87-268

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September 29, 1992

INFORMATION REGARDING TECHNICAL ASSUMPTIONS USED IN THE SECOND FURTHER NOTICE OF PROPOSED RULE MAKING IN DOCKET NO. 87-268

The Commission has received a letter requesting information on the assumptions used to develop the proposals set forth in the Second Further Notice of Proposed Rule Making in MM Docket 87-268, FCC 92-332, released August 14, 1992 (Second Further Notice). The letter, dated September 11, 1992, is signed jointly by the Association for Maximum Service Television, Inc.; the Association of America's Public Television Stations; the Association of Independent Television Stations, Inc; CBS, Inc.; Capital Cities/ABC, Inc.; Fox TV Stations, Inc.; the National Association of Broadcasters; the National Broadcasting Co.; the Public Broadcasting Service; and the Tribune Broadcasting Company.

The letter requests answers to eight questions. The answers to these questions are provided below.

QUESTION 1: Are the terms "service area" and "coverage area" as used in the Second Further Notice (particularly in describing the Commission's objective of achieving a "minimum" service area of 85 to 90 km for all ATV stations) the same as the definitions adopted by the FCC Advisory Committee on Advanced Television Service (Advisory Committee)? (The Advisory Committee defines "service area" -- whether NTSC or ATV -- as the area contained within the station's "noise-limited" contour reduced by the interference within that contour, i.e. the interference-limited contour. The Advisory Committee defines coverage area, on the other hand, as the area contained within the station's noise-limited contour without regard to interference from other stations, i.e. noise-limited service. See Section 7.2.2.1 of Draft of the Advisory Committee ATV System Recommendation Report, Version 8/10/92, SS/WP4.)

ANSWER TO QUESTION 1: The terms service area and coverage, as used in the Second Further Notice, generally have the same meaning and are used interchangeably therein. These terms are used in both a general and specific context. In the general context, the Commission generally considers a TV station's service area to be the geographic area where viewers can receive that station's signal. When it is important that the terms be understood in a specific context, they are appropriately qualified. A station's maximum service area is the area in which reception is limited by noise. That is, a station's maximum service area is the area where its service is "noise-limited." Thus a station's noise-limited service area, as used in the Second Further Notice, is the same as the Advisory Committee's definition of coverage area. In the case of NTSC service, the Commission considers a station's noise-limited service area to be the area defined by its Grade B contour. In proposing an 85-90 km goal for the maximum service area of ATV

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stations, the Second Further Notice chose the approximate distances now reached by the noise-limited service area of most existing UHF TV stations. This approach was also used by the system proponents in their estimates of coverage as provided in their submissions to the Advisory Committee for final certification of their technical systems. A station's actual service area will, of course, be reduced by any interference from other TV stations operating on the same and adjacent channels. That is, a station's "interference-limited" service area is the area contained within the station's "noise-limited" contour reduced by the interference within that contour. Thus, a stations "interference-limited" service area, as used in the Second Further Notice" is the same as the Advisory Committee's definition of service area.

The only exception to the above usage in the Second Further Notice is in paragraphs 11-13, 33 where the positions of various commenting parties, including the Advisory Committee are discussed. In those paragraphs, the use of the terms service area and coverage age are as intended by the individual commenting parties.

QUESTION 2: What are the power and antenna height parameters used to achieve the 85 to 90 km "minimum" service area for all ATV stations?

ANSWER TO QUESTION 2: For the demonstration purposes of the draft ATV Table of Allotments, the Second Further Notice assumed that the power and antenna height all new ATV stations would be 27 dBk and 1200 feet, respectively. Based on information available at the time the Second Further Notice was adopted, it appears that these values for power and antenna height will allow ATV stations to provide noise-limited service to a distance of 88.5 km (55 miles). These assumptions were based on the general claims of the system proponents as to co-channel spacings their systems would support. The proponents' claims are set forth in their submissions to the Advisory Committee for final certification of their systems for testing. The proponents' analyses can be verified by the method outlined in footnote 33 of the Second Further Notice. Additional information on these parameters is provided in Paragraph 23 of the Second Further Notice. In practice, the actual values of these parameters will vary substantially across different stations. The Commission will present specific proposals for regulating power, antenna height and other parameters as necessary in a subsequent action after the Advisory Committee submits its recommendation for a technical standard.

