Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide A Fixed Service in the 12.2-12.7 GHz Band	)	ET Docket No. 98-206 RM-9147 RM-9245

FOURTH ERRATUM

Adopted: February 13, 2001 **Released:** February 16, 2001

By the Office of Engineering and Technology:

1. On December 8, 2000, the Commission released a *First Report and Order and Further Notice of Proposed Rule Making* in the above captioned proceeding. Subsequent to the release of this document, a minor error was discovered in the program used to calculate the satellite outage time data presented in Appendices G, H, and J. Therefore, with this Erratum we correct Appendices G, H, and J.

2. Accordingly, IT IS ORDERED that this Erratum is issued pursuant to Section 0.241 of the Commission's rules on delegated authority, 47 C.F.R. § 0.241.

FEDERAL COMMUNICATIONS COMMISSION

Bruce Franca
Acting Chief
Office of Engineering and Technology

APPENDIX G – EXAMPLES OF DBS SERVICE OUTAGES FOR DIFFERENT PERCENTAGES OF SERVICE UNAVAILABILITY (45 cm antenna)

Table 1 EchoStar @ 119 WL

DBS satellite orbital location	Degrees	119.0	119.0	119.0	119.0
Earth station location		Denver, CO	Washington, D.C.	Seattle, WA	Miami, FL
DBS satellite e.i.r.p. towards the Earth station location	DBW	48.6	52.6	46.7	52.6
Earth station elevation above mean sea level	Mm	1.58	0.01	0.01	0.0
Earth station elevation angle	Degrees	41.8	27.6	35.2	37.7
Free space loss	DB	205.9	206.1	206.0	205.9
Earth station antenna miss-pointing error	DB	0.5	0.5	0.5	0.5
Atmospheric absorption	DB	0.2	0.2	0.2	0.2
Clear-sky receive system noise temperature	Kelvin	85	85	85	85
Clear-sky earth station antenna G/T	DB	14.5	14.5	14.5	14.5
C/I for other assignments in the BSS Plan	DB	20.0	20.0	20.0	20.0
Clear-sky feeder link C/(N+I)	DB	26.2	26.2	26.2	26.2
Clear-sky carrier-to-noise plus interference ratio	DB	10.7	13.6	8.9	13.8
Required C/(N+I) for operating threshold	DB	6.1	6.1	6.1	6.1
Link margin	DB	4.6	7.5	2.8	7.7
Rain margin	DB	1.83	4.09	0.94	4.23
Rain intensity exceeded for 0.01% of an average year	mm/h	30.3	48.2	36.5	95.8
Satellite link availability for an average year	%	99.97	99.94	99.69	99.77
Satellite link unavailability for an average year	%	0.0285	0.0647	0.3142	0.2279
Total link unavailable time for an average year	Minutes	149.9	340.1	1652.5	1198.8
10% of the unavailable time in an average year	Minutes	15.0	34.0	165.3	119.9
5% of the unavailable time in an average year	Minutes	7.5	17.0	82.6	59.9
2.86% of the unavailable time in an average year	Minutes	4.3	9.7	47.3	34.3
Satellite link unavailability for the worst-month	%	0.1290	0.2631	1.0409	0.7873
Total link unavailable time for the worst-month	Minutes	56.5	115.3	456.2	345.1
10% of the unavailable time in the worst-month	Minutes	5.7	11.5	45.6	34.5
5% of the unavailable time in the worst-month	Minutes	2.8	5.8	22.8	17.3
2.86% of the unavailable time in the worst-month	Minutes	1.6	3.3	13.0	9.9
Rainy sky C/I for a 2.86% increase in link unavailability	DB	23.9	22.6	25.0	22.2

