Alaska Communications Internet LLC
VSAT License Modification Application

Technical Appendix

I. Frequency Coordination Reports

II. Radiation Hazard Studies

I. Frequency Coordination Reports

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: A1810815 5.96 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Aniak DO, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNITED UTILITIES, INC.
UNITED2, LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: A1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Aniak DO, AK		
Call Sign:			
Latitude	(NAD83)	61 34 55.6 N	
Longitude	(NAD83)	159 32 18.3 W	
Elevation AMSL	(ft/m)	37.20	11.34
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5960.2-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	130.80	132.79
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.95	11.68

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	353.04	158.84
Max Rain Scatter Distances	(km)	286.93	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
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SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: B1810815 5.96 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Aniak AJSHS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

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WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

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Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: B1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Aniak AJSHS, AK		
Call Sign:			
Latitude	(NAD83)	61 34 48.3 N	
Longitude	(NAD83)	159 33 6.7 W	
Elevation AMSL	(ft/m)	37.20	11.34
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5960.2-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	130.78	132.77
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.95	11.68

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	353.07	158.85
Max Rain Scatter Distances	(km)	286.93	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: C1810815 5.96 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Aniak AMNES, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNITED UTILITIES, INC.
UNITED2, LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

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Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: C1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Aniak AMNES, AK		
Call Sign:			
Latitude	(NAD83)	61 34 49.0 N	
Longitude	(NAD83)	159 31 51.7 W	
Elevation AMSL	(ft/m)	37.20	11.34
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5960.2-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	130.80	132.79
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.95	11.68

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	353.01	158.82
Max Rain Scatter Distances	(km)	286.92	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
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972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: D1810815 5.96 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Chuathbaluk CVSS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNITED UTILITIES, INC.
UNITED2, LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: D1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Chuathbaluk CVSS, AK		
Call Sign:			
Latitude	(NAD83)	61 34 23.7 N	
Longitude	(NAD83)	159 14 57.8 W	
Elevation AMSL	(ft/m)	37.57	11.45
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5960.2-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	131.08	133.07
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	11.06	11.79

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	351.93	158.38
Max Rain Scatter Distances	(km)	286.71	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: E1810815 5.93 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Sleetmute JESS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNITED UTILITIES, INC.
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: E1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Sleetmute JESS, AK		
Call Sign:			
Latitude	(NAD83)	61 42 9.7 N	
Longitude	(NAD83)	157 10 14.9 W	
Elevation AMSL	(ft/m)	39.70	12.10
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5929-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	133.19	135.20
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	11.73	12.43

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	346.02	155.98
Max Rain Scatter Distances	(km)	285.46	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
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Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: F1810815 5.93 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Crooked Creek JJSS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNICOM, INC
UNITED UTILITIES, INC.
UNITED2, LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: F1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Crooked Creek JJSS, AK		
Call Sign:			
Latitude	(NAD83)	61 51 48.6 N	
Longitude	(NAD83)	158 8 18.2 W	
Elevation AMSL	(ft/m)	38.19	11.64
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5929-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	132.26	134.26
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	11.27	11.98

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	348.92	157.16
Max Rain Scatter Distances	(km)	286.30	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: G1810815 5.93 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Stony River GMSHS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: G1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:		Alaska Communications Internet, LLC	
Site Name, State:		Stony River GMSHS, AK	
Call Sign:			
Latitude	(NAD83)	61 47 13.6 N	
Longitude	(NAD83)	156 35 17.7 W	
Elevation AMSL	(ft/m)	40.16	12.24
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	5929-6001	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	133.79	135.81
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	11.87	12.57

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	345.50	155.77
Max Rain Scatter Distances	(km)	285.21	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: H1810815 6.19 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Kalskag GMHS, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC
UNITED UTILITIES, INC.
UNITED2, LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: H1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Kalskag GMHS, AK		
Call Sign:			
Latitude	(NAD83)	61 31 57.9 N	
Longitude	(NAD83)	160 20 50.0 W	
Elevation AMSL	(ft/m)	36.32	11.07
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6189.565-6237.565	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	129.99	131.97
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.68	11.42

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	355.52	159.85
Max Rain Scatter Distances	(km)	287.48	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.

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SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: I1810815 6.19 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Kalskag JOGES, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
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UNITED2, LLC
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Respectfully Submitted,

Jeremy Lewis
Systems Engineer

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Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: I1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:		Alaska Communications Internet, LLC	
Site Name, State:		Kalskag JOGES, AK	
Call Sign:			
Latitude	(NAD83)	61 32 41.9 N	
Longitude	(NAD83)	160 19 3.7 W	
Elevation AMSL	(ft/m)	36.35	11.08
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6189.565-6237.565	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	130.02	132.00
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.68	11.42

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10

Modulation / Emission Designator DIGITAL 5M60G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	355.50	159.84
Max Rain Scatter Distances	(km)	287.48	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: J1810815 6.19 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Kalskag ZLES, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
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COMSEARCH INC
UNITED UTILITIES, INC.
UNITED2, LLC
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Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

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Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: J1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:		Alaska Communications Internet, LLC	
Site Name, State:		Kalskag ZLES, AK	
Call Sign:			
Latitude	(NAD83)	61 30 43.6 N	
Longitude	(NAD83)	160 21 41.5 W	
Elevation AMSL	(ft/m)	36.35	11.08
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6189.565-6237.565	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	129.97	131.95
Antenna Centerline	(ft/m)	12.00	3.66
Antenna Elevation Angles	(deg)	10.69	11.43

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	37.60	41.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1244 (2.4M)
Transmit: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)		-20.50
Max EIRP Main Beam	(dbW/4KHz)		21.10
Modulation / Emission Designator	DIGITAL	5M60G7W 2M80G7W 1M20G7W	

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	355.46	159.82
Max Rain Scatter Distances	(km)	287.46	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.