QUESTION 3: What are the maximum power and height parameters used by the Second Further Notice to achieve a "maximum" service area?

ANSWER TO QUESTION 3: The Second Further Notice did not present proposals for the maximum power and antenna height that would be

allowed in order to achieve a maximum. As indicated above, we now expect that with 27 dBk of power for a digital system, or 31 dBk of power for the analog Narrow-MUSE system, and a 1200-foot antenna, ATV stations should be able to provide noise-limited service out to our service area objective of 55 miles. Other power and antenna height combinations may also be appropriate to enable stations to meet our service objective while minimizing potential for interference to other stations. As indicated above, the Commission will issue proposals for regulating of ATV operating parameters after the system recommendation is submitted. This action will include specific proposals for maximum power and antenna height as appropriate.

QUESTION 4: What criteria did the Commission use to allot ATV channels for adjacent communities that use co-located transmitting sites? Specifically, what technical criteria did the Commission use to differentiate between the ATV channels allotted to the communities of Linden, Paterson, and Secaucus, N.J., and the pool of ATV channels allotted to the New York City and Newark, N.J. communities, recognizing that all the communities mentioned above use the same transmitting location?

ANSWER TO QUESTION 4: The allotment software used a random approach to identify channels for adjacent cities that use co-located transmitter sites. The allotment software actually considers the common site of a group of channels allotted to more than one community to be a single location for allotment purposes and then randomly associates the channels allotted at that site with the communities. While this method was used to generate the draft ATV Table of Allotments, the Second Further Notice did indicate that the random method was the preferred approach for addressing such situations. Other relatively simple methods could readily be used to allotting the channels at a specific site to individual communities. One such approach might be to make all of the licensees using an existing site eligible for all of the ATV channels that would be located at that site. The allotment of channels to specific communities would be made in accordance with the community to which the licensees NTSC are allotted.

QUESTION 5: What technical parameters (planning factors) are used by the Second Further Notice to determine the ATV minimum service area?

ANSWER TO QUESTION 5: The minimum noise-limited service area proposed for ATV systems in the Second Further Notice is based on the system-independent planning factors recommended by the Advisory Committee (as of the date of adoption of the Second Further Notice) and used by the proponents to predict both noise- and interference-limited service. These planning factors are included in Appendix B of the Second Further Notice. For reference, Appendix B is

attached.

QUESTION 6: For interference purposes, what technical parameters (planning factors) are used to compute NTSC station service areas?

ANSWER TO QUESTION 6: To model the NTSC service at UHF, we used the NTSC planning factors indicated in document PS/WP3-0218 of the Advisory Committee's Working Party on Spectrum Planning and Alternatives (PS/WP3) and the ATV planning factors in Appendix B, along with the accepted value of 28 dB as the necessary co-channel desired-to-undesired (D/U) signal ratio. With these assumptions, we verified the proponents' calculations of the interference consequences to co-channel NTSC services with 155 mile separation. These considerations apply, in particular, to the analysis described in footnote 33.

QUESTION 7: What signal-to-noise ratio assumption did the Second Further Notice use to determine the coverage areas of ATV stations? What is the maximum coverage area for ATV stations in the sample table?

ANSWER TO QUESTION 7: The signal-to-noise ratio for ATV service used in the Second Further Notice was based on the values for this factor specified by the system proponents in their submissions to the Advisory Committee for final certification of their systems for testing. The digital system proponents specified ATV signal-to-noise ratios in the range 15.7 to 16.1 dB and NHK specified 27.1 dBk for the Narrow-MUSE system. These values were used by the proponents to obtain the noise-limited results tabulated in Appendix A. The Second Further Notice therefore used 16 dB and 27.1 dB as the ATV signal-to-noise ratios for the digital and Narrow-MUSE systems, respectively. The maximum expected coverage area for ATV stations in the sample table will be available to the 80 percent of ATV stations mentioned in footnote 35 as being more than 155 miles from their nearest ATV co-channel neighbor. This separation is expected to provide a noise-limited service area of slightly more than 55 miles.

