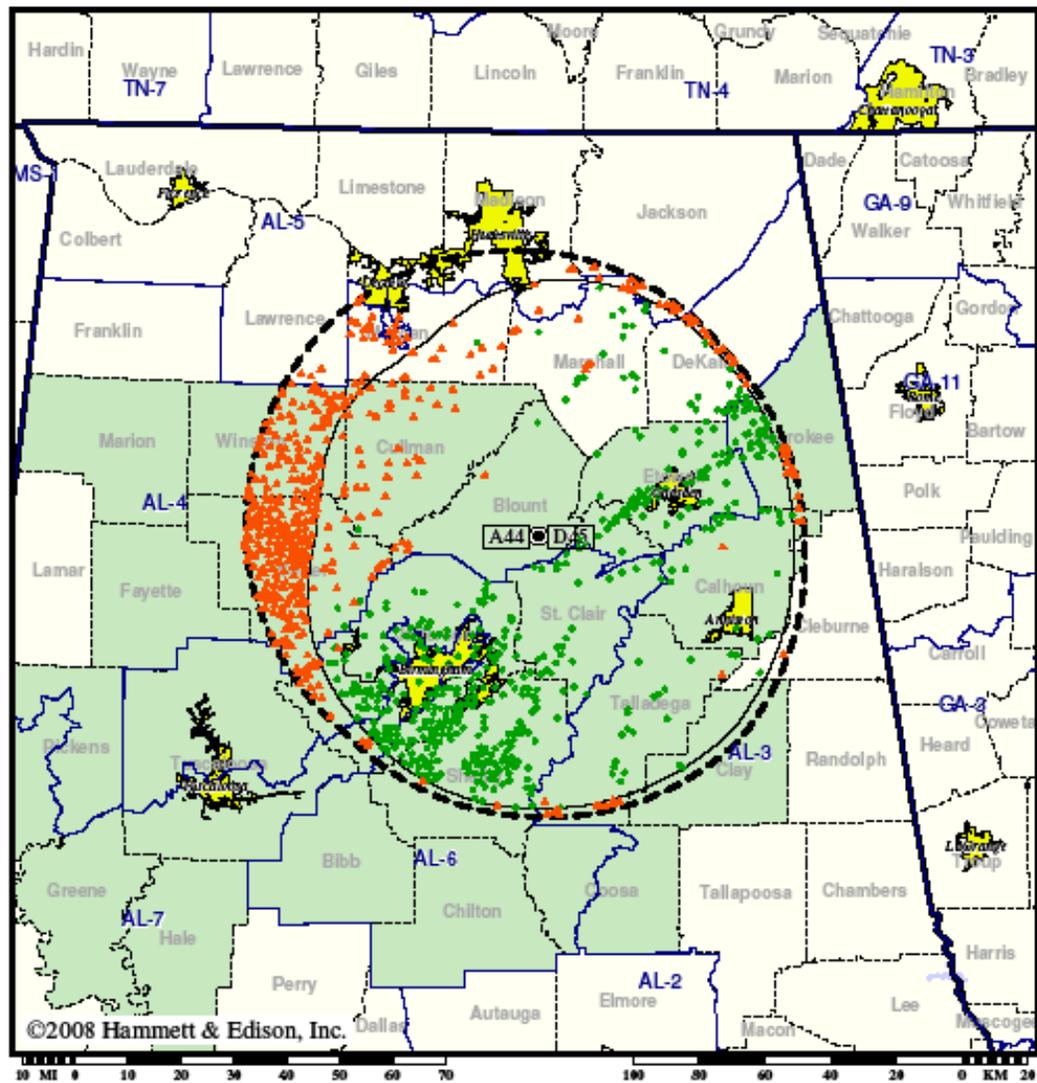
Example 1 – Channel Change from VHF to UHF

TV Station WPXH • Analog Channel 44, DTV Channel 45 • Gadsden, AL

Expected Change In Coverage: Licensed Operation

Licensed (solid): 225 kW ERP at 309 m HAAT  
vs. Analog (dashed): 5000 kW ERP at 340 m HAAT

Market: Birmingham, AL



- Coverage gained after DTV transition
- (no symbol) No change in coverage
- ▲ Coverage lost after DTV transition

