Cohen, Dippell and Everist, P.C.

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Revitalization of the AM Radio Service	)	MB Docket No. 13-249

Comments
on Behalf of
COHEN, DIPPELL AND EVERIST, P.C.

The following comments are submitted on behalf of Cohen, Dippell and Everist, P.C. ("CDE") and is in response to the Notice of Proposed Rulemaking released by the Federal Communications Commission on October 31, 2013. CDE and its predecessors have practiced before the Federal Communications Commission ("FCC") for over 75 years in broadcast and telecommunications matters. The firm or its predecessors have been located in Washington, DC since 1937 and performed professional consulting engineering services to the communication industry.

The undersigned is licensed as a Professional Engineer in the District of Columbia and has been in continuous employment with this firm or its predecessors for over fifty (50) years.

He was the Chairman of the AM Broadcasting Service Working Group preparatory to the 1979 World Administrative Radio Conference and an Industrial delegate for the United States to the International Telecommunications Union Regional Administrative Medium Frequency Broadcasting Conference in Buenos Aires, Argentina. He as the Chairman of TF:F Planning Methods; was a U.S. delegate of the Fourth Panel of Experts meeting in Geneva, Switzerland; was Chairman of the Working Group on Inventories, Incompatibilities, Negotiations and

Strategy to the Advisory Committee, all preparatory to the Second Session of the Regional Administrative MF Broadcasting Conference for Region 2 (Western Hemisphere) held in Rio de Janeiro. He was an industrial delegate for the United States to the Regional Administrative Radio-Conference (BC-R21) sponsored by the International Telecommunications Union in Geneva, Switzerland. All time was voluntary and all expenses were paid by the firm of Cohen, Dippell and Everist, P.C.

The FCC is to be commended for adopting this Notice of Proposed Rule Making ("NPRM") and outlining various procedures in an attempt to revitalize the AM broadcast service and soliciting other suggestions to be considered.

This engineering statement is dedicated to all the stations such as WRDN, Durand, Wisconsin and their effort to serve their communities.

This firm in various filings (such as MM Docket 87-267)[1] and subsequent filings did not provide its support on a number of technical items adopted in MM Docket 87-267[2]. Many of the technical criteria (primarily dealt with antenna design and technical allocation issues) were considered and adopted by the FCC in the attempt to increase fidelity and reduce interference. For the majority of stations seeking to modify and improve their facilities these technical criteria, in our opinion, were an impediment.

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[1]The owner is to be commended for raising this very important issue in the public domain.

[2]Comments on *Notice of Proposed Rule Making* concerning the AM broadcast service, MM Docket No. 87-267 by Cohen, Dippell and Everist, P.C., November 1990.

This filing is separated into three parts. There are: (1) immediate technical steps to revitalize AM broadcast, (2) interim technical steps to revitalize AM broadcast and (3) long-term technical steps to revitalize AM broadcast.[3]

The efforts indicated by the station owner of WRDN[4] is precisely the community services role that these small and medium market stations need to provide. These small and medium market stations face many market place competitive offerings of which none was available in the 1950's, 1960's and 1970's. These newer market place offerings for the most part do not provide timely, local information[5]. Similarly large market AM broadcast stations face competition from a multitude of other recently inaugurated services which also do not necessarily provide timely, local information. Timely, local information is a requirement in a full and open society when a disaster is about to or is occurring.

The FCC observes that the number of AM stations has decreased between 1990 and 2000. Table I demonstrates that fact. The thrust of these comments are directed towards improvements to a large segment of the AM station inventory, i. e., the so-called regional channels and local channels. Table II demonstrates the number of stations authorized by regional frequency for the periods by decade from 1919 through 1990. Table II also reflects the

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[3]Some of the technical criteria the Commission adopted were the Rachet rule, first-adjacent channel nighttime ratios from 0 dB to 6 dB, RSS from 50% exclusion to 25% exclusion, etc.

[4]See News Release, *Statement of Commissioner Ajit Pai on WRDN, Reel Country 1430 AM"* dated June 10,2013

[5]Pandora; iTunes, etc.

period of greatest station growth versus the period of greatest urban growth. For example, Washington, D.C.'s urban growth from 1950's to 2000 are shown in Exhibit E-1 through Exhibit E- 4[6]. As can be seen, the period the greatest number of regional stations were authorized were designed before the large increase in urban growth. While the growth of other markets may vary in comparison to Washington, D.C., they are expected to be similar.

Immediate Steps to Revitalize AM Broadcast

AM Noise

As the FCC notes, AM radio operates in an environment of interference from a variety of sources. The FCC should direct the Office of Engineering and Technology ("OET") to study whether or not many of these devices comply with Part 15 of the Rules. Certainly the testing of many off-the-shelf consumer electronic devices would yield valuable information on whether a radical change above that herein recommended for the normally protected contour for the so-called regional and local channel stations should occur.

Daytime Contour

The FCC should consider for so-called regional and local channels (Region II--Class B) to raise the daytime normally protected contour from 0.5 mV/m to 2 mV/m. The reason is to overcome manmade noise.