QUESTION 8: What desired-to-undesired signal (D/U) ratio assumptions (ATV-to-NTSC, NTSC-to-ATV and ATV-to-ATV) did the Second Further Notice use to determine the service areas of ATV stations? Did the Second Further Notice use the FCC VHF and UHF curves -- F(50, 50) and F(50, 10) -- to compute the interference areas?

ANSWER TO QUESTION 8: The co-channel D/U ratios used in the Second Further Notice were based on those specified by the proponents in their final certification submission. The D/U ratios used by the proponents are:

| | ATV-to-NTSC | NTSC-to-ATV | ATV-to-ATV |
|---|---|---|---|
| NHK | 15.4 | 2.6 | 17 |
| Zenith/AT&T | 30 | 0 | 15 |
| GI/ATVA | 30 | 6 | 16 |
| ATRC | 30 | -2 | 16.1 |
| MIT/ATVA | 30 | 6 | 15.2 |

The values chosen for the Second Further Notice are:

| | Digital Systems | Narrow-MUSE |
|---|---|---|
| ATV-to-NTSC- | 30 | 15.4 |
| NTSC-to-ATV- | 3 | 2.6 |
| ATV-to-ATV- | 16 | 17 |

These assumptions were used in developing the minimum spacing requirements proposed in paragraph 28 of the Second Further Notice. Consistent with the proponents' claims, the Second Further Notice used the FCC F(50, 50) and F(50, 10) propagation prediction curves. As stated in the Second Further Notice, important additional data will be forthcoming from the Advisory Committee's testing process, and we will include that data in future analyses after it becomes available.

APPENDIX B*
SYSTEM INDEPENDENT PLANNING FACTORS
RECOMMENDED BY THE ADVISORY COMMITTEE
(Interim Estimates)

| Planning Factor | Low VHF | High VHF | UHF |
|---|---|---|---|
| Geometric mean frequency (MHz) | 69 | 194 | 615 |
| Dipole factor (dBm-dBu) dB ($K_a$) | -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 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.

*/ This is Appendix B as included in the Second Further Notice of Proposed Rule Making, GEN Docket No. 87-268, FCC 92-332, released August 14, 1992.

DS/WP-3
June 9, 1992
Doc # 0218

June 5, 1992
Burnett Sams

# REPORT TO WP-3 ON JOINT MEETINGS OF WP-3 / SG 6, 10 & 11 COVERAGE MODEL AND TEST DATA ANALYSIS

Since the last report to WP-3, the Groups have met once and held two telephone conference calls. The results of those discussions are summarized below. The following working papers were prepared or revised:

- Outline of analysis report (R. O'Connor)
- Calculation of N-Muse CNR and D/U ratios (J. Gibson)
- Calculation of N-Muse taboo D/U ratios (R. O'Connor)
- Procedure and Analysis Form for NTSC Reference calculation (B. Sams)
- Preliminary Procedure and Analysis Form for ATV model calculations (B. Sams)

**Tasks to be done for each system:**

1. Complete Data Analysis Form calculations.

2. Plots and quantitative analysis of coverage and interference using CNR and cochannel and adjacent channel interference data.

3. Plots and areas of TOV taboo interferences.

4. Graph of accommodation percentage vs. cochannel and adjacent channel separations.

5. Draft of analysis report.

**Issues to be resolved:**

- A dip in the model's vertical antenna pattern can generate two interference contours. Jules Cohen and Victor Tawil are investigating. One solution is to truncate the near field up to a fixed distance from the transmitter.

