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## Network Systems Organization

Federal Communications Commission  
Equipment Approval Services  
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**Re: FCC ID H9PLA4121 Ref # 15207**

Date: July 25, 2000

Dear Reviewer,

In response to the following Email:

To: Norman Nelson, Symbol Technologies, Inc.  
From: Errol Chang  
echang@fcc.gov  
FCC Application Processing Branch

Re: FCC ID H9PLA4121  
Applicant: Symbol Technologies Inc  
Correspondence Reference Number: 15207  
731 Confirmation Number: EA97459  
Date of Original E-Mail: 07/20/2000

1. A total of 39 antenna configurations are identified. Hand-held devices (external antennas 6, 7, 16, 16.1 & 18; internal antennas 12, 13, 22-25, 27-31 & 35; see 2c below) are considered as mobile transmitting devices where there is feasible means to maintain a separation distance of 20 cm or more between the device, including its antenna, and the body of persons. Laptop computer and similar mobile configurations (external antennas 17, 17.1 & 33; internal antennas 5 & 14; other mobile antennas 10, 19 & 21; see 2b below) for similar reasons are also considered as mobile devices. Among the antenna configurations, three body-worn configurations are identified (antennas 11, 34 & 26; see 2d below) which are considered portable and the rest operate with antennas mounted at fixed locations (antennas 1, 2, 2.1, 3, 4, 8, 8.1, 9, 32, 15 & 20; see 2a below). Please confirm and revise operating instructions, statements etc. accordingly (see below).

**Attached is a draft memo with the proposed language per 2a-d.**

2. The warning and caution statements proposed in the RF exposure info are different than those indicated in the manual. Please revise accordingly as indicated below for putting in the final manual and upload the relevant pages of the manual. For purpose of providing operating instructions and RF exposure statements for users and installers to satisfy RF exposure requirements, the following are recommended -  
(a) antennas (11 configurations) that are mounted at fixed locations (ceiling, walls, vehicles etc.) - provide installation instructions requiring the antennas to be installed at locations where there is a minimum separation distance of 20 cm or more from all persons during normal operation. Users and installers should be informed that the installation requirements are for meeting FCC RF exposure requirement.

(b) antennas (8 configurations) that are not mounted at fixed locations, such as in laptop, desktop computers or in similar configurations - provide operating instructions at a conspicuous location in the manual to inform users on how to install, operate and maintain at least 20 cm between the antenna and persons to satisfy FCC RF exposure requirement. This should be in the form of a CAUTION statement.

(c) antennas (17 configurations) that are mounted or embedded in hand-held devices for use in a person's hands only - provide operating instructions at a conspicuous location in the manual to inform users on how to operate such devices and the requirements of maintaining at least 20 cm between the antenna (or device if antenna location is not known to the user) and the body of persons to satisfy FCC RF exposure requirement. The user should also be informed that such devices should be designed for hand-held use and should be limited for use in a person's hands only for satisfying RF exposure requirements for mobile transmitting devices. This should be in the form of a CAUTION statement.

(d) antennas (3 configurations) that are incorporated in body-worn or other portable device configurations - specific installation and operating instructions should be provided to the end-users or persons administer the operation of the device to ensure the devices are used or carried on persons in specific manners that can maintain a minimum separation for satisfying SAR compliance requirements. Persons administer the operating of a portable device (antenna 26) should inform end-users about proper device operation, when necessary, to ensure RF exposure compliance. This should be in the form of a WARNING statement at a conspicuous location in the manual indicating to responsible parties the requirements for satisfy FCC RF exposure compliance for operating a device as a portable or body-worn transmitter.

3. Please confirm output of antenna No. 1; it should be much higher than 7.27 dBm, 27.27 dBm ?

**No, the output power is reduced by 14.5 dB of cable loss. Note that the MPE calculation includes cable loss and antenna gain.**

4. Please confirm differences between what are indicated in the antenna table (list) and device description -

(a) antenna 16 & 16.1 should be for hand-held instead of mobile

**Antenna 16 is for use in the hand held device while 16.1 is for the mobile one. I have updated and attached a revised version of the antenna list.**

(b) antenna 17 & 17.1 should be for laptop instead of mobile

**Correct.**

(c) antenna 20 is for vehicle-mount and treated like a mobile to be installed at know locations on a vehicle where the separation distance can be ensured.

**Correct.**

(d) antenna 33 is for both laptop and fixed location use, both requirements are applicable.

**Correct.**

(e) antenna 19 is a mobile to be placed a locations that can satisfy separation distance requirements, similar to laptop or desktop configurations.

**Antenna 19 is a hand held unit as described in the RF Exposure information. In addition it could be placed on a gurney next to a patient while being transported in the hospital. Because of this close proximity to the torso of the patient Symbol wishes to limit the output power of the device to 135 mW. This will drop the EIRP of the antenna to below 200 mW and exempt this configuration from SAR testing. See the attached memo for the exact wording of the RF exposure warning text.**

**Antenna 19: Tissue to antenna = 0.7 in.**

(f) antenna 26 could be body-worn, as indicated in figure; please confirm and treat as body-worn device or restrict to mobile use only.

