Table 3 Naming conventions (Cont.)

Term	Refers to
	• MPT-HLS compact
MSS	Refers to all of the following: • MSS-1 • MSS-4 • MSS-8 • MSS-O Note that the term MSS does *not* include the MSS-1c.
EAS	Refers to both: • P8ETH card • EASv2 card
Core	Refers to all of the following: • Core-E card • CorEvo card • MSS/CORE ports of MSS-O and MSS-1
CorEvo	Refers to both: • CorEvo-1G card • CorEvo-10G card
PDH	Refers to all of the following: • E1 • DS1 • DS3
SDH	Refers to both: • STM-1 • OC-3

1.2 FCC part 15 subpart B

1.2.1 Wavence unlicensed radio

The JF6-9558H/6933B-9500MPT (MPT-HL) unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate turn-up. After the license is received, the unlicensed MPT-HL radio can be easily converted to the lower 6 GHz licensed band.

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The JF6-9558L/6933B-9558L and JF6-9558L-D/6933B-9558L-D (MPT-HLC) unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate turn-up. After the license is received, the unlicensed MPT-HLC radio can be easily converted to the lower 6 GHz licensed band.

The JF6-9558HC/6933B-9558HC (9558HC) unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate turn-up. The 9558HC unlicensed radio cannot be upgraded to licensed operation.

The JF6-9558H/6933B-9500MPT unlicensed radio operates in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.247 and ISED RSS-210. The JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L and JF6-9558L-D/6933B-9558L-D unlicensed radios operate in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.407 and ISED RSS-210. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum.

1.2.2 FCC Class B compliance statement

The JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D unlicensed radio have been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and ISED RSS-210. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D complies with the emission limits in FCC Part 15.247. Manufacturing, marketing and importing of this device will cease by March 2, 2018 if compliance to the emission limits in FCC part 15.407 is not achieved.

1.2.3 FCC Class B requirements

WARNING!
Regulatory compliance warning: Physical changes or modifications to the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (unlicensed) radio are strictly prohibited.
Avertissement pour conformité réglementaire: changements physiques ou modifications sur les radios JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (sans licence) sont strictement interdit.

CAUTION!
Changes or modifications not expressly approved by Nokia could void the authority to operate the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (unlicensed) radio.

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CAUTION!
Installation, Turn-Up, Maintenance, and Operation Instruction supplied with the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (unlicensed) radio require strict adherence for continued part 15 of the FCC Rules and ISED RSS-210 compliance.

This device complies with part 15 of the FCC Rules and ISED RSS-210. Operation is subject to the following three conditions: (1) this device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation. (3) This device must be professionally installed.

Cet appareil radio est conforme Á ISED RSS-210. Son fonctionnement respecte les trois conditions suivantes: 1) cette radio ne cause pas d"interférences néfastes, 2) cette radio peut recevoir des interférences, ainsi que des interférences qui peuvent causer des opérations non désirées, et 3) cette radio doit être installée par des Professionnels.

1.3 Safety awareness

1.3.1 Safety EMC-EMF-ESD norms and equipment labeling

This section describes the equipment labeling and the norms mandatory or suggested that must be considered to avoid injuries on persons and/or damage to the equipment.

- Declarations of conformity to CE marking and Countries List for the ETSI market
- Safety rules
- Electromagnetic compatibility (EMC norms)
- Equipment protection against electrostatic discharges
- Cautions to avoid equipment damage

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- IEEE 802.1
- IEEE 802.1D
- IEEE 802.1Q
- IEEE 802.3x
- IEEE 802.1AX
- MEF 9
- MEF 10
- MEF-14

2.1.7 JF6-9558H, JF6-9558HC, JF6-9558L and JF6-9558L-D (unlicensed) radios

The JF6-9558H/6933B-9500MPT (MPT-HL), JF6-9558L/6933B-9558L (MPT-HLC), and JF6-9558L-D/6933B-9558L-D (MPT-HLC) unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate turn-up. After the license is received, the JF6-9558H, JF6-9558L and JF6-9558L-D radios can be easily converted to the lower 6 GHz licensed band (JF6-9558HC conversion not supported).

