ISAT US Inc.

Exhibit C – Radiation Hazard Analysis

1.0 Introduction.

The analyses and calculations performed in this Annex comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01.

Bulletin No. 65 and the FCC R&O 96-326 specifies two Maximum Permissible Exposure (MPE) limits that are dependent on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. These are described below:

- General Population/Uncontrolled environment MPE limit is 1 mW/cm^2. The General Population / Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less.

- Occupational/Controlled environment MPE limit is 5 mW/cm^2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less.

2.0 Analysis for the L3Harris DarkWing terminal.

The analysis for the L3Harris antenna provided in this report determines the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, and 4) at the aperture surface.

Section 2.1 – Calculations for L3Harris DarkWing

Input Parameter	Value	Units
Antenna Major Axis Dimension	0.51	m
Antenna Transmit Gain @ 30 GHz	39.1	dBi
Transmit Frequency	30000	MHz
Power Input to the Antenna	7	Watts
Antenna Surface Area	1443.3	cm^2
Antenna Efficiency	0.65	real

Calculated Parameter	Value	Units
Gain Factor	8128.3052	real
Wavelength	0.0100	m

Calculated Parameter	Value	Units
Near-Field Distance	6.5025	m
Distance to Far-Field	15.606	m
Distance of Transition Range	6.5025	m

Calculated Parameter	Value	Units
Power Density in the Near Field	8.9095	mW/cm^2
Power Density in the Far Field	1.8592	mW/cm^2

Power Density in the Transition Region	8.9095	mW/cm²
Power Density at Aperture Surface	2562.44	mW/cm²

Section 2.2 – Summary and Discussion of Results

Region	Distance (m)	Calculated Power Density (mW/cm^2)	Limit Controlled Environment $\leq 5\ mW/cm^2$	Limit Uncontrolled Environment $\leq 1\ mW/cm^2$
Safe Range for Uncontrolled	≥ 20	1.0	meets limit	meets limit
Safe Range for Controlled	≥ 10	5.0	meets limit	meets limit
Near Field	6.5025	8.9095	exceeds limit	exceeds limit
Far Field	15.606	1.8592	meets limit	exceeds limit
Transition Region	6.5025	8.9095	exceeds limit	exceeds limit
Aperture Surface	N/A	2562.44	exceeds limit	exceeds limit

The analysis of the non-ionizing radiation levels presumes the maximum allowed input power to antenna of 7 W and a 100% duty cycle, resulting in worst case radiation levels. In a significant number of deployments, the terminal duty cycle would be below 100% and the actual power required would be lower than the 7 W maximum, resulting in lower radiation levels than those calculated. As with any directional antenna, the maximum level of non-ionizing radiation is in the main beam of the antenna, which is pointed to the satellite. As one moves around the antenna to the side lobes and back lobes, the radiation levels decrease significantly. Thus, the maximum radiation level from an antenna occurs in a limited area in the direction the antenna is pointed to. This is especially true in the case of the L3Harris DarkWing terminal, as it utilizes a small, flat panel antenna that results in tighter beam-forming, concentrating the transmitted power in a smaller area around the main beam and resulting in higher calculated power density in the main beam but a sharp drop off in energy as one moves toward the side lobes.

L3Harris DarkWing is for commercial and government use and is not intended to be operated by the general public. The terminal is cost prohibitive for purchase by the general public, therefore it will only be operated by trained professional personnel. The antenna installers will be aware of the antenna's radiation environment and use measures best suited to maximize protection to anyone who may come into the proximity of the terminal.

As summarized in the table above, the L3Harris DarkWing meets the FCC's MPE levels for controlled or uncontrolled environments beyond separation distances of about 10 m and 20 m, respectively. Based on these calculations, the GetSAT Milli-EX terminal meets the FCC's MPE levels for controlled environments in the far field of the antenna and exceeds the levels in the near field and the transition region, as well as on the aperture surface. The terminal has the capability to exceed the FCC's MPE levels for uncontrolled environments in the near field, far field and transition regions and at the aperture surface. Training of personnel with access to the terminal will include consideration of the operational modes of the antenna and information on how to prevent radiation exposure, including disabling the communications system. The terminal is not designed to be serviceable in the field. If maintenance of the antenna is necessary, this typically will be done at the manufacturer's facility, by trained technicians who will turn off the transmit power before performing work in these areas.