Table 2 DIRECTTV @ 101 WL

DBS satellite orbital location	Degrees	101.0	101.0	101.0	101.0
Earth station location		Denver, CO	Washington, D.C.	Seattle, WA	Miami, FL
DBS satellite e.i.r.p. towards the Earth station location	DBW	49.4	52.4	48.4	53.4
Earth station elevation above mean sea level	Km	1.58	0.01	0.01	0.0
Earth station elevation angle	Degrees	43.8	38.5	31.5	52.0
Free space loss	DB	205.8	205.9	206.0	205.7
Earth station antenna miss-pointing error	DB	0.5	0.5	0.5	0.5
Atmospheric absorption	DB	0.2	0.2	0.2	0.2
Clear-sky receive system noise temperature	Kelvin	125	125	125	125
Clear-sky earth station antenna G/T	DB	12.9	12.9	12.9	12.9
C/I for other assignments in the BSS Plan	DB	20.7	20.7	20.7	20.7
Clear-sky feeder link C/(N+I)	DB	24.2	24.2	24.2	24.2
Clear-sky carrier-to-noise plus interference ratio	DB	10.0	12.4	8.9	13.3
Required C/(N+I) for operating threshold	DB	5.0	5.0	5.0	5.0
Link margin	DB	5.0	7.4	3.9	8.3
Rain margin	DB	2.48	4.48	1.77	5.43
Rain intensity exceeded for 0.01% of an average year	mm/h	30.3	48.2	36.5	95.8
Satellite link availability for an average year	%	99.99	99.96	99.87	99.88
Satellite link unavailability for an average year	%	0.0146	0.0386	0.1251	0.1188
Total link unavailable time for an average year	Minutes	76.6	203.0	658.0	625.0
10% of the unavailable time in an average year	Minutes	7.7	20.3	65.8	62.5
5% of the unavailable time in an average year	Minutes	3.8	10.2	32.9	31.3
2.86% of the unavailable time in an average year	Minutes	2.2	5.8	18.8	19.9
Satellite link unavailability for the worst-month	%	0.0720	0.1680	0.4672	0.4468
Total link unavailable time for the worst-month	Minutes	31.51	73.6	204.8	195.8
10% of the unavailable time in the worst-month	Minutes	3.2	7.4	20.5	19.6
5% of the unavailable time in the worst-month	Minutes	1.6	3.7	10.2	9.8
2.86% of the unavailable time in the worst-month	Minutes	0.9	2.1	5.9	5.6
Rainy sky C/I for a 2.86% increase in link unavailability	DB	23.6	22.9	23.5	22.8

APPENDIX H -- A METHOD OF CONVERTING PERCENTAGE OF UNAVAILABLE TIME INTO A CARRIER-TO-INTERFERENCE RATIO

This appendix presents a method for determining the relationship between DBS service outage time and a DBS system's carrier-to-noise plus interference ratio (C/N+I). Specifically, this method can be used to determine the C/I that a terrestrial system needs to meet in relation to a DBS satellite system to keep service disruptions of the satellite system to a certain amount of outage time. In this case the terrestrial system represents the interference and the satellite system represents the desired carrier.

The availability of a satellite space-to-Earth link is defined as the total amount of time that the satellite service is available to the user without disruption. Conversely, the unavailability of that same link is the total time during which the user is without service (outage). Generally, availability and unavailability are expressed in terms of percentage of time of an average year (8765.76 hours) or the worst month in an average year.[1] These two variables are complementary and always sum to 100 percent. For example if a satellite system has an availability of 99.7%, its unavailability is 0.3% which equates to total outage time of 26.3 hours averaged over a year.

In a shared environment (satellite and terrestrial service), the total unavailability can be attributed to two sources: natural propagation phenomenon such as precipitation (*e.g.*, rain) in the space-to-earth path and external radio interference. In the frequency bands used by DBS for downlink (12.2-12.7 GHz), the predominant propagation impairment is rain attenuation in the space-to-earth slant path.[2] The amount of service outage caused by rain can be estimated using the prediction procedures of ITU-R Recommendation P.618-6. This rain attenuation model predicts, for a given geographic area, the average service outage time over an average year for a specific level of precipitation attenuation along the space-to-earth slant path.

To determine the portion of the total C/I that is attributable to a terrestrial system, we first establish the amount of outage time of the DBS space-to-earth link that is caused by precipitation only. This outage time is directly dependent on the link margin of the space-to-earth link, which is calculated from the system's link power budget. Link margin is the amount of power received at the earth station receiver above its operating threshold that is designed into the satellite link to overcome the effects of rain and other impediments. During rain, the satellite link is affected in two ways: the carrier signal strength is attenuated due to rain and the rain causes an increase in the system's noise temperature. If the rain attenuation and earth station G/T (gain / system noise temperature) degradation cause a reduction to the carrier-to-noise (C/N) power that exceeds the available link margin, the satellite link will experience an outage. The amount of attenuation due to rain that causes an outage is referred to as the rain margin.