[6]The increase in the urban growth area from 1950 to 1980 is over 4 times larger than 1950; from 1950 to 1990 over 5 times larger and from 1950 to 2000 is over 6 times larger than 1950.

1605 to 1705 KHz

As stated above the undersigned was the Chairman of the AM Broadcasting Service Working Group Preparatory to the World Administrative Radio Conference (WARC-79) from which the idea for the expanded band originated. This firm urges the FCC to revisit application criteria for the ten (10) channels created with the band expansion (1605-1705 KHz) so that these channels can serve a useful public purpose.

MDCL

The FCC should in the short term continue its current policy to permit modulation dependent carrier level ("MDCL") control technologies by letter notification.

Open FM Filing Window

The FCC's proposal to open an exclusive window for FM translators within the computed 2 mV/m contour or 40 km (25 miles) is supported. It is recommended that the language should be changed to the 2 mV/m contour or 40 km or which is the greater[7] is recommended. The FM translator should not supplant the AM broadcast station operation. If the AM broadcast station is terminated then the FM translator station is also to be deleted.

The so-called "Mattoon" waiver should be modified or deleted.

The FCC seeks comments on the possible economic impact that the authorization of FM translators to AM stations in the proposed filing window may have on full-time FM stations.

[7]Change the word "smaller" to "greater".

While this firm is not an expert in this area, it is noted in the Executive Summary of Report and Economic Study[8] and we anticipate that with the addition of FM translator to complement AM service, there will be no essential change.

Modification of the Daytime Coverage Requirement

This firm supports the change that the proposed facility of an existing station (for all non-Class A stations) demonstrates daytime coverage to at least 50% of its proposed licensed community. No opinion is offered on the percentage for the nighttime coverage to the community.

Modification of AM Efficiency Standards

This firm is opposed to a change in the efficiency standards. The reason is that it is unclear how it would be implemented and satisfy bilateral and Region II requirements.

Interim Technical Steps to Revitalize AM Broadcast

Attached hereto is the document provided and adopted by the Technical Subgroup of the Radio Advisory Committee dated May 10, 1988.

At present, the FCC's interference criteria assumes that all interfering skywave signals arrive at the same time as though there is 100% correlation in their propagation relationship.[9]

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[8]In the Matter of Economic Impact of Low Power FM Stations on Commercial FM Radio Report to Congress Pursuant to Section 8 of the Local Community Radio Act of 2010, MB Docket No. 11-83.

[9]This approach gives signals the same weight as interfering groundwave signals. Moreover, it ignores the fact for 90% of the time interference from any particular station is less than that depicted by the FCC's skywave propagation criteria. This leads to inaccuracies in the estimate of service and distorts the true interference picture.

Statistically, it is found that the number of interfering skywave signals at any one time is less than the total number of stations on the channel. For example, in the case of eight total possible events with a single probability of 0.1, the probability is:

Number of Events	Probability of Exactly X Events Occurring Simultaneously	Probability of 1 to X or Less Events Occurring Simultaneously
0	0.430	--
1	0.382	0.382
2	0.148	0.530
3	0.03	0.562
4	0.004	0.567
5	0.0004	0.567
6	0.00002	0.567
7	0.0000007	0.567
8	0.000000009	0.567

As seen from the above, the probability of eight events occurring simultaneously is far less than one.

For eight total possible events with a single probability of 0.5, the probability is:

Number of Events	Probability of Exactly X Events Occurring Simultaneously	Probability of 1 to X or Less Events Occurring Simultaneously
0	0.004	--
1	0.031	0.031
2	0.110	0.141
3	0.219	0.360

4	0.273	0.633
5	0.219	0.852
6	0.109	0.961
7	0.031	0.992
8	0.003	0.995

This firm continues to believe that the above statistical relationship more accurately portrays the behavior of skywave signals. If true, then current rules tend to overprotect groundwave contours or, conversely, over-estimate the potential for interference.

Regional stations have the preponderance of directional antenna systems. If the FCC desires to simplify directional arrays and improve groundwave service during nighttime hours, it should restore the 50% exclusion rule and RSS method of determining interference for regional (Class B) stations and use, in the alternative, skywave field strength values, 50% of the time computed for the second hour after sunset. Moreover, this firm recommends that the nominal usable field strength for all Class B stations be 2.5 mV/m. This would permit directional antennas to be relaxed (thereby increasing service) by approximately 8 dB.

Long-Term Technical Steps to Revitalize AM Broadcast

The process and methodology by which new AM stations or modified AM stations requests on Form 301 are submitted should be evaluated. Based on the past recent submissions, it appears that the current process strains the FCC's Media Bureau's engineering section to review the AM auction grantee. The reason is that the current FCC Rules governing the

allocation of AM daytime and nighttime stations are complicated by virtue of the rules being written over the past seven decades.

Therefore, it is urged that the FCC undertake an effort to develop a computerized method that would allow for an electronic submission. Such a program would allow the proponent to better understand and accurately address all the technical items required. One possible computerized method is attached. The program was developed by Nick DeMinco of NTIA.

Respectfully Submitted,

COHEN, DIPPELL AND EVERIST, P.C.