The JF6-9558H/6933B-9500MPTunlicensed radio operates in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.247 and ISED RSS-210. The JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D unlicensed radios operate in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.407 and ISED RSS-210. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum.

FCC class B compliance statement

The JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D unlicensed radio have been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and ISED RSS-210. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC class B requirements

⚠ **CAUTION!**
Changes or modifications not expressly approved by Nokia could void the authority to operate theJF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D unlicensed radio.

⚠ **CAUTION!**
Installation, Turn-Up, Maintenance, and Operation Instruction supplied with the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D unlicensed radio require strict adherence for continued part 15 of the FCC Rules and ISED RSS-210 compliance.

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The JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D devices comply with part 15 of FCC rules and ISED license-exempt RSS-210. These devices contains license-exempt transmitter(s)/receiver(s). Operation is subject to the following conditions:

1. These devices may not cause harmful interference.
2. These devices must accept any interference, including interference that may cause undesired operation of the device.
3. These devises must be professionally installed.

Les appareils JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, et JF6-9558L-D/6933B-9558L-D sont conformes à la clause 15 du règlement FCC ainsi qu'à la CNR-210 exempte de license de l'ISED.

Ces appareils contiennent des émetteurs/récepteurs exempts de licence. L'exploitation est autorisée aux conditions suivantes:

1. Les appareils ne doivent pas produire d'interférences nuisibles.
2. Les appareils doivent accepter toute interférence radioélectrique subie, même si l'interférence est susceptible d'en compromettre le fonctionnement.
3. Ces appareils doivent être installés par des professionnels.

2.2 System administration

2.2.1 Overview

The following applications are available for Wavence system administration:

1. WebEML (JUSM)
2. Web Server
3. WebCT (available with the CorEvo card only)
4. Provisioning Tool
5. MCT (available with the MPR-e and MSS-1c only)
6. MIB

WebEML, WebCT, Web Server and MCT provide a Graphical User Interface (GUI) to enable a user to view and perform system administration for all Network Elements (NEs) in a network, including remote Wavence systems.

For more information on WebEML, Web Server and Provisioning Tool see Wavence WebEML User Manual.

For more information on WebCT see the Wavence WebCT User Manual.

For more information on MCT see Wavence MCT User Manual.

Network Management is supported using 1350 OMS, 1352 CM, 1353 NM and 5620 SAM. For more information, see *Network Functions Manager – Packet* documentation.

2.3 Features

The following lists the features of the current release of Wavence.

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- "No Rx Radio Alarms" alarm profile must be configured in the radio panel (otherwise all the Rx Radio alarms will be raised)

On the node where the link works in Rx only:

- Transmitter must be muted with a TX Mute command
- ATPC, ACM should not be enabled: they cannot work
- LAG L1, Ring should not be created: they cannot work
- PPP must be disabled (otherwise a PPP Failure alarm will be raised)
- For monodirectional links with the MPT-HLS, the space diversity combiner should be equipped only on the receiver side.
- For monodirectional links with the MPT-HLS, the RF switch should be mounted and connected.
- "No Tx Radio Alarms" alarm profile must be configured in the radio panel (otherwise all the Tx Radio alarms will be raised)

2.5.2.28 Unlicensed radio for MPT-HL, MPT-HLC and 9558HC in the ANSI market

CAUTION!
Changes or modifications not expressly approved by Nokia could void the authority to operate the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (unlicensed) radio.

CAUTION!
Installation, Turn-Up, Maintenance, and Operation Instruction supplied with the JF6-9558H/6933B-9500MPT, JF6-9558HC/6933B-9558HC, JF6-9558L/6933B-9558L, and JF6-9558L-D/6933B-9558L-D (unlicensed) radio require strict adherence for continued part 15 of the FCC Rules and ISED RSS-210 compliance.

The JF6-9558H/6933B-9500MPT (MPT-HL) unlicensed radio provide fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate Turn-Up. After the license is received, the unlicensed MPT-HL radio can be easily converted to the lower 6 GHz licensed band.

The JF6-9558L/6933B-9558L and JF6-9558L-D/6933B-9558L-D (MPT-HLC) unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate turn-up. After the license is received, the unlicensed MPT-HLC radio can be easily converted to the lower 6 GHz licensed band.