The satellite link budget (carrier-to-noise plus interference ratio) and the associated rain margin can be derived from the parameters identified in Table B-1. It is evident from the table that the rain margin depends on the DBS satellite E.I.R.P. in the direction of the receiving earth station, the free space path loss, the earth station antenna gain-to-system noise temperature (G/T) ratio and the operating threshold. Once the link margin is known, one can proceed to determine the rain margin. This is accomplished by adding a rain attenuation term to the equation used to find the clear-sky carrier-to-noise ratio to instead find a rainy-sky carrier-to-noise ratio. Additionally, the G/T must be recalculated to account for the increase in atmospheric noise due to the rain. Thus, the G/T will be reduced during a rain event and the rain margin will be less than the link margin.

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[1] A method for converting annual statistics to worst-month statistics is contained in Recommendation ITU-R P.841-1, *Conversion Of Annual Statistics To Worst-Month Statistics*.

[2] In this analysis, we omitted the uplink (earth-to-space) outage contribution.

Once the rain margin is determined, the expected outage time of a satellite link in an average year or in the worst month can be computed using the prediction method contained in ITU-R Recommendation P.618-6. This recommendation entitled "Propagation Data and Prediction Method required for the Design of Earth-Space Telecommunication Systems" provides a procedure to estimate the long-term statistics of the space-to-earth path precipitation attenuation and the associated percentage of outage time.

Now that the percentage of outage time due solely to rain is known, we can reverse the procedure to determine the minimum C/I that a terrestrial system must maintain to effect a specific amount of additional outage time on the satellite system. First, the additional outage time must be determined, either as a percentage of additional outage time or a number of minutes per time period. This additional outage time can then be added to the outage time due to rain only to find the 'equivalent unavailability.' For example, if a satellite space-to-earth link has an unavailability of 0.3% and the minimum C/I for the terrestrial system to cause no more than an additional 10% outage is to be determined, the equivalent unavailability would be 0.33% (0.3 * 1.1). Using the equivalent unavailability, the ITU rain model can be used to find the corresponding 'equivalent rain margin.' That is, the ITU model can be used to find the amount of attenuation associated with the increased outage time. This change in attenuation is attributed to interference from the terrestrial system.

The C/I for the terrestrial system can now be found by modifying the methodology used to determine the satellite link budget (carrier-to-noise plus interference ratio). The terrestrial system is factored into the link budget by adding a term representing its C/I. By using the equivalent rain margin in the link budget, we find an 'equivalent link margin.' We can then find the C/I of the terrestrial system that causes the reduction of the equivalent link margin to zero. This is the minimum C/I that the terrestrial system must maintain to cause no more than the amount of additional outage time chosen.

It is important to note that the above methodology results in the rainy-sky C/I for the terrestrial service interference, which would produce the additional outage time at the DBS earth station. The reason for calculating the rainy-sky C/I is based on the assumption that in a typical satellite path, rain cells in the space-to-earth slant path are generally to the south of the earth station location. Because the terrestrial interfering path generally emanates from the north of the DBS earth station location, it will usually not be in the rain cell. Thus, at the time when a rain cell in the space-to-earth path attenuates a DBS signal, the terrestrial signal will not similarly be attenuated. Therefore, the calculated C/I is performed by not fading the terrestrial signal with rain.

Table B-2 provides an example of the process described above.

Table B-1: Required Parameters for the Determination of DBS Link Rain Margin and Satellite Link Availability and Unavailability

Input Parameters:

1. Satellite longitude;
2. Earth station location (latitude and longitude);
3. Earth station altitude above mean sea level (AMSL);
4. Satellite E.I.R.P. in the direction of the DBS earth station;
5. The operating frequency;
6. The required operating threshold for the DBS earth station receiver;
7. Receiver noise bandwidth;
8. Earth station antenna diameter;
9. Earth station antenna pointing loss towards the DBS satellite;
10. Clear-sky earth station system noise temperature;
11. Atmospheric absorption;
12. Carrier-to-interference ratio from other assignments in the BSS plan;
13. Clear-sky feeder link carrier-to-interference ratio;
14. Boltzman's constant.