720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: K1810815 6.17 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Hub, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

ACS LONG DISTANCE LICENSE SUB, LLC
ACS OF ANCHORAGE LICENSE SUB, INC.
ACS OF ANCHORAGE LICENSE SUB, LLC
ACS WIRELESS LICENSE SUB, LLC
ALASCOM, INC.
ALASKA PIPELINE COMPANY
ALASKA PUBLIC TELECOMMUNICATIONS, INC
ALASKA RAILROAD CORPORATION
ALASKA, STATE OF
AT&T MOBILITY SPECTRUM LLC
CHUGACH ELECTRIC ASSOCIATION, INC.
COMSEARCH INC
ENSTAR NATURAL GAS CO., A DIVISION OF SEMCO ENERGY, INC.
GCI COMMUNICATION CORP.
HOMER ELECTRIC ASSOCIATION
MATANUSKA TELEPHONE ASSOCIATION
MATANUSKA-SUSITNA, BOROUGH OF
MICRONET COMMUNICATIONS INC
MTA COMMUNICATIONS
NEW CINGULAR WIRELESS PCS, LLC
NORSTAR PIPELINE COMPANY, INC. AN ALASKA CORPORATION WHOLLY OWNE
RADIO DYNAMICS
VERIZON WIRELESS (VAW) LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: K1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Hub, AK		
Call Sign:			
Latitude	(NAD83)	61 8 28.4 N	
Longitude	(NAD83)	149 52 30.7 W	
Elevation AMSL	(ft/m)	134.51	41.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6169-6241	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	140.45	142.53
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	14.62	15.25

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	41.60	45.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1383 (3.8 M)
Transmit: PRODELIN 1383 (3.8M)

Max Transmitter Power	(dbW/4KHz)		-19.20
Max EIRP Main Beam	(dbW/4KHz)		26.40

Modulation / Emission Designator DIGITAL 7M00G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	351.92	162.77
Max Rain Scatter Distances	(km)	281.38	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: L1810815 6.17 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Hub, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

ACS LONG DISTANCE LICENSE SUB, LLC
ACS OF ANCHORAGE LICENSE SUB, INC.
ACS OF ANCHORAGE LICENSE SUB, LLC
ACS WIRELESS LICENSE SUB, LLC
ALASCOM, INC.
ALASKA PIPELINE COMPANY
ALASKA PUBLIC TELECOMMUNICATIONS, INC
ALASKA RAILROAD CORPORATION
ALASKA, STATE OF
AT&T MOBILITY SPECTRUM LLC
CHUGACH ELECTRIC ASSOCIATION, INC.
COMSEARCH INC
ENSTAR NATURAL GAS CO., A DIVISION OF SEMCO ENERGY, INC.
GCI COMMUNICATION CORP.
HOMER ELECTRIC ASSOCIATION
MATANUSKA TELEPHONE ASSOCIATION
MATANUSKA-SUSITNA, BOROUGH OF
MICRONET COMMUNICATIONS INC
MTA COMMUNICATIONS
NEW CINGULAR WIRELESS PCS, LLC
NORSTAR PIPELINE COMPANY, INC. AN ALASKA CORPORATION WHOLLY OWNE
RADIO DYNAMICS
VERIZON WIRELESS (VAW) LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: L1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Hub, AK		
Call Sign:			
Latitude	(NAD83)	61 8 28.4 N	
Longitude	(NAD83)	149 52 30.7 W	
Elevation AMSL	(ft/m)	134.51	41.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6169-6241	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	140.45	142.53
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	14.62	15.25

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	41.60	45.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1383 (3.8 M)
Transmit: PRODELIN 1383 (3.8M)

Max Transmitter Power	(dbW/4KHz)		-15.50
Max EIRP Main Beam	(dbW/4KHz)		30.10

Modulation / Emission Designator DIGITAL 3M00G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	351.92	175.28
Max Rain Scatter Distances	(km)	281.38	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.

720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: M1810815 6.17 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Hub, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

ACS LONG DISTANCE LICENSE SUB, LLC
ACS OF ANCHORAGE LICENSE SUB, INC.
ACS OF ANCHORAGE LICENSE SUB, LLC
ACS WIRELESS LICENSE SUB, LLC
ALASCOM, INC.
ALASKA PIPELINE COMPANY
ALASKA PUBLIC TELECOMMUNICATIONS, INC
ALASKA RAILROAD CORPORATION
ALASKA, STATE OF
AT&T MOBILITY SPECTRUM LLC
CHUGACH ELECTRIC ASSOCIATION, INC.
COMSEARCH INC
ENSTAR NATURAL GAS CO., A DIVISION OF SEMCO ENERGY, INC.
GCI COMMUNICATION CORP.
HOMER ELECTRIC ASSOCIATION
MATANUSKA TELEPHONE ASSOCIATION
MATANUSKA-SUSITNA, BOROUGH OF
MICRONET COMMUNICATIONS INC
MTA COMMUNICATIONS
NEW CINGULAR WIRELESS PCS, LLC
NORSTAR PIPELINE COMPANY, INC. AN ALASKA CORPORATION WHOLLY OWNE
RADIO DYNAMICS
VERIZON WIRELESS (VAW) LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: M1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Hub, AK		
Call Sign:			
Latitude	(NAD83)	61 8 28.4 N	
Longitude	(NAD83)	149 52 30.7 W	
Elevation AMSL	(ft/m)	134.51	41.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6169-6241	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	140.45	142.53
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	14.62	15.25

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	41.60	45.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1383 (3.8 M)
Transmit: PRODELIN 1383 (3.8M)

Max Transmitter Power	(dbW/4KHz)		-21.00
Max EIRP Main Beam	(dbW/4KHz)		24.60

Modulation / Emission Designator DIGITAL 9M50G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	351.92	156.69
Max Rain Scatter Distances	(km)	281.38	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: N1810815 6.17 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Hub, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/08/2018 Original PCN
There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