Additionally, there are various safety features associated with the operation and installation of the terminal that will prevent radiation exposure. As the antenna will not operate below elevation angles of five degrees, and the terminal will be pointed upward toward the satellite, persons nearby are unlikely to be exposed to the main beam of the antenna. Personnel will be trained to install and operate the terminal in a manner to ensure that any location where prolonged operation will occur is limited to locations such that areas where the limits for uncontrolled environments could be exceeded will be restricted to trained personnel. Furthermore, the manuals for this terminal will provide warnings regarding potential for radiation hazard, including a label attached to the surface of the terminal warning about the potential for radiation hazard, and a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR §1.1310 Table 1.

The terminal is also designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. Especially given the small size of these flat panel antennas and their operational elevation angle, there is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

In conclusion, the results of the analysis combined with the design and operational characteristics of the terminal show that the L3Harris DarkWing terminal, operating n a controlled environment, and under the proper mitigation procedures, meet the guidelines specified in § 1.1310 of the Regulations.

3.0 Analysis for the Gigasat ULV terminal.

The analysis for the Gigasat ULV antenna provided in this report determines the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, 4) region between the feed and main reflector surface, 5) at the main reflector surface, and 6) between the antenna edge and the ground.

Section 3.1 – Calculations for Gigasat ULV

Input Parameter	Value	Units
Antenna Diameter	0.6	m
Antenna Transmit Gain	43.3	dBi
Transmit Frequency	30000	MHz
Antenna Feed Flange Diameter	5	cm
Power Input to the Antenna	9	Watts

Calculated Parameter	Value	Units
Antenna Surface Area	0.2827	m^2
Area of Antenna Flange	19.6344	cm^2
Antenna Efficiency	0.6018	real
Gain Factor	21379.6209	real
Wavelength	0.0100	m

Calculated Parameter	Value	Units
Near-Field Distance	9	m
Distance to Far-Field	21.6	m
Distance of Transition Range	9	m

Calculated Parameter	Value	Units
Power Density in the Near Field	7.6621	mW/cm^2
Power Density in the Far Field	3.2820	mW/cm^2
Power Density in the Transition Region	7.6621	mW/cm^2
Power Density at the Feed Flange	1853.5190	mW/cm^2
Power Density at Main Reflector	12.7328	mW/cm^2
Power Density between Reflector and Ground	3.1832	mW/cm^2

Section 3.2 – Summary and Discussion of Results

Region	Distance (m)	Calculated Power Density (mW/cm^2)	Limit Controlled Environment ≤ 5 mW/cm^2	Limit Uncontrolled Environment ≤ 1 mW/cm^2
Safe Range for Uncontrolled	≥ 25	1.0	meets limit	meets limit
Safe Range for Controlled	≥ 15	5.0	meets limit	meets limit
Near Field	9	7.6621	exceeds limit	exceeds limit
Far Field	21.6	3.282	meets limit	exceeds limit
Transition Region	9	7.6621	exceeds limit	exceeds limit
Feed Flange	N/A	1853.5190	exceeds limit	exceeds limit
Main Reflector	N/A	12.7328	exceeds limit	exceeds limit

The Gigasat ULV terminal proposed in this application is for commercial and government uses and intended to be operated by professional personnel. As summarized in the above table, the Gigasat ULV antenna does not meet the FCC's MPE levels for controlled or uncontrolled environments until separation distances of 25 m and 15 m respectively. However, given that the antenna will not operate below elevation angles of 5 degrees, and because the operating personnel will be trained to stay away from the main beam, persons on the ground are unlikely to be exposed to the main beam of the antenna, and therefore the levels of power density will be significantly reduced from those calculated.