Donald G. Everist
President

DATE: January 22, 2014

TABLE I
TABULATION OF
STANDARD BROADCAST STATION AUTHORIZATIONS
FROM FCC WEBSITE
JANUARY 2014

Date of Count	AM
6/30/1943	911
6/30/1944	912
6/30/1945	931
6/30/1946	961
6/30/1947	1298
6/30/1948	1693
6/30/1949	1963
6/30/1950	2118
6/30/1951	2238
6/30/1952	2333
12/31/1968	4236
1/31/1969	4240
1/31/1970	4269
9/30/1990	4978
10/31/1990	4984
11/30/1990	4984
12/31/1990	4987
1/31/1991	4986
2/28/1991	4990
3/31/1991	4986
4/30/1991	4987
5/31/1991	4986
6/30/1991	
7/31/1991	4988
8/31/1991	
9/30/1991	4988
10/31/1991	4988
11/30/1991	4990
12/31/1991	4985
1/31/1992	4984
2/29/1992	4984
3/31/1992	4982
4/30/1992	4982
5/31/1992	4978
6/30/1992	4971
7/31/1992	4969
8/31/1992	4969
9/30/1992	4963
10/31/1992	
11/30/1992	4961
12/31/1992	4961
1/31/1993	4960
2/28/1993	4957
3/31/1993	4956

TABLE I
TABULATION OF
STANDARD BROADCAST STATION AUTHORIZATIONS
FROM FCC WEBSITE
JANUARY 2014

4/30/1993	4954
5/31/1993	4949
6/30/1993	4952
7/31/1993	4951
8/31/1993	4950
9/30/1993	4949
10/31/1993	4948
11/30/1993	4945
12/31/1993	4944
3/31/1994	4938
2/28/1994	4934
3/31/1994	4933
4/30/1994	
5/31/1994	4928
6/30/1994	4929
7/31/1994	4925
8/31/1994	4923
9/30/1994	4919
10/31/1994	4914
11/30/1994	4912
12/31/1994	4913
1/31/1995	4909
2/28/1995	4912
3/31/1995	4911
4/30/1995	4913
5/31/1995	4912
6/30/1995	4907
7/31/1995	4906
8/31/1995	4906
9/30/1995	4908
10/31/1995	4906
11/30/1995	4908
12/31/1995	4909
1/31/1996	4909
2/29/1996	4906
3/31/1996	4894
4/30/1996	4890
5/31/1996	4890
6/30/1996	4884
7/31/1996	4879
8/31/1996	4873
9/30/1996	4872
10/31/1996	4864
11/30/1996	4863
12/31/1996	4857
1/31/1997	4854

TABLE I
TABULATION OF
STANDARD BROADCAST STATION AUTHORIZATIONS
FROM FCC WEBSITE
JANUARY 2014

2/28/1997	4840
3/31/1997	4821
4/30/1997	4813
5/31/1997	4814
6/30/1997	4811
7/31/1997	4812
8/31/1997	
9/30/1997	4811
10/31/1997	4785
11/30/1997	4786
12/31/1997	4762
1/31/1998	4753
2/28/1998	4741
3/31/1998	4724
4/30/1998	4732
5/31/1998	4724
6/30/1998	4727
7/31/1998	4732
8/31/1998	4733
9/30/1998	4734
10/30/1998	4790
11/30/1998	4792
12/31/1998	4793
1/31/1999	4790
2/28/1999	4789
3/31/1999	4785
4/30/1999	4782
5/31/1999	4784
6/30/1999	4781
7/31/1999	4782
8/31/1999	4782
9/30/1999	4783
10/31/1999	
9/30/2000	4685
10/31/2000	
6/30/2001	4715
9/30/2001	4727
12/31/2001	4772
3/31/2002	
6/30/2002	4811
9/30/2002	4804
12/31/2002	4804
3/31/2003	4804
6/30/2003	4803
9/30/2003	4802
12/31/2003	4794

TABLE I
TABULATION OF
STANDARD BROADCAST STATION AUTHORIZATIONS
FROM FCC WEBSITE
JANUARY 2014

3/31/2004	4781
6/30/2004	4771
9/30/2004	4770
12/31/2004	4774
3/31/2005	4761
6/30/2005	4759
9/30/2005	4758
12/31/2005	4757
3/31/2006	4759
6/30/2006	4744
9/30/2006	4751
12/31/2006	4754
3/31/2007	
6/30/2007	
9/30/2007	4776
12/31/2007	4776
3/31/2008	4776
6/30/2008	4778
9/30/2008	4778
12/31/2008	4786
3/31/2009	
6/30/2009	4789
9/30/2009	4789
12/31/2009	4790
3/31/2010	4790
6/30/2010	4786
9/30/2010	4784
12/31/2010	4782
3/31/2011	4778
6/30/2011	4770
9/30/2011	4763
12/31/2011	4766
3/31/2012	4762
6/30/2012	4754
9/30/2012	4745
12/31/2012	4738
3/31/2013	4736
6/30/2013	4734
9/30/2013	4728
12/31/2013	4727

COHEN, DIPPELL AND EVERIST, P.C.