**Antenna 26 can be considered a body worn device in the shoulder strap configuration. See the attached memo for the exact wording of the RF exposure warning text.**

5. For body-worn or portable operating configurations (antennas 11, 34, & 26) please clarify the minimum separation distance between the antenna and a person's body, as provided by the device when operated in manners specified in the operating instructions for the device. The information should be included in the operating instructions for these devices, indicating when operated as specified the device would provide the separation distance needed for ensuring RF exposure compliance (see 2d above)

**Antenna 11: Tissue to antenna = 2.1 in.**

**Antenna 34: Tissue to antenna = 0.65 in.**

**Antenna 26: Tissue to antenna = 3.0 in.**

I hope these answers are satisfactory.

Respectfully,

Norman H. Nelson



# RF Exposure Antenna Summary

## Network Systems Organization

FCC ID: **H9PLA4121**

WLAN PC Card, 11 Mbps, T2

Source Based

Output Power: 135 mW

Original Equip.

Mobile DC Factor: 1.000

Portable DC Factor: 1.000

## Mobile Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	MPE (cm)	TR Status	Device Type
01.	Parapolic Grid	ML-2499-PGA1-0	Dish	24.0	14.50	6.80	9.8	Tested	Fixed
02.	Pipe Bomb 11"x4'	50-11901-048P	Dipole Array	5.2	1.00	20.30	5.3	Tested	Fixed
02.1	Pipe Bomb 11"x15'	50-11901-180P	Dipole Array	5.2	3.75	17.55	3.9	See # 2	Fixed
03.	Patch	ML-2499-PTA1-0	Patch	6.5	1.50	19.80	5.8	Tested	Fixed
04.	Panel	ML-2499-PNA1-0	Panel	11.0	3.48	17.82	7.8	Tested	Fixed
05.	IEC	24-20776-02	Patch	0.0	0.00	21.30	3.3	Tested	Laptop
06.	4140	50-11900-001	Whip	-2.0	0.00	21.30	2.6	Tested	Hand Held
07.	HS Dipole	50-21900-030	Dipole	2.0	0.55	20.75	3.9	Tested	Hand Held
08.	Pipe Bomb 25"x20'	50-11902-240S	Dipole Array	7.0	5.00	16.30	4.1	Tested	Fixed
08.1	Pipe Bomb 25"x30'	50-11902-360S	Dipole Array	7.0	7.49	13.81	3.1	See # 8	Fixed
09.	Ceiling Panel	ML-2499-SD24-0	Plane	3.3	1.50	19.80	4.0	Tested	Fixed
10.	Trilogy AP	21-20667-01	Dipole	2.0	0.20	21.11	4.0	Tested	Fixed
12.	Toko	50-21900-022	Puck	0.0	0.00	21.30	3.3	Tested	Hand Held
13.	6846D	10-41003-01	Slot	0.0	0.37	20.93	3.1	Tested	Hand Held
14.	End Cap "C"	10-20511-01	F-Element	0.0	0.00	21.30	3.3	Tested	Laptop
15.	Amtrak Omni	50-21900-027	Dipole	3.0	0.00	21.30	4.6	See # 10	Fixed
16.	Rubber DuckTNC-RP	50-21900-029	Dipole	1.0	0.00	21.30	3.7	See # 10	Hand Held
16.1	Rubber Duck	50-21900-007	Dipole	1.0	0.00	21.30	3.7	See # 10	Fixed
17.	PC04	50-11903-0115	Dipole	2.0	0.28	21.02	4.0	See # 10	Laptop
17.1	PC14	50-11903-0355	Dipole	2.0	0.86	20.44	3.7	See # 10	Laptop
18.	4342	50-21900-033	Dipole	1.2	0.15	21.15	3.7	See # 10	Hand Held

Antenna Gain listed without cable

TR Status refers to whether the antenna was tested. If not refer to the directed antenna test data

Duty Cycle Factors are applied to MPE and EIRP

Tx Limited configurations are for low power versions of the radio. See the specific antenna exhibit for detail

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FCC ID: **H9PLA4121**

WLAN PC Card, 11 Mbps, T2

Source Based

Mobile DC Factor: 1.000

Output Power: 135 mW

Original Equip.