Calculation method:

(A) Calculate the distance and elevation angle between satellite and earth station using the satellite longitude (1) and the earth station location (2).
(B) Calculate the free space transmission loss using the distance (A) and the operating frequency (5).
(C) Calculate DBS antenna gain using the operating frequency (5) and the earth station antenna diameter (8).
(D) Calculate the clear-sky G/T ratio using the antenna gain (C) and the clear-sky earth station system noise temperature (10).
(E) Calculate the clear-sky carrier-to-noise ratio using the E.I.R.P. (4), free space transmission loss (B), earth station antenna pointing loss (9), clear-sky G/T (D), receiver noise bandwidth (7), Boltzman's constant (14) and atmospheric absorption (11).
(F) Calculate the clear-sky carrier-to-noise plus interference ratio using the clear-sky carrier-to-noise ratio (E), the carrier-to-interference ration from other assignments in the BSS plan (12), and the clear-sky feeder link carrier-to-interference ratio (13)
(G) Calculate the link and rain margins using the clear-sky carrier-to-noise plus interference ratio (F) and the operating threshold (6).
(H) Calculate the satellite link unavailability using ITU-R Recommendation P.618-6, the rain margin (G), earth station location (2), earth station elevation angle (A), AMSL (3), and operating frequency (5).
(I) Determine the acceptable increase in unavailability due to terrestrial service interference and calculate equivalent unavailability of the satellite by adding the satellite link unavailability (H) and the increase in unavailability due to terrestrial interference.
(J) Determine the equivalent rain margin using the equivalent unavailability (I) and ITU-R Recommendation P.618-6.
(K) Determine the C/I for the terrestrial interference using the equivalent rain margin (J) in the step (G) calculation.

Table B-2: An Example of A Satellite Downlink Power Budget, Rain Margin, Unavailability and Carrier-to-Interference Ratio		
A. Inputs		
Satellite longitude	Degrees	119.0
Earth station latitude and longitude (lat/long)	Degrees	38.90/77.01
Earth station altitude above mean sea level	Km	0.01
Satellite e.i.r.p. in the direction of the DBS earth station	DBW	52.6
Operating frequency	GHz	12.45
Required operating threshold	DB	6.1
Receiver noise bandwidth	MHz	24.0
Earth station antenna diameter	M	0.45
Earth station antenna pointing loss towards the satellite	DB	0.5
Clear-sky earth station antenna system noise temperature	Kelvin	85.0
Atmospheric absorption	DB	0.2
C/I for other assignments in the BSS Plan	DB	20.0
Clear-sky feeder link C/(N+I)	DB	26.2
Boltzman's constant	DB	228.6
B. Calculate		
Distance from GSO satellite to earth station	Km	38,825
Earth station antenna elevation angle	Degrees	27.6
Free space path loss	DB	206.1
Earth station antenna gain	DBi	33.83
Clear-sky earth station antenna G/T	DB	14.5
Clear-sky carrier-to-thermal noise ratio	DB	15.1
Clear-sky carrier-to-thermal noise plus interference ratio	DB	13.6
Clear-sky link margin	DB	7.5
Rain margin	DB	4.09
Satellite link unavailability due to rain	%	0.0647
Calculated satellite link availability	%	99.9353
Acceptable increase in unavailability due to terrestrial service interference	%	2.86
Equivalent unavailability due to rain and terrestrial interference	%	0.0665
Equivalent rain margin	DB	4.03
Rainy sky C/I for the terrestrial service interference	DB	22.6

APPENDIX J: UNAVAILABILITY STATISTICS FOR INCREASES IN DBS OUTAGES OF 2.86%, 60 MINUTES, AND 30 MINUTES ANNUALLY (45 cm antenna)

Unavailability Statistics for DIRECTV Satellite at 101° W.L for Top Markets
(Statistics computed using inputs as listed in Appendix G and the method described in Appendix H)