TABLE II
REGIONAL CHANNELS
LISTED BY DECADE FOR
COMMENCEMENT OF OPERATION

Frequency MHz	1919-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1990	Total
550	7	4	8	2	2	0	2	25
560	9	4	5	2	0	1	1	22
570	8	3	3	4	1	0	2	21
580	9	2	7	7	0	0	1	26
590	6	8	6	2	5	0	2	29
600	6	3	4	8	2	1	1	25
610	7	2	9	5	1	0	1	25
620	8	4	7	4	0	0	2	25
630	7	4	4	8	1	0	2	26
790	7	3	13	12	4	4	1	44
910	7	3	14	13	5	1	7	50
920	6	1	17	15	9	0	0	48
930	8	7	13	7	10	1	3	49
950	7	3	9	17	7	2	1	46
960	7	4	10	18	3	2	3	47
970	7	3	12	20	6	2	0	50
980	4	1	14	23	4	2	2	5
1150	5	5	16	20	7	3	1	57
1250	9	5	7	23	8	1	5	58
1260	5	2	18	32	5	1	0	63
1270	5	1	10	30	12	2	5	65
1280	5	4	21	19	8	2	2	61
1290	8	4	16	21	7	2	4	62
1300	6	2	14	24	15	2	2	65
1310	10	1	16	25	6	2	3	63
1320	3	6	16	22	10	3	2	62
1330	4	6	14	21	11	3	5	64
1350	4	4	12	24	11	1	3	59
1360	7	2	17	30	9	4	1	70
1370	5	4	9	33	14	3	2	70
1380	5	3	15	23	14	3	2	65
1390	5	6	10	20	12	3	2	58
1410	3	4	16	26	9	7	2	67
1420	4	3	15	30	7	2	7	68
1430	2	3	16	23	14	3	3	64
1440	5	3	17	21	8	3	4	61
1460	5	0	10	34	11	4	5	69
1470	3	5	10	32	11	2	3	66
1480	6	5	6	24	24	2	3	70
1590	0	2	11	35	15	10	6	79
1600	1	0	20	29	15	5	4	74
TOTALS	235	139	487	788	323	89	107	2,168

← Period of Greatest Station Growth →		← Period of Greatest Urban Growth →

Source: The Broadcasting Yearbook 1990.