Portable DC Factor: 1.000

20.	Mag Dipole	ML-2499-MGA1-	Dipole	2.0	3.00	18.30	2.9	See # 10	Vehicle Mount
21.	Trilogy PCI, 72"	25-20728-01	Dipole	2.0	3.53	17.77	2.7	See # 10	Fixed
22.	Novas	50-21900-034	F-Element	0.0	0.43	20.87	3.1	See # 14	Hand Held
23.	1742	703549-2	F-Element	0.0	0.11	21.19	3.2	See # 14	Hand Held
24.	2742	703624-2	F-Element	0.0	0.13	21.17	3.2	See # 14	Hand Held
25.	7242	10-35477-01	F-Element	0.0	0.13	21.17	3.2	See # 14	Hand Held
26.	Criticare BFA	50-21900-021	F-Element	0.0	0.20	21.11	3.2	See # 14	Hand Held
27.	7546D	10-40948-01	F-Element	0.0	0.22	21.09	3.2	See # 14	Hand Held
28.	7546	10-38649-02	F-Element	0.0	0.31	20.99	3.2	See # 14	Hand Held
29.	6846	10-32290-02	F-Element	0.0	0.34	20.96	3.2	See # 14	Hand Held
30.	2042	10-17577-03	F-Element	0.0	0.06	21.24	3.3	See # 14	Hand Held
31.	6146	10-35305-02	F-Element	0.0	0.12	21.18	3.2	See # 14	Hand Held
32.	Corner Patch	ML-2499-DLA1-0	Patch	7.5	1.50	19.80	6.5	See # 3	Fixed
33.	Plane	50-21900-008	Plane	0.0	1.00	20.30	2.9	See # 9	Fixed
35.	XP	50-21900-024	Slot	0.0	0.58	20.73	3.1	See # 13	Hand Held

## Body Worn Antennas

Ant No	Model	Symbol P/N	Type	Gain (dBi)	Cabel Loss (dB)	Pout (dBm)	EIRP (mW)	TR Status	Device Type	Tx Limited
11.	Vocollect MMCX	50-21900-025	Dipole	2.0	0.25	21.06	202.1	Tested + SAR	Body Worn	
19.	DASH 3000	50-21900-036	Dipole	2.2	0.62	20.69	194.4	See # 10	Body Worn	
34.	Oniel MMCX	50-21900-031	Slot	0.0	0.37	20.93	124.0	See # 13	Body Worn	

Antenna Gain listed without cable  
TR Status refers to whether the antenna was tested. If not  
refer to the directed antenna test data

Duty Cycle Factors are applied to MPE and EIRP

Tx Limited configurations are for low power versions  
of the radio. See the specific antenna exhibit for detail

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## INTER OFFICE MEMO

To: Technical Publications Managers & Technical Writers  
From: Norm Nelson  
Subject: Required language for PRGs for FCC RF Exposure  
Date: July 25, 2000  
CC: Ray Martino, Dean Kawaguchi, Dornu Narnor

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In order to satisfy the FCC's RF Exposure requirements we must include notes, cautions, and warnings in our Product Reference Guides for the LA4111 and LA4121 Wireless LAN cards and all devices that use these cards. The purpose of these texts are to inform users, administrators, and installers on the correct use and installation of our Spectrum 24 systems and equipment in a way that protects users and the general public from RF exposure.

Currently the FCC categorizes our equipment configurations into four categories.

### **Radio devices with antennas mounted at fixed locations.**

This includes access points with antennas that are fixed in place. Usually the antennas are mounted on ceilings, walls, or vehicles etc.

The following text will be located in a conspicuous place in the section describing proper antenna installation.

"CAUTION: Exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements this antenna shall be installed to ensure a minimum separation distance of 20 cm from all persons during normal operating conditions."

### **Radio devices with antennas not mounted at fixed locations.**

This includes laptops and desktop types of equipment and their antennas that can be moved fairly easily. A laptop with an antenna velcroed to the back of the display cover is a good example.

The following text will be located in a conspicuous place in the section describing proper antenna installation.

"CAUTION: Exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements this antenna shall be installed in such a manner that it may be located near hands but must be more than 20 cm from any persons body during normal operating conditions."

### **Radio devices in hand held units.**

All of Symbol's or OEM's hand held terminals that incorporate either internal or external antennas.

The following text will be located in a conspicuous place in the section describing proper usage of the hand held device.

"CAUTION: Exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements this hand held device is only approved for use in the user's hand when there is 20 cm or more between the antenna and any persons body during normal operating conditions."

### **Radio devices with antennas in body worn units.**

All terminals that are either strapped to a person's body with belts or other devices that could come in close proximity to the users body. This would include Symbol's wrist mounted unit as well as OEMs belt worn and belt slung devices. In addition medical monitoring equipment that could be placed against a patient is one of these devices as well.

#### **Devices for Trained Users**

Trained users are employees and industrial users that have access to the User's Manual for operation and safety guidelines.

The following text will be located in a conspicuous place in the section describing proper positioning and operation of the body worn device.

"Warning: Exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements this device shall be used in accordance with the operating conditions and instructions listed in this manual."

#### **Devices for general public**

General public devices are those devices used by the general public that don't have access to the users guide and must either rely on the intrinsic design of the device or instructions from an administrator for correct use of the device. For devices that will be used without the guidance of an administrator a SAR test must be performed so this warning can be omitted.

The following text will be located in a conspicuous place in the section describing proper positioning and usage of the body worn device.

"Warning: Exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements this device shall be used in accordance with the operating conditions and instructions listed in this manual. It is the responsibility of the person administering this device to ensure proper operation by the end user."