WPXH Licensed

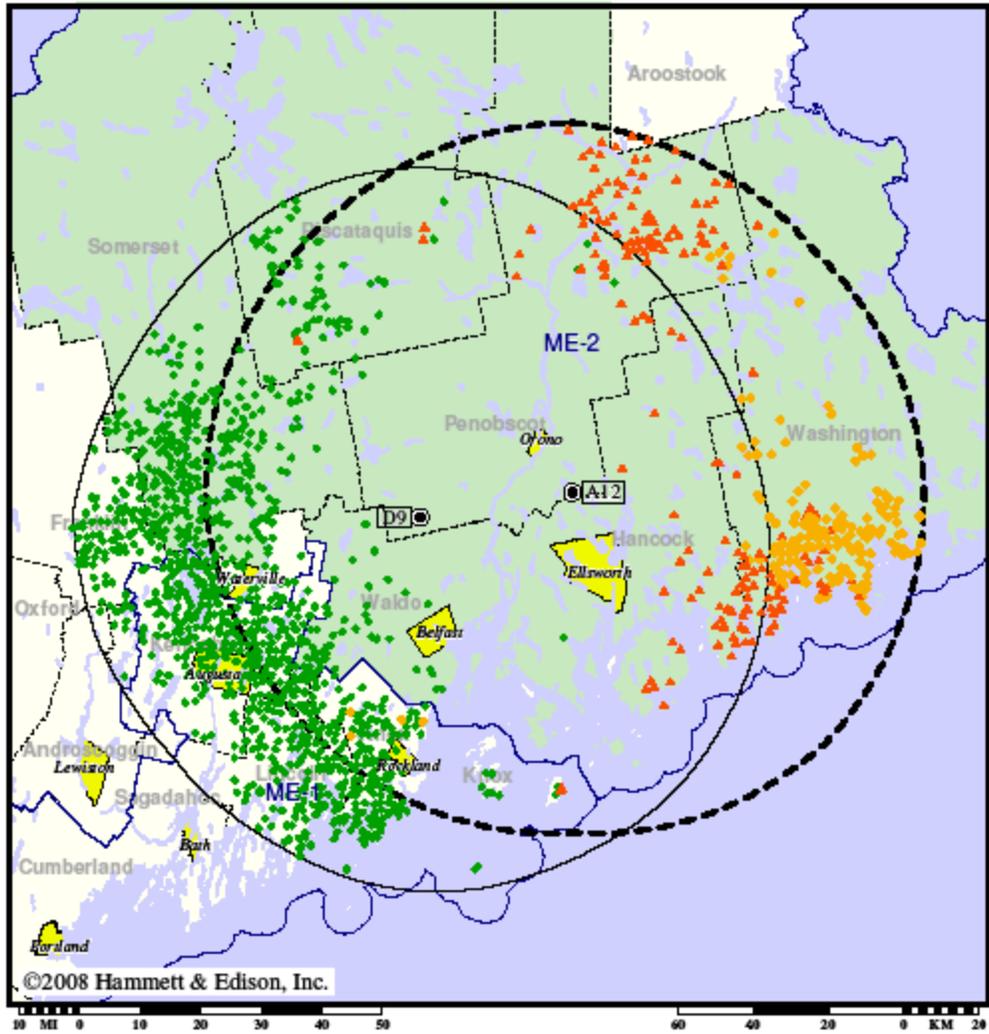
Example 2 - Station Did Not Maximize or Replicate Analog Service Area

Station WMEB-TV • Analog Channel 12, DTV Channel 9 • Orono, ME

Expected Change In Coverage: Licensed Operation

Licensed (solid): 15.0 kW ERP at 375 m HAAT, Network: PBS  
vs. Analog (dashed): 316 kW ERP at 290 m HAAT, Network: PBS

Market: Bangor, ME



- Coverage gained after DTV transition
- (no symbol) No change in coverage
- ◆ Coverage lost but still served by same network
- ▲ Coverage lost and no other service by same network