As with any directional antenna, the maximum level of non-ionizing radiation is in the main beam of the antenna that is pointed to the satellite. Therefore, the levels of power density will be significantly reduced from those calculated. When maintenance of the antenna is required, the trained technicians will turn off the transmit power before performing maintenance activities. Training of personnel with access to the antenna will include consideration of the operation mode of the antenna and information on how to prevent radiation exposure, including disabling the communications system. Furthermore, the manuals for these terminals will provide warnings regarding potential for radiation hazard, including a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR §1.1310 Table 1. Finally, a label will be attached to the surface of the terminal warning about the potential for radiation hazard.

The terminal is also designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. There is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

In conclusion, the results show that the Gigasat ULV antenna, in a controlled environment and under the proper mitigation procedures, meets the guidelines specified in § 1.1310 of the Commission's Rules.

4.0 Analysis for the Paradigm Hornet 100GX 950mp terminal.

The analysis for the Paradigm Hornet 100GX 950mp antenna provided in this report determines the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, and 4) at the aperture surface.

Section 4.1 – Calculations for Paradigm Hornet 100GX 950mp

Input Parameter	Value	Units
Antenna Major Axis Dimension	1.0	m
Antenna Transmit Gain @ 30 GHz	47.6	dBi
Transmit Frequency	30000	MHz
Antenna Feed Flange Diameter	4	cm
Power Input to the Antenna	10	Watts

Calculated Parameter	Value	Units
Antenna Surface Area	0.7854	m^2
Area of Antenna Flange	12.566	cm^2
Gain Factor	57544	real
Antenna Efficiency	0.5830	real
Wavelength	0.0100	m

Calculated Parameter	Value	Units
Near-Field Distance	25	m
Distance to Far-Field	60	m
Distance of Transition Range	25	m

Calculated Parameter	Value	Units
Power Density in the Near Field	2.97	mW/cm^2
Power Density in the Far Field	1.27	mW/cm^2
Power Density in the Transition Region	2.97	mW/cm^2
Power Density at the Feed Flange	3183	mW/cm^2
Power Density at Main Reflector	5.0931	mW/cm^2
Power Density between Reflector and Ground	1.2733	mW/cm^2

Section 4.2 – Summary and Discussion of Results

Region	Distance (m)	Calculated Power Density (mW/cm^2)	Limit Controlled Environment $\leq$ 5 mW/cm^2	Limit Uncontrolled Environment $\leq$ 1 mW/cm^2
Safe Range for Uncontrolled	$\geq$ 70	1.0	meets limit	meets limit
Safe Range for Controlled	$\geq$ 20	5.0	meets limit	meets limit
Near Field	25	2.97	meets limit	exceeds limit
Far Field	60	1.27	meets limit	exceeds limit
Transition Region	25	2.97	meets limit	exceeds limit
Feed Flange	N/A	3183.2	exceeds limit	exceeds limit
Main Reflector	N/A	5.0931	exceeds limit	exceeds limit

The Paradigm Hornet 100GX 950mp terminal proposed in this application is for commercial and government uses and intended to be operated by professional personnel. As summarized in the above table, the Paradigm Hornet 100GX 950mp antenna does not meet the FCC's MPE levels for controlled or uncontrolled environments until separation distances of 70 m and 20 m respectively. However, given that the antenna will not operate below elevation angles of 5 degrees, and because the operating personnel will be trained to stay away from the main beam, persons on the ground are unlikely to be exposed to the main beam of the antenna, and therefore the levels of power density will be significantly reduced from those calculated.

As with any directional antenna, the maximum level of non-ionizing radiation is in the main beam of the antenna that is pointed to the satellite. Therefore, the levels of power density will be significantly reduced from those calculated. When maintenance of the antenna is required, the trained technicians will turn off the transmit power before performing maintenance activities. Training of personnel with access to the antenna will include consideration of the operation mode of the antenna and information on how to prevent radiation exposure, including disabling the communications system. Furthermore, the manuals for these terminals will provide warnings regarding potential for radiation hazard, including a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR §1.1310 Table 1. Finally, a label will be attached to the surface of the terminal warning about the potential for radiation hazard.