ACS LONG DISTANCE LICENSE SUB, LLC
ACS OF ANCHORAGE LICENSE SUB, INC.
ACS OF ANCHORAGE LICENSE SUB, LLC
ACS WIRELESS LICENSE SUB, LLC
ALASCOM, INC.
ALASKA PIPELINE COMPANY
ALASKA PUBLIC TELECOMMUNICATIONS, INC
ALASKA RAILROAD CORPORATION
ALASKA, STATE OF
AT&T MOBILITY SPECTRUM LLC
CHUGACH ELECTRIC ASSOCIATION, INC.
COMSEARCH INC
ENSTAR NATURAL GAS CO., A DIVISION OF SEMCO ENERGY, INC.
GCI COMMUNICATION CORP.
HOMER ELECTRIC ASSOCIATION
MATANUSKA TELEPHONE ASSOCIATION
MATANUSKA-SUSITNA, BOROUGH OF
MICRONET COMMUNICATIONS INC
MTA COMMUNICATIONS
NEW CINGULAR WIRELESS PCS, LLC
NORSTAR PIPELINE COMPANY, INC. AN ALASKA CORPORATION WHOLLY OWNE
RADIO DYNAMICS
VERIZON WIRELESS (VAW) LLC
WIRELESS APPLICATIONS CORP

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: N1810815

TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Hub, AK		
Call Sign:			
Latitude	(NAD83)	61 8 28.4 N	
Longitude	(NAD83)	149 52 30.7 W	
Elevation AMSL	(ft/m)	134.51	41.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)	6169-6241	
Range of Satellite Orbital Long.	(deg W)	114.00	116.00
Range of Azimuths from North	(deg)	140.45	142.53
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	14.62	15.25

Equipment Parameters		Receive	Transmit
Antenna Gain, Main Beam	(dbI)	41.60	45.60
15 DB Half Beamwidth	(deg)	1.50	1.00

Antennas Receive: PRODELIN 1383 (3.8 M)
Transmit: PRODELIN 1383 (3.8M)

Max Transmitter Power	(dbW/4KHz)		-17.60
Max EIRP Main Beam	(dbW/4KHz)		28.00

Modulation / Emission Designator DIGITAL 72M0G7W 2M80G7W 1M20G7W

Coordination Parameters		Receive	Transmit
Max Greater Circle Distances	(km)	351.92	168.18
Max Rain Scatter Distances	(km)	281.38	100.00
Max Interference Power Long Term	(dbW)	-140.60	-154.00
Max Interference Power Short Term	(dbW)	-118.40	-130.80
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: M1817645 3.94 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Naknek, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/26/2018 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: M1817645

TECHNICAL CHARACTERISTICS OF RECEIVE ONLY EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Naknek, AK		
Call Sign:			
Latitude	(NAD83)	58 43 43.7 N	
Longitude	(NAD83)	157 0 0.9 W	
Elevation AMSL	(ft/m)	16.08	4.90
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)		
Range of Satellite Orbital Long.	(deg W)	114.00	115.00
Range of Azimuths from North	(deg)	132.51	133.51
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	13.89	14.28

Equipment Parameters — Receive

Antenna Gain, Main Beam	(dbI)	37.60
15 DB Half Beamwidth	(deg)	1.50

Antennas Receive: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)	
Max EIRP Main Beam	(dbW/4KHz)	
Modulation / Emission Designator	DIGITAL	5M60G7W

Coordination Parameters — Receive

Max Greater Circle Distances	(km)	332.73	
Max Rain Scatter Distances	(km)	282.26	
Max Interference Power Long Term	(dbW)	-140.60	
Max Interference Power Short Term	(dbW)	-118.40	
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: N1817645 3.94 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Alitek, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/26/2018 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: N1817645

TECHNICAL CHARACTERISTICS OF RECEIVE ONLY EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Alitek, AK		
Call Sign:			
Latitude	(NAD83)	56 53 52.2 N	
Longitude	(NAD83)	154 14 43.0 W	
Elevation AMSL	(ft/m)	49.87	15.20
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)		
Range of Satellite Orbital Long.	(deg W)	114.00	115.00
Range of Azimuths from North	(deg)	134.70	135.72
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	16.31	16.71

Equipment Parameters		Receive
Antenna Gain, Main Beam	(dbI)	37.60
15 DB Half Beamwidth	(deg)	1.50

Antennas Receive: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)	
Max EIRP Main Beam	(dbW/4KHz)	
Modulation / Emission Designator	DIGITAL	5M60G7W

Coordination Parameters		Receive	
Max Greater Circle Distances	(km)	321.68	
Max Rain Scatter Distances	(km)	279.67	
Max Interference Power Long Term	(dbW)	-140.60	
Max Interference Power Short Term	(dbW)	-118.40	
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: P1817645 3.94 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Excursion Inlet, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/26/2018 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: P1817645

TECHNICAL CHARACTERISTICS OF RECEIVE ONLY EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Excursion Inlet, AK		
Call Sign:			
Latitude	(NAD83)	58 24 55.3 N	
Longitude	(NAD83)	135 26 36.4 W	
Elevation AMSL	(ft/m)	34.12	10.40
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)		
Range of Satellite Orbital Long.	(deg W)	114.00	115.00
Range of Azimuths from North	(deg)	155.25	156.37
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	21.08	21.31

Equipment Parameters — Receive

Antenna Gain, Main Beam	(dbI)	37.60
15 DB Half Beamwidth	(deg)	1.50

Antennas Receive: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)	
Max EIRP Main Beam	(dbW/4KHz)	
Modulation / Emission Designator	DIGITAL	5M60G7W

Coordination Parameters — Receive

Max Greater Circle Distances	(km)	302.15	
Max Rain Scatter Distances	(km)	276.24	
Max Interference Power Long Term	(dbW)	-140.60	
Max Interference Power Short Term	(dbW)	-118.40	
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: R1817645 3.94 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