DISTRICT OF COLUMBIA

INFORMATION BASED ON
DATA PUBLISHED BY THE
U.S. CENSUS BUREAU
WEB SITE

1940

WASHINGTON, D. C., METROPOLITAN DISTRICT

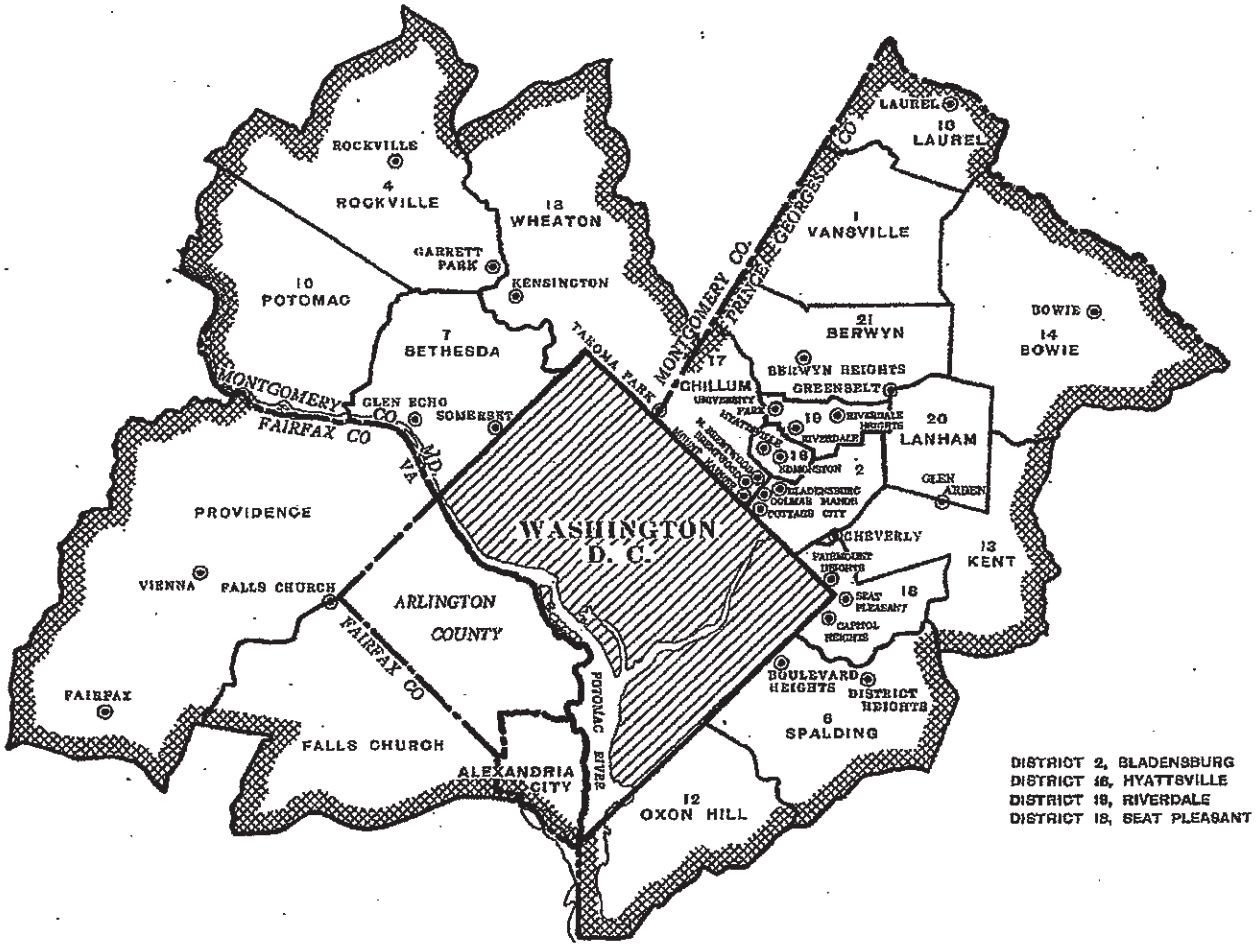

EXHIBIT E-1

SCALE

0 5 10 15 20 Kilometers

0 5 10 15 20 Miles

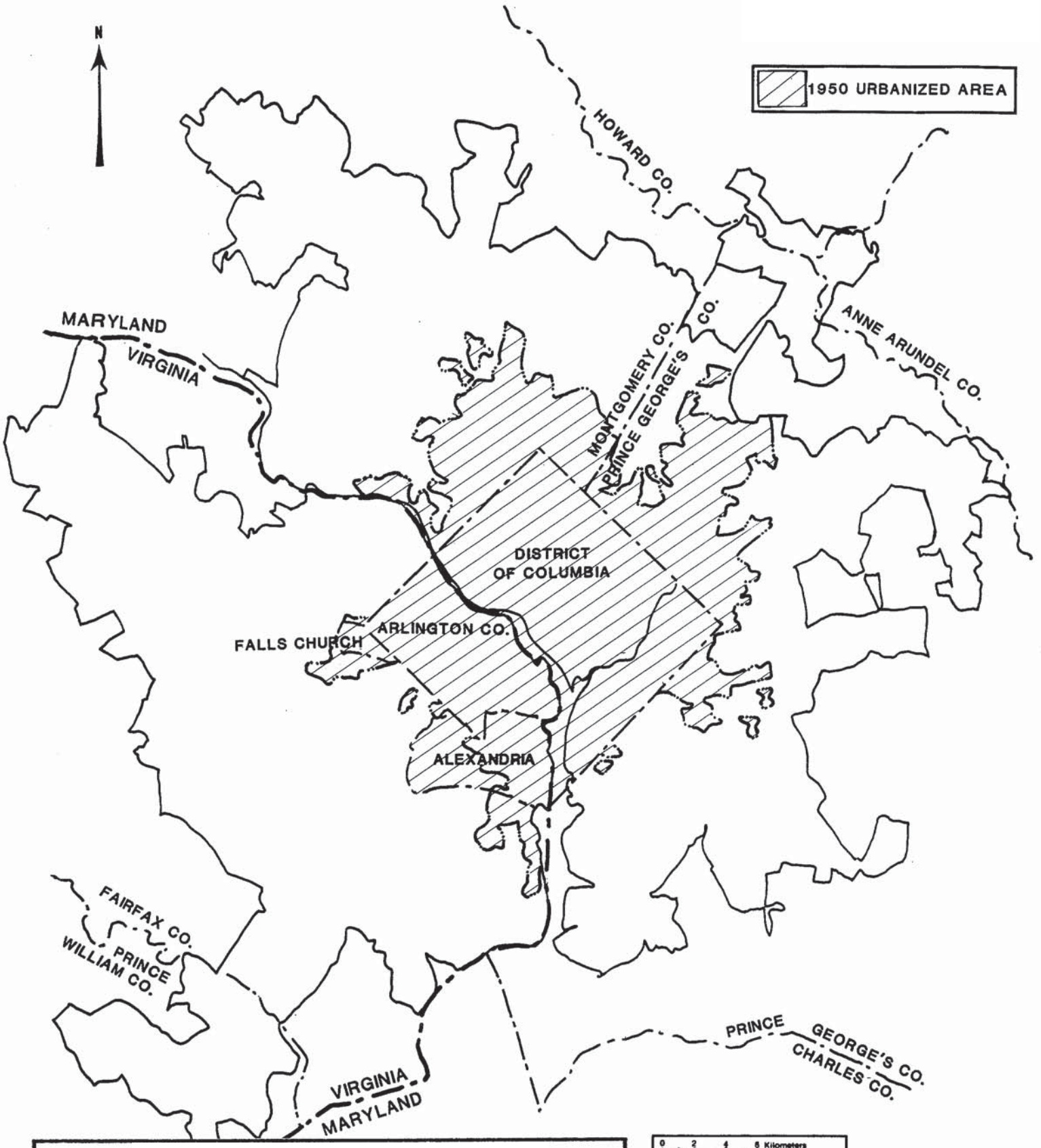

EXHIBIT E-2
COMPARISON OF
1980 DISTRICT OF COLUMBIA
URBANIZED AREA
TO THE 1950 URBANIZED AREA
JANUARY 2014

COHEN, DIPPELL and EVERIST, P.C. Consulting Engineers Washington, D.C.

