DTV Service Area. The "DTV service area" is defined as the area within this noise-limited contour based on the F(50,90) propagation curves after coverage is reduced:

(a) by areas where interference from DTV or NTSC stations is deemed to be unacceptable: and,

(b) where the effects of terrain reduce the signal level below the noise-limited service threshold.

It is recognized that the model can indicate large DTV power levels under certain conditions, for example, when attempting to replicate NTSC coverage of a VHF station with DTV coverage using a high UHF channel. The most significant differences occur for such stations whose antenna is not very high above the nearby terrain. Optimal engineering of such facilities may ultimately involve tradeoffs between the antenna height and other factors, resulting in different power levels.

Conversion of Service Area to Served Population. The model is designed to apply the replication criterion on the basis of square miles, not population. For each prospective DTV service area, the model calculates the population in that area as determined from the 1990 U.S. Census database. In most cases, replication of area substantially yields replication of population. However, when there is no such agreement between area and population, as can happen in anomalous cases, adjustments can be made to achieve replication by population and by areas, thus yielding the choice of a different and better channel. This is achieved by selecting another channel from the list of available channels.

III. Other Parameters and Guidelines

RF Propagation Model. For evaluating DTV and NTSC service areas, the physical area being evaluated is divided into 360 evenly spaced radials extending from the transmitter site. Evaluations of predicted field strength are made every 1 km on each radial using the Longley-Rice propagation model that takes into account the specific terrain profile (using the U.S. Geological Survey terrain database) between the transmitter site and each receiving site. This terrain-based propagation model provides more realistic predictions of field strength than the traditional FCC curves that assume that all areas have the same "average" terrain roughness.

Adjacent Channel Spacing. A station that is not located on the same tower is defined as 'not co-located.' The model initially does not evaluate the suitability of DTV 'not co-located' on the adjacent channels that are closer than 80 km (~50 miles) to an NTSC channel. However, if there is an NTSC station that does not have an DTV station assigned after all candidates that meet all requirements are evaluated, the model attempts to select and evaluate DTV channels that violate either the close (i.e., non zero) spacing or distant spacing by as little as possible. All violations of the spacing rules are printed on an exception report.

TV/Land Mobile Protection. The allotment/assignment program allows a minimum co-channel spacing of 240 km (~149 miles) between an DTV channel and channels that are allocated between

channels 14 through 20 for land mobile use.

Canadian and Mexican Stations. Existing Canadian and Mexican NTSC stations and vacant allotments, as determined from the FCC's database, are protected using a 155 km (~96 miles) minimum co-channel and 80 km adjacent channel DTV-to-NTSC separation distance. No allowance is made for future Canadian or Mexican DTV assignments.

U.S. Vacant Allotments. Commercial vacant allotments are initially eliminated from consideration of DTV channels. Once a full accommodation is achieved, the program attempts to provide DTV channels for all vacant noncommercial allotments. It will then seek to find a new NTSC channel to accommodate each vacant noncommercial allotment.

LPTV and Translators. Coverage of existing low power stations and translators are not considered in the assignment process, but many of them may still be able to continue operating after the DTV channels are assigned. No DTV channels are assigned to LPTV stations, or translators, but in some cases there may be sufficient spectrum to enable translators and LPTV stations to transmit DTV services as well.

IV. Limitations

The model can understate NTSC and DTV coverage where there are little terrain blockages and large market-to-market spacing. The area calculated using F (50,90) propagation curves with the adjusted signal strength minimum level for each channel is the maximum obtainable; even if the Longley-Rice propagation model predicts a signal level above the Grade B threshold beyond that boundary.

The minimum co-channel spacing is a fixed parameter. The optimization model only considers channels present in its selection file that satisfy the minimum spacing. Manual selection of a channel or channels where known significant terrain blocking exists (e.g., mountain ranges) can be made and coverage reevaluated for interference impacts.