St Paul, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/26/2018 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC

Respectfully Submitted,

Jeremy S. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: R1817645

TECHNICAL CHARACTERISTICS OF RECEIVE ONLY EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	St Paul, AK		
Call Sign:			
Latitude	(NAD83)	57 7 23.0 N	
Longitude	(NAD83)	170 16 45.0 W	
Elevation AMSL	(ft/m)	26.25	8.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)		
Range of Satellite Orbital Long.	(deg W)	114.00	115.00
Range of Azimuths from North	(deg)	119.27	120.20
Antenna Centerline	(ft/m)	6.56	2.00
Antenna Elevation Angles	(deg)	8.96	9.45

Equipment Parameters — Receive

Antenna Gain, Main Beam	(dbI)	41.60
15 DB Half Beamwidth	(deg)	1.00

Antennas Receive: PRODELIN 1383 (3.8 M)

Max Transmitter Power	(dbW/4KHz)	
Max EIRP Main Beam	(dbW/4KHz)	
Modulation / Emission Designator	DIGITAL	3M20G7W

Coordination Parameters — Receive

Max Greater Circle Distances	(km)	369.72	
Max Rain Scatter Distances	(km)	291.78	
Max Interference Power Long Term	(dbW)	-140.60	
Max Interference Power Short Term	(dbW)	-118.40	
Rain Zone / Radio Zone		3	A

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: S1817645 3.94 GHz
Licensee: Alaska Communications Internet, LLC

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

Anchorage, AK

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

06/26/2018 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

COMSEARCH INC

Respectfully Submitted,

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
720 F Avenue, Suite 100
Plano, Texas 75074
972-422-7200

File: S1817645

TECHNICAL CHARACTERISTICS OF RECEIVE ONLY EARTH STATION

Company:	Alaska Communications Internet, LLC		
Site Name, State:	Anchorage, AK		
Call Sign:			
Latitude	(NAD83)	61 11 10.5 N	
Longitude	(NAD83)	149 52 15.6 W	
Elevation AMSL	(ft/m)	114.83	35.00
Receive Frequency Range	(MHz)	3944-4016	
Transmit Frequency Range	(MHz)		
Range of Satellite Orbital Long.	(deg W)	114.00	115.00
Range of Azimuths from North	(deg)	140.47	141.50
Antenna Centerline	(ft/m)	34.12	10.40
Antenna Elevation Angles	(deg)	14.59	14.90

Equipment Parameters		Receive
Antenna Gain, Main Beam	(dbI)	37.60
15 DB Half Beamwidth	(deg)	1.50

Antennas Receive: PRODELIN 1244 (2.4M)

Max Transmitter Power	(dbW/4KHz)	
Max EIRP Main Beam	(dbW/4KHz)	
Modulation / Emission Designator	DIGITAL	4M70G7W

Coordination Parameters		Receive	
Max Greater Circle Distances	(km)	347.44	
Max Rain Scatter Distances	(km)	281.43	
Max Interference Power Long Term	(dbW)	-140.60	
Max Interference Power Short Term	(dbW)	-118.40	
Rain Zone / Radio Zone		3	A

II. Radiation Hazard Studies

RADIATION HAZARD ANALYSIS

Alaska Communications
Aniak District Office
2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		66%	
Nominal Frequency	*(Enter value)*	5965	MHz
Nominal Wavelength (λ)		0.0503	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	29	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	69	meters
Transition Region =	R_{nf}	to	R_{ff}	

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} = 4P/A = 1.58 mW/cm^2 (1)

where: P = total power at feed, milliwatts

A = Total area of reflector, sq. cm

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} = $(16\ \varepsilon\ P)/(\pi D^2)$ = 0.00 mW/cm^2 (2)

from 0 to 29 meters

Evaluation: Uncontrolled Environment: Complies to FCC Limits

Controlled Environment: Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t = $(PD_{nf})(R_{nf})/R$ = dependent on R (3)

where: PD_{nf} = near field power density

R_{nf} = near field distance

R = distance to point of interest

For: 29 < R < 69 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 0

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

PD_{ff} = $PG/(4\pi R^2)$ = dependent on R (4)

where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} > 69$ meters

PD_{ff} = 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$$G_{off} = 32 - 25\log(\Theta)$$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

$PD_{1\ deg\ off\text{-}axis}$ = PD_{ff} x 1585/G = 0.0000 mW/cm^2 (5)

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

$PD_{nf(off\text{-}axis)}$ = PD_{nf} /100 = 0.000 mW/cm^2 at D off axis (6)

See page 5 for the calculation of the distance vs elevation angle required to achieve this rule for a given object height.

7.0 Region Between the Feed Horn and Sub-reflector

Transmissions from the feed horn are directed toward the subreflector surface, and are confined within a conical shape defined by the feed horn. The energy between the feed horn and subreflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

Note 1:
Mitigation of the radiation level may take several forms. First, check the distance from the antenna to the nearest potentially occupied area that the antenna could be pointed toward, and compare to the distances appearing in Sections 2, 3 & 4. If those distances lie within the potentially hazardous regions, then the most common solution would be to take steps to insure that the antenna(s) are not capable of being pointed at those areas while RF is being transmitted. This may be accomplished by setting the tracking system to not allow the antenna be pointed below certain elevation angles. Other techniques, such as shielding may also be used effectively.