- **Attendees:**

| | | |
|---|---|---|
| Jules Cohen | Jim Gibson | Donald Jansky |
| Jeff Krauss | Jim Kutzner | Bob O'Connor |
| Jouke Rypkema | Burnett Sams | Ed Williams |

**Summary of May 12 Conference Call:**

- Agreed to do analysis for only two cochannel spacings: minimum and typical. These values were previously listed in tables as minimum and rural, and are for NTSC: VHF 275 & 305; UHF 250 & 290 km. The minimum spacing for ATV is 160 km. The wider spacing for ATV will be determined per system to provide comparable service areas (May 21).

- Analysis will be done for ATEL impairment ratings of 3 and 4. There was concern that the statistics for impairment rating 4 were not as solid as for lower levels because low level signal were contaminated by noise in the absence of interference. Using the range of 3-4 avoids this end-of-scale effect. This will also be fairer to the analog system which still has a robust signal at the NLSC. The spread between ratings 3 and 4 may also show differences among the two-level digital systems.

- The group will accept and use the data reductions performed by ATEL. We will use the summary statistics for signal strengths and D/U ratios as published.

- The NTSC and ATV service area calculations will be based upon one cochannel and one collocated or diametrically opposed adjacent channel. Note added: Since there are two NTSC and two ATV adjacent channels to consider, it is proposed to use, in each example calculation, the worst case of adjacent channel interference.

- N-Muse has given an explanation for poor performance on adjacent channel tests. It was our conclusion that we must use the published values and not discount the test results. No one can predict with certainty the consequences of implementing a fix for this problem or any other problem that may arise in the future with other systems. One can not say that any given factor may be improved without making another factor worse.

5) ATV Service Area: One cochannel and one adjacent interferer into ATV
Use worst case of ATV or NTSC cochannel
Use worst case of 4 non-collocated adjacent channels possibilities

Taboos:

6) NTSC with ATV taboos: 0,30,60,90,120 km spacings
7) ATV with ATV taboos: 0,30,60,90,120 km spacings
8) ATV with NTSC taboos: 0,30,60,90,120 km spacings

- Report:
  Service area as percent of NTSC service area
  Possibility of collocating adjacent channels
  Taboo collocation and interference areas vs spacings

- Graph of percent ATV accommodation vs cochannel separation

- Attendees:

| | | |
|---|---|---|
| Jules Cohen | Jim Gibson | Donald Jansky |
| Jim Kutzner | Max Muterspaugh | Jouke Rypkema |
| Burnett Sams | Antoon Uyttendaele | |

# DRAFT – PROCEDURE FOR MODEL NTSC REFERENCE RUNS
June 8, 1992

- The model code must be frozen and remain frozen.

- The model runs specified below are to be repeated for the Low VHF, High VHF and UHF TV bands, and for each band, runs are to be made for minimum and typical NTSC cochannel spacings.

- There are 6 combinations of parameters for NTSC Reference calculations: For each combination of parameters one plot is to be made with 3 NTSC stations on a horizontal line with the specified separations.

  NTSC Adjacent Channel
  NTSC Desired Station
  NTSC Cochannel

Show the Grade B contour of each station

For the desired station, plot:
  Adjacent channel interference area
  Cochannel interference area
  Strong, moderate, and weak signal contours
  Grade A contour
  City contour

For the desired station, calculate:
  Radius of all 6 contours
  Grade A & B contour areas
  Cochannel interference area and penetration
  Adjacent channel interference area and axis crossings

  All areas as percent of Grade B area
  Grade B area less cochannel interference area and as percent of Grade B area

  Grade B area less cochannel and adjacent channel interference area and as percent of Grade B area

A printout showing the parameter values and results of each run.

**PROCEDURE FOR MODEL ATV RUNS**
**Preliminary -- Subject to Revision**
**June 8, 1992**

- The model code must remain frozen from the NTSC Reference run.
- There are 12 x 5 cochannel plots; this number should be reduced.
- There are 8 adjacent channel plots and a number (9-36) of taboo plots.
- A printout should show the parameter values and results of each model run.

**Cochannel** -- The five model runs specified below are to be repeated for 12 combinations of parameters: For ATEL impairment grades 3 and 4, for each of the Low VHF, High VHF and UHF TV bands, and for minimum and typical NTSC cochannel spacings within each band.