VI. Audit Trail

Each run will have the following supporting documentation:

Job name/date/time
File name of NTSC summary file
File name of DTV summary file
Study type
Assignment model file used
Channel relationships with respect to protected station for NTSC to NTSC
Channel relationships with respect to protected station for DTV to NTSC
Channel relationships with respect to protected station for DTV to DTV
Channel relationships with respect to protected station for NTSC to DTV

Co-channel, adjacent channel and non-adjacent channel protection ratios applied for:

NTSC to NTSC
DTV to NTSC
DTV to DTV
NTSC to DTV

List of service contour levels for DTV and NTSC
Transmit antenna pattern for NTSC station used: yes/no
Transmit antenna pattern for DTV station used: yes/no
Receive antenna patterns considered: yes/no/file name
Separation violations' control report

Appendix A: Planning Factors Used for DTV

I. System Independent Planning Factors
Recommended by the Advisory Committee

Planning Factor	Low VHF	High VHF	UHF
Geometric mean frequency (MHz)	69	194	615
Dipole factor (dBm-dBu) dB (K_d)	-111.8	-120.8	-130.8
Thermal noise (dBm) (N_t)	-106.2	-106.2	-106.2
Antenna Gain (dB) (G)	4	6	10
Downlead line loss for 50 ft. (15 m.) of coax (dB) (L)	1	2	4
Front-to-back ratio (dB) (ratio of forward gain to maximum response over rear 180°	10*	12*	14*
Receiver noise figure (dB) (N_R)	5**	5**	10**
Time probability factor for 90% availability (dB) (dT)	***	***	***
Location probability for (dL) 50% availability (dB)	0	0	0

* For the receiving antenna manufacturer's objectives the values are 14, 16, and 20.

** Possible changes in the VHF figures are still under consideration.

*** The time probability factor is defined as the difference F(50,10) minus F(50,50), where these two values are determined from the FCC charts in Section 73.699. This factor is a function of the distance between the transmitting and receiving antennas.

See "Fifth Interim Report of the Planning Subcommittee of the FCC Advisory Committee on Advanced Television Service," March, 1992

Appendix B: D/U Ratio of the Grand Alliance System

Parameter	Measured Value (dB)
Carrier-to-Noise Ratio	+15.19
Co-channel D/U Ratio	
DTV-into-NTSC	+34.44
NTSC-into-DTV	+1.81
DTV-into-DTV	+15.27
Adjacent D/U Ratio	
Lower DTV-into-NTSC	-17.43
Upper DTV-into-NTSC	-11.95
Lower NTSC-into-DTV	-47.73
Upper NTSC-into-DTV	-48.71
Lower DTV-into-DTV	-41.98
Upper DTV-into-DTV	-43.17
Taboo D/U Ratio, DTV-into-NTSC	
N-2	-23.73
N+2	-27.93
N-3	-29.73
N+3	-34.13
N-4	-34.00 *
N+4	-24.96
N-7	-35.00 *
N+7	-34.00 *
N-8	-31.62
N+8	-43.22
N+14	-33.38
N+15	-30.58
Taboo D/U Ratio, NTSC-into-DTV	
N-2	-62.45
N+2	-59.86
N-3	< -61.79
N+3	< -62.49
N-4	-58.00 *

Appendix B: D/U Ratio of the Grand Alliance System

Taboo D/U Ratio, NTSC-into-DTV (continued)

N+4	-58.00 *
N-7	-58.00 *
N+7	-58.00 *
N-8	-58.00 *
N+8	-58.00 *
N+14	-58.00 *
N+15	-58.00 *

Taboo D/U Ratio, DTV-into-DTV

N-2	-60.52
N+2	-59.13
N-3	< -60.61
N+3	< -61.53
N-4	-58.00 *
N+4	-62.00 *
N-7	-63.00 *
N+7	-63.00 *
N-8	-63.00 *
N+8	-63.00 *
N+14	-63.00 *
N+15	-63.00 *

Appendix C: Vertical Antenna Pattern for NTSC and DTV Transmitting Facility

Vertical plane relative field values were obtained from manufacturers' catalogs for the power gains specified.

VERTICAL ANTENNA PATTERNS					
Degrees Below Horizontal	Relative Field Strength				
	Low VHF	High VHF		UHF	
	NTSC/ATV	NTSC	ATV	NTSC	ATV
0.75	1.00	1.00	1.00	1.00	1.00
1.50	1.00	0.95	0.97	0.74	0.88
2.00	0.99	0.86	0.94	0.52	0.69
2.50	0.98	0.73	0.89	0.33	0.46
3.00	0.97	0.60	0.82	0.22	0.26
3.50	0.95	0.47	0.73	0.17	0.18
4.00	0.93	0.36	0.65	0.15	0.21
5.00	0.88	0.30	0.47	0.13	0.20
6.00	0.82	0.37	0.33	0.10	0.08
7.00	0.74	0.37	0.27	0.11	0.11
8.00	0.637	0.31	0.28	0.10	0.07
9.00	0.57	0.22	0.28	0.10	0.09
10.0	0.48	0.17	0.25	0.11	0.15