Evaluation of Safe Occupancy Area in Front of Antenna

The distance (S) from a vertical axis passing through the dish center to a safe off axis location in front of the antenna can be determined based on the dish diameter rule (Item 6.0). Assuming a flat terrain in front of the antenna, the relationship is:

$$S = (D/\sin \alpha) + (2h - D - 2)/(2 \tan \alpha) \quad (7)$$

where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	11.34	6.2	meters	Enter minimum elevation angle required
Specific Elev:	11.34	6.2	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

Prepared by Andrew Corporation

RADIATION HAZARD ANALYSIS

Alaska Communications

Aniak - Auntie Mary Nicoli Elementary School (AMNES)

2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		66%	
Nominal Frequency	*(Enter value)*	5965	MHz
Nominal Wavelength (λ)		0.0503	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	29	meters
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Transition Region =		R_{nf} to R_{ff}		

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} =	4P/A =	1.58	mW/cm^2	(1)
where:	P = total power at feed, milliwatts			
	A = Total area of reflector, sq. cm			

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

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The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} =	$(16\ \varepsilon\ P)/(\pi D^2)$ =	0.00	mW/cm^2		(2)
		from 0 to	29	meters	

Evaluation:	Uncontrolled Environment:	Complies to FCC Limits
	Controlled Environment:	Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t =	$(PD_{nf})(R_{nf})/R$ =	dependent on R	(3)
where:	PD_{nf} = near field power density		
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For: 29 < R < 69 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

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4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

$$PD_{ff} = PG/(4\pi R^2) = \text{dependent on R} \quad (4)$$

where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} > 69$ meters

$PD_{ff} =$ 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

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5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

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for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
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Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

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For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
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Then:				
	α	S		
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Prepared by Andrew Corporation

RADIATION HAZARD ANALYSIS

Alaska Communications
Chuathbaluk - Crow Village Sam School (CVSS)
2.4 Meter to E115WB C-Band

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RADIATION HAZARD ANALYSIS

Alaska Communications

Crooked Creek – Johnnie John Sr School (JJSS)

2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		66%	
Nominal Frequency	*(Enter value)*	5965	MHz
Nominal Wavelength (λ)		0.0503	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	29	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	69	meters
Transition Region =		R_{nf} to R_{ff}		

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} =	4P/A =	1.58	mW/cm^2	(1)
where:	P = total power at feed, milliwatts			
	A = Total area of reflector, sq. cm			

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} =	$(16\ \varepsilon\ P)/(\pi D^2)$ =	0.00	mW/cm^2		(2)
		from 0 to	29	meters	

Evaluation:	Uncontrolled Environment:	Complies to FCC Limits
	Controlled Environment:	Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t =	$(PD_{nf})(R_{nf})/R$ =	dependent on R	(3)
where:	PD_{nf} = near field power density		
	R_{nf} = near field distance		
	R = distance to point of interest		

For: 29 $< R <$ 69 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:

Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 0

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

$$PD_{ff} = PG/(4\pi R^2) = \text{dependent on R} \quad (4)$$

where: P = total power at feed

G = Numeric Antenna gain in the direction of interest relative to isotropic radiator

R = distance to the point of interest

For: $R > R_{ff} > 69$ meters

$PD_{ff} =$ 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:

Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$$G_{off} = 32 - 25\log(\Theta)$$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees

(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:

$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

$$PD_{1\ deg\ off\text{-}axis} = PD_{ff} \times 1585/G = 0.0000 \quad mW/cm^2 \quad (5)$$

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

$PD_{nf(off\text{-}axis)}$ = PD_{nf} /100 = 0.000 mW/cm^2 at D off axis (6)

See page 5 for the calculation of the distance vs elevation angle required to achieve this rule for a given object height.

7.0 Region Between the Feed Horn and Sub-reflector

Transmissions from the feed horn are directed toward the subreflector surface, and are confined within a conical shape defined by the feed horn. The energy between the feed horn and subreflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

Note 1:
Mitigation of the radiation level may take several forms. First, check the distance from the antenna to the nearest potentially occupied area that the antenna could be pointed toward, and compare to the distances appearing in Sections 2, 3 & 4. If those distances lie within the potentially hazardous regions, then the most common solution would be to take steps to insure that the antenna(s) are not capable of being pointed at those areas while RF is being transmitted. This may be accomplished by setting the tracking system to not allow the antenna be pointed below certain elevation angles. Other techniques, such as shielding may also be used effectively.

Evaluation of Safe Occupancy Area in Front of Antenna

The distance (S) from a vertical axis passing through the dish center to a safe off axis location in front of the antenna can be determined based on the dish diameter rule (Item 6.0). Assuming a flat terrain in front of the antenna, the relationship is:

$$S = (D/\sin \alpha) + (2h - D - 2)/(2 \tan \alpha) \quad (7)$$

where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	11.64	6.1	meters	Enter minimum elevation angle required
Specific Elev:	11.64	6.1	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

RADIATION HAZARD ANALYSIS

Alaska Communications
Aniak Junior Senior High School (AJSHS)
2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		66%	
Nominal Frequency	*(Enter value)*	5965	MHz
Nominal Wavelength (λ)		0.0503	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
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In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} = 4P/A = 1.58 mW/cm^2 (1)
where: P = total power at feed, milliwatts
A = Total area of reflector, sq. cm

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

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The maximum power density in the near field is given by:

PD_{nf} = $(16\ \varepsilon\ P)/(\pi D^2)$ = 0.00 mW/cm^2 (2)
from 0 to 29 meters

Evaluation: Uncontrolled Environment: Complies to FCC Limits

Controlled Environment: Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t = $(PD_{nf})(R_{nf})/R$ = dependent on R (3)
where: PD_{nf} = near field power density
R_{nf} = near field distance
R = distance to point of interest
For: 29 < R < 69 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

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where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} > 69$ meters

$PD_{ff} =$ 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

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Prepared by Andrew Corporation

RADIATION HAZARD ANALYSIS

Alaska Communications

Sleetmute - Jack Egnaty Senior School (JESS)

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Specific Elev:	12.1	5.9	meters	Enter minimum elevation angle required
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Alaska Communications
Stony River – Gusty Michael School (GMSHS)
2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		66%	
Nominal Frequency	*(Enter value)*	5965	MHz
Nominal Wavelength (λ)		0.0503	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	29	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	69	meters
Transition Region =	R_{nf} to R_{ff}			