1 - **Desired NTSC with ATV cochannel for ATV ERP calculation**
Plot the NTSC Grade A & B contours and the ATV noise limited contour
For the each station, plot:
Cochannel interference area
Strong, moderate, and weak signal contours
For each station, calculate:
Radius and area of all contours
Cochannel interference area and penetration
All areas as percent of reference contour area
Grade B area less cochannel interference area and as percent of Grade B area
ATV contour area less cochannel interference area as percent of ATV contour and as percent of NTSC service area.
Calculate permissible ATV ERP

2 - **Desired NTSC with ATV cochannel for ERP vs HAAT** -- Show contours and repeat calculation of ERP for HAAT = 500, 1000, 1500, 2000, 2500 ft.

3 - NTSC with ATV and NTSC cochannels

**Taboo Analysis** -- The model runs specified below are to be done using only the parameters for the UHF TV band and for minimum NTSC cochannel spacing. For NTSC and ATV taboo interference into ATV, ATEL impairment grade 4 is used. For NTSC and ATV taboo interference into NTSC, ATEL impairment grade tbd is used.

For each taboo relationship including adjacent channels (Nine for N-Muse), a plot of the desired station with interference from an undesired taboo station at each of the following separations: 30,60,90,120 km. Four areas per plot. Calculate the interference area and percent of contour. Show strong, moderate, and weak signal contours.

A total of 2 x 2 x 9 = 36 plots. The possibility of reducing this number by including multiple taboos on one plot should be considered.

1:9 NTSC with NTSC taboos

1:9 NTSC with ATV taboos

1:9 ATV with ATV taboos

1:9 ATV with NTSC taboos

| ATV Parameters | Grade: 4 | 3 |
|---|---|---|
| ATV CNR (dB) | 37.9 | 31.8 |
| ATV into NTSC D/U | 13.0 | 13.0 |
| NTSC into ATV D/U | 20.7 | 16.1 |
| ATV into ATV D/U | 31.2 | 24.5 |
| Adj NTSC into ATV D/U | 24.6 | 13.3 |
| Adj ATV into ATV D/U | 16.6 | 3.8 |

| ATTC Taboo Test Results | | | | | |
|---|---|---|---|---|---|
| TOV Table 19-8A/B (Pages I-19-25/6) | Desired Power Strong -15.0 | Moderate -35.0 | Weak -55.0 | Area | Percent |
| Taboo -2 NTSC into NTSC | -10.0 | -18.6 | -29.5 | | |
| Taboo +2 NTSC into NTSC | -7.8 | -20.2 | -31.5 | | |
| Taboo +4 NTSC into NTSC | -9.4 | -17.4 | -25.8 | | |
| Taboo -7 NTSC into NTSC | -9.9 | -20.6 | -35.2 | | |
| Taboo -8 NTSC into NTSC | -10.0 | -20.6 | -39.3 | | |
| Taboo +14 NTSC into NTSC | -10.0 | -19.6 | -27.3 | | |
| Taboo +15 NTSC into NTSC | -0.2 | -6.5 | -18.2 | | |
| | | | | | |
| Taboo -2 ATV into NTSC | -10.0 | -21.0 | -31.8 | | |
| Taboo +2 ATV into NTSC | -7.8 | -20.6 | -32.0 | | |
| Taboo +4 ATV into NTSC | -14.5 | -18.8 | -27.2 | | |
| Taboo -7 ATV into NTSC | -10.0 | -25.0 | -40.0 | | |
| Taboo -8 ATV into NTSC | -10.0 | -24.6 | -40.0 | | |
| Taboo +14 ATV into NTSC | -10.0 | -25.0 | -40.0 | | |
| Taboo +15 ATV into NTSC | -10.0 | -22.1 | -27.9 | | |