WMEB-TV Licensed

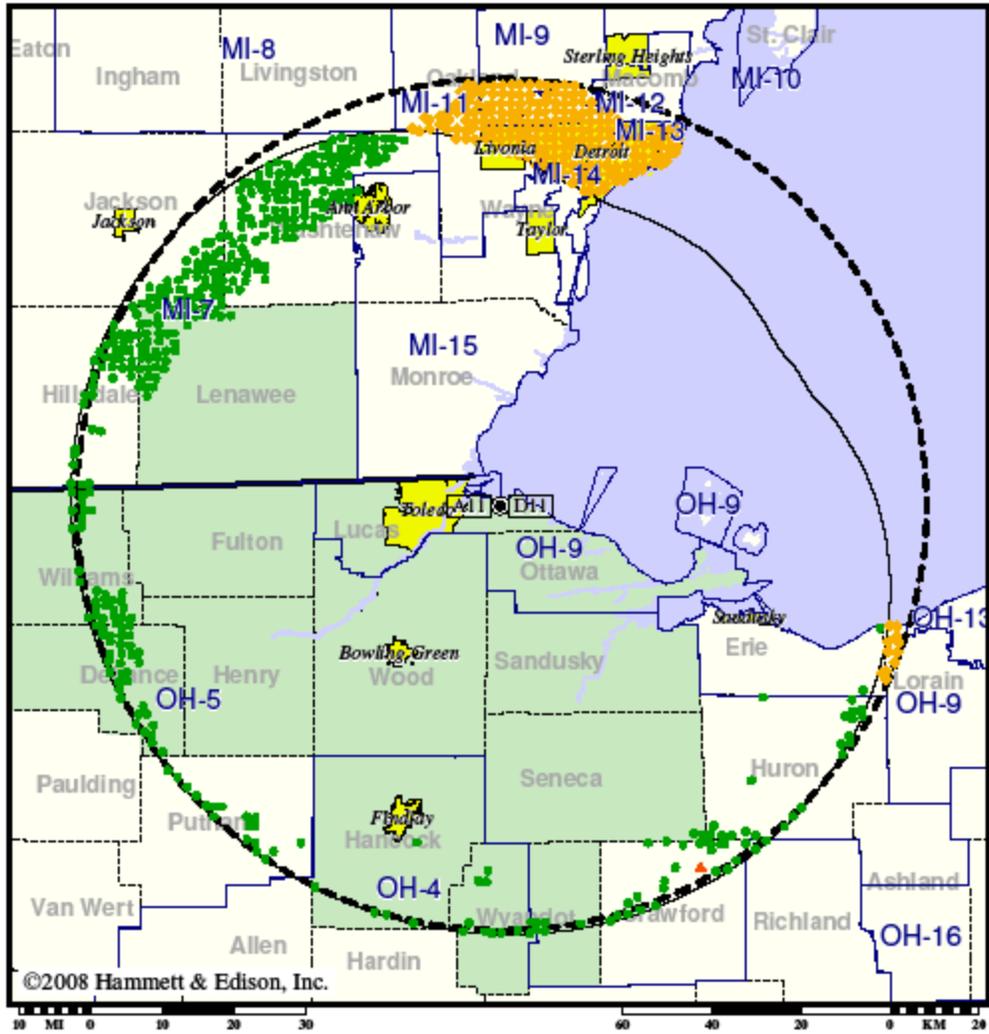
Example 3 – Station Relocated Its Transmitter

TV Station WTOL • Analog Channel 11, DTV Channel 11 • Toledo, OH

Expected Change In Coverage: Granted Construction Permit

CP (solid): 17.6 kW ERP at 304 m HAAT, Network: CBS  
 vs. Analog (dashed): 316 kW ERP at 305 m HAAT, Network: CBS

Market: Toledo, OH



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- Coverage gained after DTV transition
- (no symbol) No change in coverage
- ◆ Coverage lost but still served by same network
- ▲ Coverage lost and no other service by same network

WTOL CP

Example 4 – Station Changed Its Antenna Pattern

## APPENDIX B

### Methodology for Developing the Maps

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,<sup>10</sup> 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

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<sup>10</sup> 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.<sup>11</sup> 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.

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<sup>11</sup> 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 Kailua, 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, WFSX-TV Wilmington, NC.

Nielsen Designated Market Areas

<u>Tab Number</u>	<u>DMA Name</u>	<u>State</u>
1	Abilene-Sweetwater	TX
2	Albuquerque-Santa Fe	NM
3	Alexandria	LA
4	Alpena	MI
5	Amarillo	TX
6	Anchorage	AK
7	Atlanta	GA
8	Augusta	GA
9	Baltimore	MD
10	Bangor	ME
11	Baton Rouge	LA
12	Beaumont-Port Arthur	TX
13	Birmingham	AL
14	Bluefield-Beckley-Oak Hill	WV
15	Boise	ID
16	Boston	MA
17	Buffalo	NY
18	Burlington-Plattsburgh	NY
19	Casper-Riverton	WY
20	Cedar Rapids-Waterloo- Iowa City-Dubuque	IA
21	Charleston	SC
22	Charleston-Huntington	WV
23	Charlotte	NC
24	Chattanooga	TN
25	Cheyenne-Scottsbluff	WY
26	Chico-Redding	CA
27	Cincinnati	OH
28	Clarksburg-Weston	WV
29	Colorado Springs-Pueblo	CO
30	Columbia	SC
31	Columbia-Jefferson City	MO
32	Columbus	GA
33	Columbus-Tupelo-West Point	MS
34	Dallas-Ft. Worth	TX
35	Davenport-Rock Island-Moline	IL
36	Dayton	OH
37	Denver	CO
38	Detroit	MI
39	Duluth-Superior	MI
40	Erie	PA