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} =	4P/A =	1.58	mW/cm^2	(1)
where:	P = total power at feed, milliwatts			
	A = Total area of reflector, sq. cm			

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} =	$(16\ \varepsilon\ P)/(\pi D^2)$ =	0.00	mW/cm^2		(2)
		from 0 to	29	meters	

Evaluation:	Uncontrolled Environment:	Complies to FCC Limits
	Controlled Environment:	Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t =	$(PD_{nf})(R_{nf})/R$ =	dependent on R	(3)
where:	PD_{nf} = near field power density		
	R_{nf} = near field distance		
	R = distance to point of interest		

For: 29 < R < 69 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 0

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

$$PD_{ff} = PG/(4\pi R^2) = \text{dependent on R} \quad (4)$$

where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} >$ 69 meters

PD_{ff} = 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$$G_{off} = 32 - 25\log(\Theta)$$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
G_{off} = 32 - 25log(1) = 32 - 0 dBi = 1585 numeric

$$PD_{1\text{ deg off-axis}} = PD_{ff} \times 1585/G = 0.0000 \text{ mW/cm}^2 \quad (5)$$

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

$PD_{nf(off\text{-}axis)}$ = PD_{nf} /100 = 0.000 mW/cm^2 at D off axis (6)

See page 5 for the calculation of the distance vs elevation angle required to achieve this rule for a given object height.

7.0 Region Between the Feed Horn and Sub-reflector

Transmissions from the feed horn are directed toward the subreflector surface, and are confined within a conical shape defined by the feed horn. The energy between the feed horn and subreflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

Note 1:
Mitigation of the radiation level may take several forms. First, check the distance from the antenna to the nearest potentially occupied area that the antenna could be pointed toward, and compare to the distances appearing in Sections 2, 3 & 4. If those distances lie within the potentially hazardous regions, then the most common solution would be to take steps to insure that the antenna(s) are not capable of being pointed at those areas while RF is being transmitted. This may be accomplished by setting the tracking system to not allow the antenna be pointed below certain elevation angles. Other techniques, such as shielding may also be used effectively.

Evaluation of Safe Occupancy Area in Front of Antenna

The distance (S) from a vertical axis passing through the dish center to a safe off axis location in front of the antenna can be determined based on the dish diameter rule (Item 6.0). Assuming a flat terrain in front of the antenna, the relationship is:

$$S = (D/\sin \alpha) + (2h - D - 2)/(2 \tan \alpha) \quad (7)$$

where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	12.24	5.8	meters	Enter minimum elevation angle required
Specific Elev:	12.24	5.8	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

Prepared by Andrew Corporation

RADIATION HAZARD ANALYSIS

Alaska Communications
Kalskag – George Morgan Senior High School (GMHS)
2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		60%	
Nominal Frequency	*(Enter value)*	6229	MHz
Nominal Wavelength (λ)		0.0482	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	30	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	72	meters
Transition Region =		R_{nf} to R_{ff}		

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} = 4P/A = 1.58 mW/cm^2 (1)

where: P = total power at feed, milliwatts
A = Total area of reflector, sq. cm

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} = $(16\ \varepsilon\ P)/(\pi D^2)$ = 0.00 mW/cm^2 (2)
from 0 to 30 meters

Evaluation: Uncontrolled Environment: Complies to FCC Limits

Controlled Environment: Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t = $(PD_{nf})(R_{nf})/R$ = dependent on R (3)

where: PD_{nf} = near field power density
R_{nf} = near field distance
R = distance to point of interest
For: 30 < R < 72 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 0

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

PD_{ff} = $PG/(4\pi R^2)$ = dependent on R (4)

where: P = total power at feed

G = Numeric Antenna gain in the direction of interest relative to isotropic radiator

R = distance to the point of interest

For: $R > R_{ff} > 72$ meters

PD_{ff} = 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$G_{off} = 32 - 25\log(\Theta)$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

$PD_{1\ deg\ off\text{-}axis}$ = PD_{ff} x 1585/G = 0.0000 mW/cm^2 (5)

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

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where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	11.07	6.4	meters	Enter minimum elevation angle required
Specific Elev:	11.07	6.4	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

Prepared by Andrew Corporation

RADIATION HAZARD ANALYSIS

Alaska Communications
Kalskag – Joseph & Olinga Gregory Elementary School (JOGES)
2.4 Meter to E115WB C-Band

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Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

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Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	72 meters
Transition Region =		R_{nf} to R_{ff}	

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The maximum power density in the near field is given by:

PD_{nf} = $(16\ \varepsilon\ P)/(\pi D^2)$ = 0.00 mW/cm² (2)

from 0 to 30 meters

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For: 30 < R < 72 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

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R = distance to the point of interest

For: $R > R_{ff} > 72$ meters

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We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

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$PD_{1\ deg\ off\text{-}axis}$ = PD_{ff} x 1585/G = 0.0000 mW/cm^2 (5)

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where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	11.08	6.4	meters	Enter minimum elevation angle required
Specific Elev:	11.08	6.4	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

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RADIATION HAZARD ANALYSIS

Alaska Communications
Kalskag – Zackar Levi Elementary School (ZLES)
2.4 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	2.40	meters
Antenna Surface Area		4.5	sq. meters
Antenna Isotropic Gain	*(Enter value)*	41.7	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	0	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		60%	
Nominal Frequency	*(Enter value)*	6229	MHz
Nominal Wavelength (λ)		0.0482	meters
Maximum Transmit Power / Carrier	*(Enter value)*	20	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		20	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		18	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	30	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	72	meters
Transition Region =		R_{nf} to R_{ff}		

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} = 4P/A = 1.58 mW/cm² (1)

where: P = total power at feed, milliwatts
A = Total area of reflector, sq. cm

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} = $(16\,\varepsilon\,P)/(\pi D^2)$ = 0.00 mW/cm² (2)
from 0 to 30 meters