## Planning Factors for NTSC & ATV — Impairment Grades 3 & 4

| Receiver Planning Factors | | LOW VHF | | | HIGH VHF | | | UHF | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | NTSC | ATV-4 | ATV-3 | NTSC | ATV-4 | ATV-3 | NTSC | ATV-4 | ATV-3 |
| Receiver Impedance Ohms | | 300.0 | 300.0 | 300.0 | 300.0 | 300.0 | 300.0 | 300.0 | 300.0 | 300.0 |
| Bandwidth MHz | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Nt dBm | | -106.2 | -106.2 | -106.2 | -106.2 | -106.2 | -106.2 | -106.2 | -106.2 | -106.2 |
| Nr dB | | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| CNR dB | | 28.5 | 37.9 | 31.8 | 28.5 | 37.9 | 31.8 | 28.5 | 37.9 | 31.8 |
| | | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== |
| Receiver Terminals dBm | | -67.7 | -58.3 | -64.4 | -67.7 | -58.3 | -64.4 | -67.7 | -58.3 | -64.4 |
| Frequency (MHz) | | 69.0 | 69.0 | 69.0 | 194.0 | 194.0 | 194.0 | 615.0 | 615.0 | 615.0 |
| Channel | | 4 | 4 | 4 | 10 | 10 | 10 | 38 | 38 | 38 |
| Kd 615 ch38 MHz dBm/dBu | (-) | -111.7 | -111.7 | -111.7 | -120.7 | -120.7 | -120.7 | -130.7 | -130.7 | -130.7 |
| Line Losses dB | | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 2.0 | 5.0 | 4.0 | 4.0 |
| | | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== |
| F(50,90) dBu at Ant terms | | 45.0 | 54.4 | 48.3 | 55.0 | 64.4 | 58.3 | 68.0 | 76.4 | 70.3 |
| Antenna gain (dB) | (-) | 4.0 | 4.0 | 4.0 | 6.0 | 6.0 | 6.0 | 13.0 | 10.0 | 10.0 |
| Antenna F/B Ratio (dB) | ref | 6.0 | 10.0 | 10.0 | 6.0 | 12.0 | 12.0 | 6.0 | 14.0 | 14.0 |
| | | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== |
| F(50,90) Field (dBu) | | 41.0 | 50.4 | 44.3 | 49.0 | 58.4 | 52.3 | 55.0 | 66.4 | 60.3 |
| FCC(50/50)-FCC(50/90) dB | | 6.0 | | | 7.0 | | | 9.0 | | |
| | | ===== | | | ===== | | | ===== | | |
| Contour F(50,50) Field (dBu) | | 47.0 | | | 56.0 | | | 64.0 | | |
| | | 47.0 | | | 56.0 | | | 64.0 | | |
| Contour dBm - dBu | | -114.7 | -108.7 | -108.7 | -123.7 | -116.7 | -116.7 | -131.7 | -124.7 | -124.7 |

| A ' Calculated Results | UHF | | | |
|---|---|---|---|---|
| | Min | | Typ | |
| | ATV-4 | ATV-3 | ATV-4 | ATV-3 |
| ATV ERP (dBk) | | | | |
| ATV Strong Signal Radius | | | | |
| ATV Moderate Signal Radius | | | | |
| ATV Weak Signal Radius | | | | |
| ATV Noise Ltd Radius (km) | | | | |
| ATV Noise Ltd Signal (dBm) | | | | |
| ATV Noise Ltd (50,90) Signal (dBu) | | | | |
| ATV Noise Ltd Coverage (sqkm) | | | | |
| | | | | |
| ATV CoCh into NTSC (km) | | | | |
| ATV CoCh into NTSC (sqkm) | | | | |
| NTSC CoCh into ATV (km) | | | | |
| NTSC CoCh into ATV (sqkm) | | | | |
| ATV CoCh into ATV (km) | | | | |
| ATV CoCh into ATV (sqkm) | | | | |
| | | | | |
| ATV Adj Ch Int dB | | | | |
| ATV Adj Ch Int Area (sqkm) | | | | |
| ATV Service Area (sqkm) | | | | |
| Percent of NTSC Service Area | | | | |