41	Eugene	OR
42	Eureka	CA
43	Evansville	IN
44	Fairbanks	AK
45	Fargo-Valley City	ND
46	Flint-Saginaw-Bay City	MI
47	Fresno-Visalia	CA
48	Ft. Smith-Fayetteville- Springdale-Rogers	AR
49	Gainesville	FL
50	Grand Junction-Montrose	CO
51	Grand Rapids-Kalamazoo- Battle Creek	MI
52	Great Falls	MT
53	Green Bay-Appleton	MI
54	Greensboro-High Point- Winston-Salem	NC
55	Greenville-Spartanburg- Asheville	NC
56	Greenwood-Greenville	MS
57	Harlingen-Weslaco- Brownsville-McAllen	MS
58	Harrisburg-Lancaster- Lebanon-York	PA
59	Harrisonburg	VA
60	Hartford and New Haven	CT
61	Hattiesburg-Laurel	MS
62	Helena	MT
63	Honolulu	HI
64	Houston	TX
65	Idaho Falls-Pocatello	ID
66	Indianapolis	IN
67	Jackson	MS
68	Jackson	TN
69	Jacksonville	FL
70	Johnstown-Altoona- State College	PA
71	Joplin-Pittsburg	MO
72	Juneau	AK
73	Knoxville	TN
74	Lake Charles	LA
75	Las Vegas	NV
76	Lincoln-Hastings-Kearney	NE
77	Little Rock-Pine Bluff	AR
78	Los Angeles	CA
79	Louisville	KY

80	Lubbock	TX
81	Marquette	MI
82	Medford-Klamath Falls	OR
83	Minneapolis-St. Paul	MN
84	Minot-Bismarck-Dickinson	ND
85	Mobile-Pensacola	AL
86	Monroe-El Dorado	AR
87	Monterey-Salinas	CA
88	Montgomery-Selma	AL
89	Nashville	TN
90	New Orleans	LA
91	New York	NY
92	Norfolk-Portsmouth- Newport News	VA
93	North Platte	NE
94	Odessa-Midland	TX
95	Orlando-Daytona Beach- Melbourne	FL
96	Ottumwa-Kirksville	IA
97	Paducah-Cape Girardeau- Harrisburg	KY
98	Philadelphia	PA
99	Phoenix	AZ
100	Pittsburgh	PA
101	Portland	OR
102	Portland-Auburn	ME
103	Providence-New Bedford	RI
104	Puerto Rico	
105	Raleigh-Durham	NC
106	Rapid City	SD
107	Reno	NV
108	Richmond-Petersburg	VA
109	Roanoke-Lynchburg	VA
110	Rochester-Mason City-Austin	IA
111	Sacramento-Stockton- Modesto	CA
112	Salt Lake City	UT
113	San Angelo	TX
114	San Antonio	TX
115	San Francisco-Oakland- San Jose	CA
116	Santa Barbara-Santa Maria- San Luis Obispo	CA
117	Savannah	GA
118	Seattle Tacoma	WA
119	Sioux City	IA

120	Sioux Falls	SD
121	Spokane	WA
122	St. Joseph	MO
123	St. Louis	MO
124	Syracuse	NY
125	Tallahassee-Thomasville	FL
126	Tampa-St. Petersburg	FL
127	Terre Haute	IN
128	Toledo	OH
129	Traverse City-Cadillac	MI
130	Tucson	AZ
131	Tulsa	OK
132	Utica	NY
133	Waco-Temple-Bryan	TX
134	Washington	DC
135	Wausau-Rhineland	WI
136	West Palm Beach- Ft. Pierce	FL
137	Wichita Falls-Lawton	TX
138	Wichita-Hutchinson Plus	KS
139	Wilmington	NC