Evaluation: Uncontrolled Environment: Complies to FCC Limits

Controlled Environment: Complies to FCC Limits

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t = $(PD_{nf})(R_{nf})/R$ = dependent on R (3)

where: PD_{nf} = near field power density
R_{nf} = near field distance
R = distance to point of interest
For: 30 < R < 72 meters

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: 0

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 0

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

PD_{ff} = $PG/(4\pi R^2)$ = dependent on R (4)

where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} > 72$ meters

PD_{ff} = 0.00 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : See Section 3

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$$G_{off} = 32 - 25\log(\Theta)$$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

$PD_{1\ deg\ off\text{-}axis}$ = PD_{ff} x 1585/G = 0.0000 mW/cm^2 (5)

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

$PD_{nf(off\text{-}axis)}$ = PD_{nf} /100 = 0.000 mW/cm^2 at D off axis (6)

See page 5 for the calculation of the distance vs elevation angle required to achieve this rule for a given object height.

7.0 Region Between the Feed Horn and Sub-reflector

Transmissions from the feed horn are directed toward the subreflector surface, and are confined within a conical shape defined by the feed horn. The energy between the feed horn and subreflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

Note 1:
Mitigation of the radiation level may take several forms. First, check the distance from the antenna to the nearest potentially occupied area that the antenna could be pointed toward, and compare to the distances appearing in Sections 2, 3 & 4. If those distances lie within the potentially hazardous regions, then the most common solution would be to take steps to insure that the antenna(s) are not capable of being pointed at those areas while RF is being transmitted. This may be accomplished by setting the tracking system to not allow the antenna be pointed below certain elevation angles. Other techniques, such as shielding may also be used effectively.

Evaluation of Safe Occupancy Area in Front of Antenna

The distance (S) from a vertical axis passing through the dish center to a safe off axis location in front of the antenna can be determined based on the dish diameter rule (Item 6.0). Assuming a flat terrain in front of the antenna, the relationship is:

$$S = (D/\sin \alpha) + (2h - D - 2)/(2 \tan \alpha) \quad (7)$$

where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	2.4	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	7.0	meters	
	15	4.8	meters	
	20	3.7	meters	
	25	3.1	meters	
	30	2.7	meters	
Specific Elev:	11.08	6.4	meters	Enter minimum elevation angle required
Specific Elev:	11.08	6.4	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.

RADIATION HAZARD ANALYSIS

Alaska Communications Dimond D
Data Up Link Hub
3.8 Meter to E115WB C-Band

This analysis predicts the radiation levels around a proposed earth station complex, comprised of one or more aperture (reflector) type antennas. This report is developed in accordance with the prediction methods contained in OET Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields," Edition 97-01, pp 26-30. The maximum level of non-ionizing radiation to which employees may be exposed is limited to a power density level of 5 milliwatts per square centimeter (5 mW/cm^2) averaged over any 6 minute period in a controlled environment and the maximum level of non-ionizing radiation to which the general public is exposed is limited to a power density level of 1 milliwatt per square centimeter (1 mW/cm^2) averaged over any 30 minute period in a uncontrolled evironment. Note that the worse-case radiation hazards exist along the beam axis. Under normal circumstances, it is highly unlikely that the antenna axis will be aligned with any occupied area since that would represent a blockage to the desired signals, thus rendering the link unuseable.

The parameters which determine the radiation levels for the proposed earth station antenna site follows:

Earth Station Technical Parameter Table

Antenna Actual Diameter	*(Enter value)*	3.80	meters
Antenna Surface Area		11.3	sq. meters
Antenna Isotropic Gain	*(Enter value)*	45.6	dBi
No. of Identical Adjacent Antennas	*(Enter value)*	1	

Note: The Radiation Levels will be increased directly by the number of antennas indicated, on the assumption that all antennas may illuminate the same area.

Nominal Antenna Efficiency (ε)		60%	
Nominal Frequency	*(Enter value)*	6205	MHz
Nominal Wavelength (λ)		0.0483	meters
Maximum Transmit Power / Carrier	*(Enter value)*	300	Watts
Number of Carriers	*(Enter value)*	1	
Total Transmit Power		300	Watts
W/G Loss from Transmitter to Feed:	*(Enter value)*	0.5	dB
Total Feed Input Power		267	Watts

Near Field Limit=	R_{nf} =	$D^2/4\lambda$ =	75	meters
Far-Field Limit =	R_{ff} =	$0.6\ D^2/\lambda$ =	179	meters
Transition Region =		R_{nf} to R_{ff}		

In the following sections, the power density in the above regions, as well as other critically important areas will be calculated and evaluated. The calculations are done in the order discussed in OET Bulletin 65. In addition to the input parameters above, input cells are provided below for the user to evaluate the power density at specific distances or angles.

1. At the Antenna Surface:

The power density at the reflector surface can be calculated from the expression:

PD_{refl} =	4P/A =	9.43	mW/cm^2	(1)
where:	P = total power at feed, milliwatts			
	A = Total area of reflector, sq. cm			

In the normal range of transmit powers for satellite antennas, the power densities at or around the reflector surface is expected to exceed safe levels. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

2. On-Axis Near Field Region:

The geometrical limits of the radiated power in the near field approximate a cylindrical volume with a diameter equal to that of the antenna. In the near field, the power density is neither uniform nor does its value vary uniformly with distance from the antenna. For the purpose of considering radiation hazard it is assumed that the on-axis flux density is at its maximum value throughout the length of this region. The length of this region, i.e., the distance from the antenna to the end of the near field, is computed as R_{nf} above.