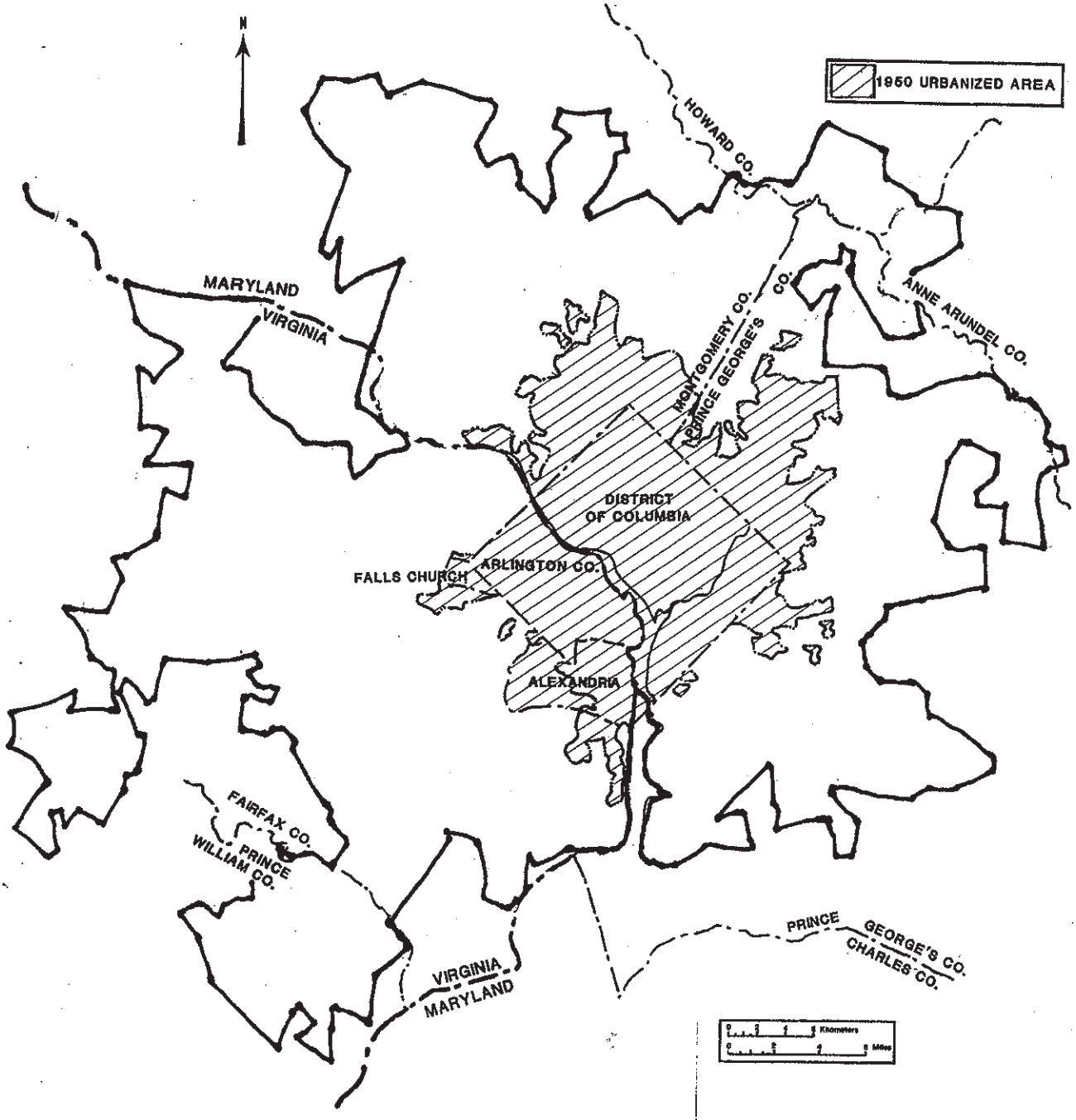

EXHIBIT E-3
COMPARISON OF
THE 1990 DISTRICT OF COLUMBIA
URBANIZED AREA
TO THE 1950 URBANIZED AREA
JANUARY 2014

COHEN, DIPPELL AND EVERIST, P.C. CONSULTING ENGINEERS

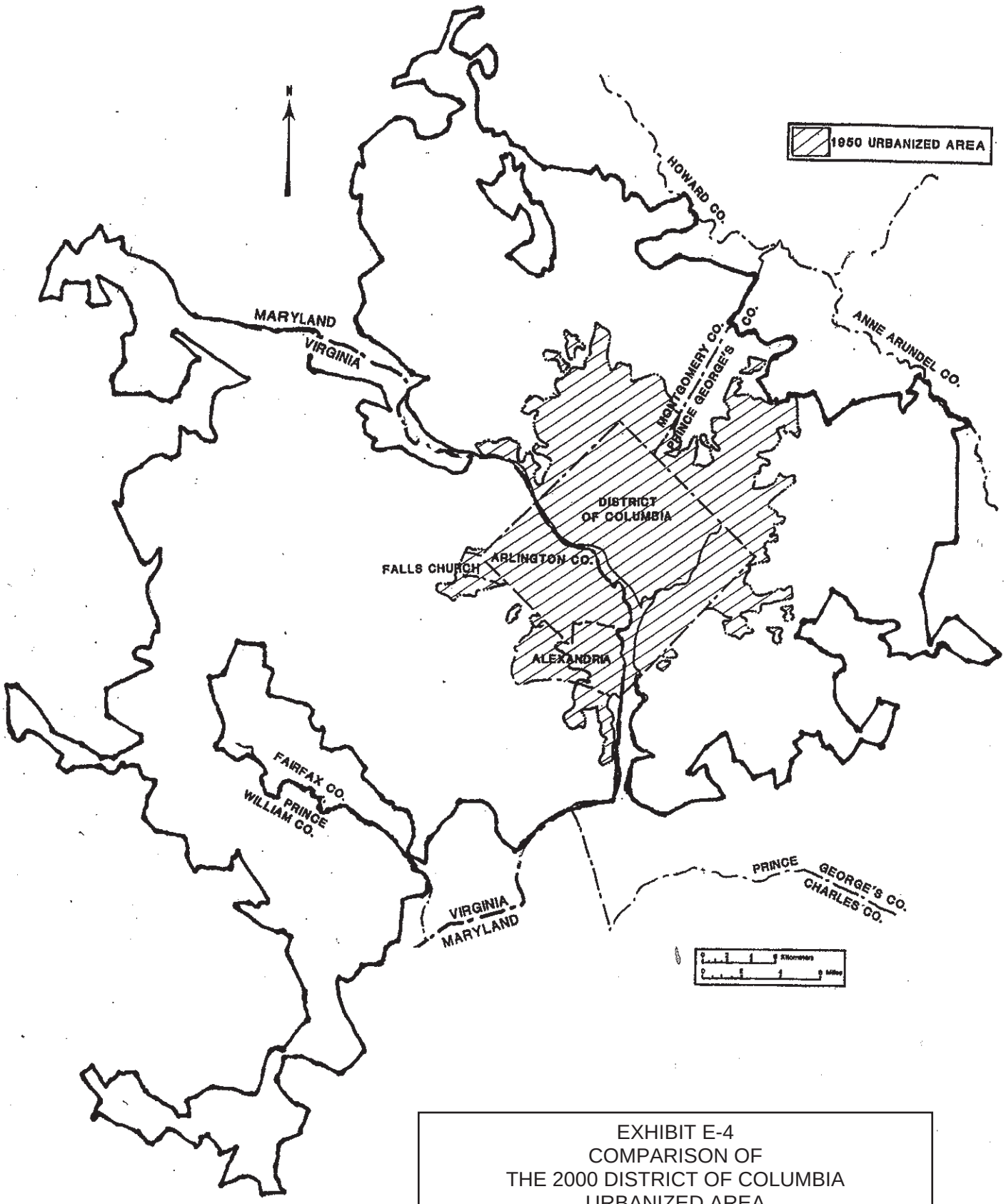

EXHIBIT E-4
COMPARISON OF
THE 2000 DISTRICT OF COLUMBIA
URBANIZED AREA
TO THE 1950 URBANIZED AREA
JANUARY 2014

COHEN, DIPPELL AND EVERIST, P.C. CONSULTING ENGINEERS

Cohen, Dippell and Everist, P.C.

ABSTRACTION FROM SUBMISSION TO THE RADIO ADVISORY COMMITTEE

TO: Technical Subgroup of Radio Advisory Committee

FROM: Donald G. Everist

SUBJECT: Mathematical Representation of Probability of 10% Skywave Signals Appearing at a Location Simultaneously

DATE: May 10, 1988

The following is a mathematical representation of the probability of multiple 10% skywave signals simultaneously appearing at a location. This document is a result of John Reiser's special effort and contribution. The following formula has been utilized:

WHERE:

p is the probability

n is the independent trials

k is "successes"

c is

For eight total possible events with a single probability of 0.1, the probability is:

Number Of Events	Probability Of Exactly X Events	Probability Of 1 to X or less Events Occurring
0	0.430	--
1	0.382	0.382
2	0.148	0.530
3	0.03	0.562
4	0.004	0.567
5	0.0004	0.567
6	0.00002	0.567
7	0.0000007	0.567
8	0.000000009	0.567

For eight total possible events with a single probability of 0.5, the probability is:

Number Of Events	Probability Of Exactly X Events	Probability Of 1 to X or less Events Occurring
0	0.004	--
1	0.031	0.031
2	0.110	0.141
3	0.219	0.360
4	0.273	0.633
5	0.219	0.852
6	0.109	0.961
7	0.031	0.992
8	0.003	0.995

Assumption: The eight total events are independent

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SUMMARY OF INPUTS
TO THE SOFTWARE PROGRAM
DEVELOPED BY N. DEMINCO J. GEIKAS
ABSTRACTED FROM
"USER MANUAL FOR LOW AND MEDIUM FREQUENCY PROPAGATION MODEL"
DATED JULY 1998

The National Telecommunications and Information Administration ("NTIA") published report NTIA Report 99-368 entitled, "Medium Frequency Propagation Prediction Techniques and Antenna Modeling for Intelligent Transportation System (ITS) Broadcast Applications" and provides the equations used to develop a software evaluation ITS model authored by Nicholos DeMinco dated August 1999. From that a software program has been developed and described in the "User Manual for Low and Medium Frequency Propagation Model" by N DeMinco J Geikas dated July 1998.

A brief description of the input is as follows:

1. Ground Wave Model
    a. Smooth Earth – calculations for ground-wave field strengths assume homogeneous earth
    b. Mixed Path, Smooth Earth – calculations for ground-wave field strengths are made in sections with different ground constants
    c. Irregular Terrain, Mixed Path – uses elevation and ground constants at regular intervals to calculate field strengths (takes time to run)
2. Skywave Model
    a. FCC – Uses a curve of field strength versus distance (FCC,1982)
    b. CCIR – Uses USSR Model with modifications (Haakinson, 1988)
    c. WANG – model independent from frequency (Wang, 1985)
3. Frequency
    a. 150kHz < f <1750kHz
    b. System 1 requires a single frequency, but System 2 and 3 creates a range around the input value
4. Propagation
    a. For System 1, sky-wave predictions are made for both daytime and nighttime
    b. For Systems 2 and 3, if daytime is chosen no sky-wave predictions will be made, and if nighttime is chosen, only interfering transmitters that broadcast at night will be considered
5. Transmitter Site Parameters
    a. input coordinates (NAD 83)
6. Receiver Site Parameters
    a. For System 1, input coordinates (NAD 83)
    b. For System 2, input coordinates and radius searched around for interfering transmitters
    c. For System 3, make a boundary rectangle using longitudinal or latitudinal lines, and the distance beyond this rectangle to search for interfering transmitters
7. Required Reliability: 0 -100%
    a. The noise power is adjusted by the reliability. A 90% reliability implies that the computed signal to noise power ratio will be available for 90% of the time in a 1 hour/3 month season time block
8. Earth Radius Ratio: .5 – 3.0
    a. The ratio of the effective earth radius to the actual earth radius is used in ground-wave predictions.
    b. Using 1.33 gives a standard refractive atmosphere

9. Seasons
    a. The season chosen effects the noise variables that are included in the calculations
    b. For system 1, multiple can be selected
    c. For system 2, one must be selected
    d. System 3 is independent of the season
10. Man-Made Noise
    a. Select the type of environment of the receiver. The values give the median man-made noise in 1 Hz bandwidth at 1 MHZ. the value is adjusted for the selected frequency
    b. System 3 does not require this input
11. Time of Day
    a. This is the local time of day at the receiver, it affects the noise calculations.
    b. For system 1, multiple can be selected
    c. For system 2, one must be selected
    d. System 3 does not require this input
12. Ground Constants
    a. If "Smooth Earth" was selected, you may enter values manually or use the default values which are extracted from the database
    b. For manual input, enter a segment length, ground constant and dielectric constant for each segment you desire along a path up to a maximum of 50 segments
13. Terrain
    a. If "Irregular Terrain, Mixed Path" was selected, terrain data is necessary
    b. They all use values extracted from the database, or input manually for System 1
    c. For manual input, insert a terrain interval value (km) and then the elevation value for each interval
14. Transmitter, Receiver Antenna
    a. Vertical Monopole – the gain changed with elevation angle
        i. Antenna feed point height above ground (m)
        ii. Vertical monopole length (.01λ to.7λ)
        iii. Antenna monopole efficiency (1.00 to 100%
        iv. Ground Screen (yes or no)
            1. Ground screen radius (.01λ to.6λ)
            2. number of radials (5 – 360)
    b. Field Strength – this option allows the user to specify a fixed field strength at a fixed distance from the transmitter whose transmitter power is at a fixed reference level. The algorithm computes the equivalent antenna gain to be used in calculations.
        i. Antenna feed point height above ground (m)
        ii. Antenna field strength (mV/m)
        iii. Antenna reference power (kW)
        iv. Antenna reference distance (km)
    c. User Gain – this option allows the user to enter a fixed antenna gain relative to an isotropic that is used for all azimuths and elevations.
        i. Antenna feed point height above ground (m)
        ii. Antenna power gain relative to isotropic radiator (dBi)
    d. Ferrite Loop – this antenna is modeled to approximate the antenna found in MF receivers. The antenna is not directional and is very lossy with gains of -40 to -80 dBi typically.