The terminal is also designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. There is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

In conclusion, the results show that the Paradigm Hornet 100GX 950mp antenna, in a controlled environment and under the proper mitigation procedures, meets the guidelines specified in § 1.1310 of the Commission's Rules.

5.0 Analysis for the EMS Taipan terminal.

The analysis for the EMS Taipan antenna provided in this report determines the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, 4) region between the feed and main reflector surface, 5) at the main reflector surface, and 6) between the antenna edge and the ground.

Section 5.1 – Calculations for EMS Taipan

Input Parameter	Value	Units
Antenna Major Axis Dimension	0.48	m
Antenna Transmit Gain @ 30 GHz	45.0	dBi
Transmit Frequency	30000	MHz
Antenna Feed Flange Diameter	7.7	cm
Power Input to the Antenna	5	Watts

Calculated Parameter	Value	Units
Antenna Surface Area	0.1810	m^2
Area of Antenna Flange	46.5649	cm^2
Gain Factor	31623	real
Antenna Efficiency	0.65	real
Wavelength	0.0100	m

Calculated Parameter	Value	Units
Near-Field Distance	5.76	m
Distance to Far-Field	13.824	m
Distance of Transition Range	5.76	m

Calculated Parameter	Value	Units
Power Density in the Near Field	7.18	mW/cm^2
Power Density in the Far Field	6.58	mW/cm^2
Power Density in the Transition Region	7.18	mW/cm^2
Power Density at the Feed Flange	429.5	mW/cm^2
Power Density at Main Reflector	11.05	mW/cm^2

Power Density between Reflector and Ground	2.7632	mW/cm²

Section 5.2 – Summary and Discussion of Results

Region	Distance (m)	Calculated Power Density (mW/cm^2)	Limit Controlled Environment $\leq$ 5 mW/cm^2	Limit Uncontrolled Environment $\leq$ 1 mW/cm^2
Safe Range for Uncontrolled	$\geq$ 35.5	1.0	meets limit	meets limit
Safe Range for Controlled	$\geq$ 15.9	5.0	meets limit	meets limit
Near Field	5.8	7.2	meets limit	exceeds limit
Far Field	13.8	6.6	meets limit	exceeds limit
Transition Region	5.8	7.2	meets limit	exceeds limit
Feed Flange	N/A	429.5	exceeds limit	exceeds limit
Main Reflector	N/A	11.05	exceeds limit	exceeds limit

The EMS Taipan terminal proposed in this application is for commercial and government uses and intended to be operated by professional personnel. As summarized in the above table, the EMS Taipan antenna does not meet the FCC's MPE levels for controlled or uncontrolled environments until separation distances of 35.5 m and 15.9 m respectively. However, given that the antenna will not operate below elevation angles of 5 degrees, and because the operating personnel will be trained to stay away from the main beam, persons on the ground are unlikely to be exposed to the main beam of the antenna, and therefore the levels of power density will be significantly reduced from those calculated.

As with any directional antenna, the maximum level of non-ionizing radiation is in the main beam of the antenna that is pointed to the satellite. Therefore, the levels of power density will be significantly reduced from those calculated. When maintenance of the antenna is required, the trained technicians will turn off the transmit power before performing maintenance activities. Training of personnel with access to the antenna will include consideration of the operation mode of the antenna and information on how to prevent radiation exposure, including disabling the communications system. Furthermore, the manuals for these terminals will provide warnings regarding potential for radiation hazard, including a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR §1.1310 Table 1. Finally, a label will be attached to the surface of the terminal warning about the potential for radiation hazard, in accordance with §25.228(d).