Market	Average Yearly Statistics		Increased Outage = 2.86%				Increased Minutes of Outage = 60 min.		Increased Minutes of Outage = 30 Min.	
							Change in Percentage of Availability = 0.0114 %		Change in Percentage of Availability = 0.0057 %	
	Percentage of Availability	Minutes of Outage	Percentage of Availability	Minutes of Outage	Increased Minutes of Outage	Change in Percentage of Availability	Percentage of Availability	Minutes of Outage	Percentage of Availability	Minutes of Outage
New York	99.9498	264.02	99.9484	271.58	7.55	0.0014	99.9384	324.02	99.9441	294.02
Los Angeles	99.9639	189.87	99.9629	195.30	5.43	0.0010	99.9525	249.87	99.9582	219.87
Chicago	99.9618	200.91	99.9607	206.66	5.75	0.0011	99.9504	260.91	99.9561	230.91
Philadelphia	99.9604	208.27	99.9593	214.23	5.96	0.0011	99.9490	268.27	99.9547	238.27
San Francisco	99.9313	361.32	99.9293	371.66	10.33	0.0020	99.9199	421.32	99.9256	391.32
Boston	99.9586	217.74	99.9574	223.97	6.23	0.0012	99.9472	277.74	99.9529	247.74
Washington, DC	99.9614	203.02	99.9603	208.82	5.81	0.0011	99.9500	263.02	99.9557	233.02
Dallas	99.8567	753.68	99.8526	775.24	21.56	0.0041	99.8453	813.68	99.8510	783.68
Detroit	99.9477	275.07	99.9462	282.94	7.87	0.0015	99.9363	335.07	99.9420	305.07
Atlanta	99.9701	157.26	99.9692	161.76	4.50	0.0009	99.9587	217.26	99.9644	187.26
Houston	99.8177	958.80	99.8125	986.22	27.42	0.0052	99.8063	1018.80	99.8120	988.80
Seattle	99.8749	657.96	99.8713	676.78	18.82	0.0036	99.8635	717.96	99.8692	687.96
Cleveland	99.9355	339.23	99.9337	348.94	9.70	0.0018	99.9241	399.23	99.9298	369.23
Minneapolis	99.9476	275.60	99.9461	283.48	7.88	0.0015	99.9362	335.60	99.9419	305.60
Tampa	99.9035	507.54	99.9007	522.05	14.52	0.0028	99.8921	567.54	99.8978	537.54
Miami	99.8812	624.82	99.8778	642.69	17.87	0.0034	99.8698	684.82	99.8755	654.82
Phoenix	99.9301	367.64	99.9281	378.15	10.51	0.0020	99.9187	427.64	99.9244	397.64
Denver	99.9854	76.79	99.9850	78.98	2.20	0.0004	99.9740	136.79	99.9797	106.79
Pittsburgh	99.9576	223.00	99.9564	229.38	6.38	0.0012	99.9462	283.00	99.9519	253.00
Sacramento	99.9190	426.02	99.9167	438.20	12.18	0.0023	99.9076	486.02	99.9133	456.02
St. Louis	99.9593	214.06	99.9581	220.18	6.12	0.0012	99.9479	274.06	99.9536	244.06
Orlando	99.8995	528.58	99.8966	543.69	15.12	0.0029	99.8881	588.58	99.8938	558.58
Portland	99.9037	506.49	99.9009	520.97	14.49	0.0028	99.8923	566.49	99.8980	536.49
Indianapolis	99.9475	276.12	99.9460	284.02	7.90	0.0015	99.9361	336.12	99.9418	306.12
San Diego	99.9773	119.39	99.9767	122.80	3.41	0.0006	99.9659	179.39	99.9716	149.39
Charlotte	99.9632	193.55	99.9621	199.08	5.54	0.0011	99.9518	253.55	99.9575	223.55
Cincinnati	99.9442	293.48	99.9426	301.87	8.39	0.0016	99.9328	353.48	99.9385	323.48
Kansas City	99.9644	187.24	99.9634	192.59	5.35	0.0010	99.9530	247.24	99.9587	217.24
Milwaukee	99.9462	282.96	99.9447	291.05	8.09	0.0015	99.9348	342.96	99.9405	312.96
Nashville	99.9656	180.93	99.9646	186.10	5.17	0.0010	99.9542	240.93	99.9599	210.93
Columbus	99.9644	187.24	99.9634	192.59	5.35	0.0010	99.9530	247.24	99.9587	217.24
Greenville	99.9505	260.34	99.9491	267.79	7.45	0.0014	99.9391	320.34	99.9448	290.34

Unavailability Statistics for EchoStar Satellite at 119° W.L for Top Markets
(Statistics computed using inputs as listed in Appendix G and the method described in Appendix H)