The maximum power density in the near field is given by:

PD_{nf} =	$(16\ \varepsilon\ P)/(\pi D^2)$ =	5.62	mW/cm^2		(2)
		from 0 to	75	meters	

Evaluation:	Uncontrolled Environment:	Mitigation Required, See Note 1
	Controlled Environment:	Mitigation Required, See Note 1

3.0 On-Axis Transition Region:

The transition region is located between the near and far field regions. As stated in Bulletin 65, the power density begins to vary inversely with distance in the transition region. The maximum power density in the transition region will not exceed that calculated for the near field region, and the transition region begins at that value. The maximum value for a given distance within the transition region may be computed for the point of interest according to:

PD_t =	$(PD_{nf})(R_{nf})/R$ =	dependent on R	(3)
where:	PD_{nf} = near field power density		
	R_{nf} = near field distance		
	R = distance to point of interest		
	For: 75 < R < 179 meters		

We use Eq (3) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu}: In F-F region, See Section 4

Controlled Environment Safe Operating Distance,(meters), R_{safec}: 84

4.0 On-Axis Far-Field Region:

The on- axis power density in the far field region (PD_{ff}) varies inversely with the square of the distance as follows:

$$PD_{ff} = PG/(4\pi R^2) = \text{dependent on R} \qquad (4)$$

where: P = total power at feed
G = Numeric Antenna gain in the direction of interest relative to isotropic radiator
R = distance to the point of interest

For: $R > R_{ff} > 179$ meters

$PD_{ff} =$ 2.41 mW/cm^2 at R_{ff}

We use Eq (4) to determine the safe on-axis distances required for the two occupancy conditions:
Evaluation:

Uncontrolled Environment Safe Operating Distance,(meters), R_{safeu} : 278

Controlled Environment Safe Operating Distance,(meters), R_{safec} : See Section 3

5.0 Off-Axis Levels at the FarField Limit and Beyond

In the far field region, the power is distributed in a pattern of maxima and minima (sidelobes) as a function of the off-axis angle between the antenna center line and the point of interest. Off-axis power density in the far field can be estimated using the antenna radiation patterns prescribed for the antenna in use. Usually this will correspond to the antenna gain pattern envelope defined by the FCC or the ITU, which takes the form of:

$$G_{off} = 32 - 25\log(\Theta)$$

for Θ from 1 to 48 degrees; -10 dBi from 48 to 180 degrees
(Applicable for commonly used satellite transmit antennas)

Considering that satellite antenna beams are aimed skyward, power density in the far field will usually not be a problem except at low look angles. In these cases, the off axis gain reduction may be used to further reduce the power density levels.

For example: At one (1) degree off axis At the far-field limit, we can calculate the power density as:
$G_{off} = 32 - 25\log(1) = 32 - 0$ dBi = 1585 numeric

$$PD_{1\ deg\ off\text{-}axis} = PD_{ff} \times 1585/G = 0.1050 \quad mW/cm^2 \qquad (5)$$

6.0 Off-Axis power density in the Near Field and Transitional Regions

According to Bulletin 65, off-axis calculations in the near field may be performed as follows: assuming that the point of interest is at least one antenna diameter removed from the center of the main beam, the power density at that point is at least a factor of 100 (20 dB) less than the value calculated for the equivalent on-axis power density in the main beam. Therefore, for regions at least D meters away from the center line of the dish, whether behind, below, or in front under of the antenna's main beam, the power density exposure is at least 20 dB below the main beam level as follows:

$$PD_{nf(off\text{-}axis)} = \quad PD_{nf}/100 = \quad 0.056 \quad mW/cm^2 \text{ at D off axis} \quad (6)$$

See page 5 for the calculation of the distance vs elevation angle required to achieve this rule for a given object height.

7.0 Region Between the Feed Horn and Sub-reflector

Transmissions from the feed horn are directed toward the subreflector surface, and are confined within a conical shape defined by the feed horn. The energy between the feed horn and subreflector is conceded to be in excess of any limits for maximum permissible exposure. This area will not be accessible to the general public. Operators and technicians will receive training specifying this area as a high exposure area. Procedures must be established that will assure that all transmitters are rerouted or turned off before access by maintenance personnel to this area is possible.

Note 1:
Mitigation of the radiation level may take several forms. First, check the distance from the antenna to the nearest potentially occupied area that the antenna could be pointed toward, and compare to the distances appearing in Sections 2, 3 & 4. If those distances lie within the potentially hazardous regions, then the most common solution would be to take steps to insure that the antenna(s) are not capable of being pointed at those areas while RF is being transmitted. This may be accomplished by setting the tracking system to not allow the antenna be pointed below certain elevation angles. Other techniques, such as shielding may also be used effectively. In any event, in no circumstances will any person be located within the on-axis near-field region while the antenna is transmitting. The antenna is inaccessible to the general public and will be turned off prior to any planned maintenance by trained personnel.

Evaluation of Safe Occupancy Area in Front of Antenna

The distance (S) from a vertical axis passing through the dish center to a safe off axis location in front of the antenna can be determined based on the dish diameter rule (Item 6.0). Assuming a flat terrain in front of the antenna, the relationship is:

$$S = (D/\sin\alpha) + (2h - D - 2)/(2\tan\alpha) \qquad (7)$$

where: α = minimum elevation angle of antenna
D = dish diameter in meters
h = maximum height of object to be cleared, meters

For distances equal or greater than determined by equation (7), the radiation hazard will be below safe levels for all but the most powerful stations (> 4 kilowatts RF at the feed).

	For D =	3.8	meters	
	h =	1	meters	Enter clearance height required
Then:				
	α	S		
	10	11.1	meters	
	15	7.6	meters	
	20	5.9	meters	
	25	4.9	meters	
	30	4.3	meters	
Specific Elev:	14.5	7.8	meters	Enter minimum elevation angle required
Specific Elev:	14.5	7.8	meters	Enter maximum elevation angle required

Suitable fencing or other barrier should be provided to prevent casual occupancy of the area in front of the antenna within the limits prescribed above at the lowest elevation angle required.