The terminal is also designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. There is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

In conclusion, the results show that the EMS Tailan antenna, in a controlled environment and under the proper mitigation procedures, meets the guidelines specified in § 1.1310 of the Commission's Rules.

6.0 Analysis for the Comtech RECON 1.3m terminal.

The analysis for the Comtech RECON 1.3m antenna provided in this report determines the power flux density levels of the earth station in the 1) far-field, 2) near-field, 3) transition region, 4) region between the feed and main reflector surface, 5) at the main reflector surface, and 6) between the antenna edge and the ground.

Section 6.1 – Calculations for Comtech RECON 1.3m

Input Parameter	Value	Units
Antenna Diameter	1.35	m
Antenna Transmit Gain	50.4	dBi
Transmit Frequency	29500	MHz
Antenna Feed Flange Diameter	6.3246	cm
Power Input to the Antenna	15.8	Watts

Calculated Parameter	Value	Units
Antenna Surface Area	1.4313	m^2
Area of Antenna Flange	31.4154	cm^2
Antenna Efficiency	0.6304	real
Gain Factor	109647.8196	real
Wavelength	0.0102	m

Calculated Parameter	Value	Units
Near-Field Distance	44.803125	m
Distance to Far-Field	107.5275	m
Distance of Transition Range	44.803125	m

Calculated Parameter	Value	Units
Power Density in the Near Field	2.7836	mW/cm^2
Power Density in the Far Field	1.1924	mW/cm^2
Power Density in the Transition Region	2.7836	mW/cm^2
Power Density at the Feed Flange	2011.7494	mW/cm^2
Power Density at Main Reflector	4.4154	mW/cm^2

Power Density between Reflector and Ground	1.1039	mW/cm²

Section 6.2 – Summary and Discussion of Results

Region	Distance (m)	Calculated Power Density (mW/cm^2)	Limit Controlled Environment $\leq$ 5 mW/cm^2	Limit Uncontrolled Environment $\leq$ 1 mW/cm^2
Safe Range for Uncontrolled	$\geq$ 117.4	1.0	meets limit	meets limit
Safe Range for Controlled	$\geq$ 52.5	5.0	meets limit	meets limit
Near Field	44.8	2.8	meets limit	exceeds limit
Far Field	107.5	1.2	meets limit	exceeds limit
Transition Region	44.8	2.8	meets limit	exceeds limit
Feed Flange	N/A	2011.7	exceeds limit	exceeds limit
Main Reflector	N/A	1.1039	exceeds limit	exceeds limit

The Comtech RECON 1.3m terminal proposed in this application is for commercial and government uses and intended to be operated by professional personnel. As summarized in the above table, the Comtech RECON 1.3m antenna does not meet the FCC's MPE levels for controlled or uncontrolled environments until separation distances of 117.4 m and 52.5 m respectively. However, given that the antenna will not operate below elevation angles of 5 degrees, and because the operating personnel will be trained to stay away from the main beam, persons on the ground are unlikely to be exposed to the main beam of the antenna, and therefore the levels of power density will be significantly reduced from those calculated.

As with any directional antenna, the maximum level of non-ionizing radiation is in the main beam of the antenna that is pointed to the satellite. Therefore, the levels of power density will be significantly reduced from those calculated. When maintenance of the antenna is required, the trained technicians will turn off the transmit power before performing maintenance activities. Training of personnel with access to the antenna will include consideration of the operation mode of the antenna and information on how to prevent radiation exposure, including disabling the communications system. Furthermore, the manuals for these terminals will provide warnings regarding potential for radiation hazard, including a diagram showing the regions around the terminal where the radiation levels could exceed the maximum radiation exposure limit specified in 47 CFR §1.1310 Table 1. Finally, a label will be attached to the surface of the terminal warning about the potential for radiation hazard.

The terminal is also designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. There is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

In conclusion, the results show that the Comtech RECON 1.3m antenna, in a controlled environment and under the proper mitigation procedures, meets the guidelines specified in § 1.1310 of the Commission's Rules.