Market	Average Yearly Statistics		Increased Outage = 2.86%				Increased Minutes of Outage = 60 Min.		Increased Minutes of Outage = 30 Min.	
	Percentage of Availability	Minutes of Outage	Percentage of Availability	Minutes of Outage	Increased Minutes of Outage	Change in Percentage of Availability	Change in Percentage of Availability = 0.0114 %		Change in Percentage of Availability = 0.0057 %	
							Percentage of Availability	Minutes of Outage	Percentage of Availability	Minutes of Outage
New York	99.9546	238.78	99.9533	245.61	6.83	0.0013	99.9432	298.78	99.9489	268.78
Los Angeles	99.9063	492.81	99.9036	506.91	14.09	0.0027	99.8949	552.81	99.9006	522.81
Chicago	99.9291	372.90	99.9271	383.56	10.66	0.0020	99.9177	432.90	99.9234	402.90
Philadelphia	99.9501	262.45	99.9487	269.95	7.51	0.0014	99.9387	322.45	99.9444	292.45
San Francisco	99.8328	879.38	99.8280	904.53	25.15	0.0048	99.8214	939.38	99.8271	909.38
Boston	99.9446	291.37	99.9430	299.71	8.33	0.0016	99.9332	351.37	99.9389	321.37
Washington, DC	99.9353	340.29	99.9334	350.02	9.73	0.0019	99.9239	400.29	99.9296	370.29
Dallas	99.7470	1330.64	99.7398	1368.70	38.06	0.0072	99.7356	1390.64	99.7413	1360.64
Detroit	99.9457	285.59	99.9441	293.76	8.17	0.0016	99.9343	345.59	99.9400	315.59
Atlanta	99.8917	569.60	99.8886	585.89	16.29	0.0031	99.8803	629.60	99.8860	599.60
Houston	99.6844	1659.88	99.6754	1707.36	47.47	0.0090	99.6730	1719.88	99.6787	1689.88
Seattle	99.6858	1652.52	99.6768	1699.78	47.26	0.0090	99.6744	1712.52	99.6801	1682.52
Cleveland	99.9321	357.12	99.9302	367.33	10.21	0.0019	99.9207	417.12	99.9264	387.12
Minneapolis	99.9304	366.06	99.9284	376.53	10.47	0.0020	99.9190	426.06	99.9247	396.06
Tampa	99.8180	957.22	99.8128	984.60	27.38	0.0052	99.8066	1017.22	99.8123	987.22
Miami	99.7721	1198.63	99.7656	1232.91	34.28	0.0065	99.7607	1258.63	99.7664	1228.63
Phoenix	99.8115	991.41	99.8061	1019.76	28.35	0.0054	99.8001	1051.41	99.8058	1021.41
Denver	99.9715	149.89	99.9707	154.18	4.29	0.0008	99.9601	209.89	99.9658	179.89
Pittsburgh	99.9524	250.35	99.9510	257.51	7.16	0.0014	99.9410	310.35	99.9467	280.35
Sacramento	99.8052	1024.54	99.7996	1053.84	29.30	0.0056	99.7938	1084.54	99.7995	1054.54
St. Louis	99.8340	873.07	99.8293	898.04	24.97	0.0047	99.8226	933.07	99.8283	903.07
Orlando	99.8073	1013.50	99.8018	1042.48	28.99	0.0055	99.7959	1073.50	99.8016	1043.50
Portland	99.8567	753.68	99.8526	775.24	21.56	0.0041	99.8453	813.68	99.8510	783.68
Indianapolis	99.8910	573.28	99.8879	589.68	16.40	0.0031	99.8796	633.28	99.8853	603.28
San Diego	99.9382	325.03	99.9364	334.33	9.30	0.0018	99.9268	385.03	99.9325	355.03
Charlotte	99.9220	410.24	99.9198	421.97	11.73	0.0022	99.9106	470.24	99.9163	440.24
Cincinnati	99.9182	430.22	99.9159	442.53	12.30	0.0023	99.9068	490.22	99.9125	460.22
Kansas City	99.9056	496.49	99.9029	510.69	14.20	0.0027	99.8942	556.49	99.8999	526.49
Milwaukee	99.9239	400.24	99.9217	411.69	11.45	0.0022	99.9125	460.24	99.9182	430.24
Nashville	99.9328	353.44	99.9309	363.54	10.11	0.0019	99.9214	413.44	99.9271	383.44
Columbus	99.9237	401.30	99.9215	412.77	11.48	0.0022	99.9123	461.30	99.9180	431.30
Greenville	99.9000	525.95	99.8971	540.99	15.04	0.0029	99.8886	585.95	99.8943	555.95