The JF6-9558HC/6933B-9558HC (9558HC) unlicensed radio provide fast deployment of service with microwave radio. No license and small antennas (no FCC and ISED requirements) allow immediate Turn-Up. The 9558HC unlicensed radio cannot be upgraded to licensed operation.

Table 27 Unlicensed radio

Transceiver	FCC ID	ISED ID
9558HC	JF6-9558HC	6933B-9558HC
MPT-HL	JF6-9558H	6933B-9500MPT

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Table 27 Unlicensed radio (Cont.)

Transceiver	FCC ID	ISED ID
MPT-HLC	JF6-9558L	6933B-9558L
MPT-HLC	JF6-9558L-D	6993-9558L-D

See the Wavence Equipping Options drawing, found in Wavence Engineering Support Documentation for unlicensed radio configurations and equipping options.

The MPT-HL unlicensed radio operates in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.247 and ISED RSS-210. The MPT-HLC and 9558HC unlicensed radios operate in the 5725-5850 U-NII-3 band in accordance with FCC Part 15.407 and ISED RSS-210. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum. Advantages, disadvantages, and antenna recommendations for the unlicensed radio follow:

Advantages:

- Fast installation and Turn-Up
- Between 6.6 — 185 Mb/s user configurable data payload capacity consisting of a combination of E1/DS1, DS3, STM-1/OC-3, and/or Ethernet traffic
- Field convertible to lower 6 GHz licensed band (MPT-HL/HLC)
- Field expandable to higher capacities.
- Common network management with licensed radios.
- Common spares and training with licensed radios
- Adaptive Modulation - automatic interference countermeasures

Disadvantages:

- Interference from other 5725-5850 U-NII-3 band transmissions are possible
- Operating restrictions
- 5.725 to 5.850 GHz band
- Performance could deteriorate due to interference as the frequency band becomes congested.

Antenna Recommendations:

- Frequency – 5.8 GHz
- Size and Type, see Table 28: 5.8 GHz unlicensed antenna options
- Gain and 3 dB Beamwidth, see Table 28: 5.8 GHz unlicensed antenna options.
- The required antenna impedance is 50 ohms.

Antennas not included in Table 28: 5.8 GHz unlicensed antenna options are strictly prohibited for use with these devices.

This radio transmitter 6933B-9558HC has been approved by ISED to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

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Le présent émetteur radio 6933B-9558HC a été approuvé par ISED pour fonctionner avec les types d'antenne énumérés ci□dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Table 28 5.8 GHz unlicensed antenna options

MPT-HL/HLC	9558HC
1 ft flat panel – 23 dBi/9°	1 ft flat panel – 23 dBi/9°
2 ft flat panel – 28 dBi/3.5°	2 ft flat panel – 28 dBi/3.5°
2 ft parabolic – 29 dBi/6°	2 ft parabolic – 29 dBi/6°
4 ft parabolic – 35 dBi/3°	-
6 ft parabolic – 38 dBi/2°	-
8 ft parabolic – 41 dBi/1.5°	-
10 ft parabolic – 42.5 dBi/1.2°	-

These antennas can only be used in a fixed point-to-point configuration.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

DANGER!
The antennas used for this transmitter must be installed to provide a separation distance of at least 12 meters from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

DANGER!
Les antennes utilisées pour cet émetteur doivent être installées de manière à offrir une distance de séparation d'au moins 12 mètres entre toutes les personnes et ne doivent pas être situées ou fonctionner conjointement avec une autre antenne ou un autre émetteur.

DANGER!
Danger of public exposure to long term RF radiated energy. When using a 1 ft flat panel antenna with a 1 watt (+30 dBm) output power, the antenna must be located in an area that does not allow the general population access to within 12 meters (5.8 Ghz) of the antenna.

Frequency Plan:

- For MPT-HL frequency plan for the 5.725 and 5.850 GHz unlicensed band, see Figure 64: Frequency plan MPT-HL: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210) .
- For MPT-HLC frequency plan for the 5.725 and 5.850 GHz unlicensed band, see Figure 65: Frequency plan 9558HLC: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210) .

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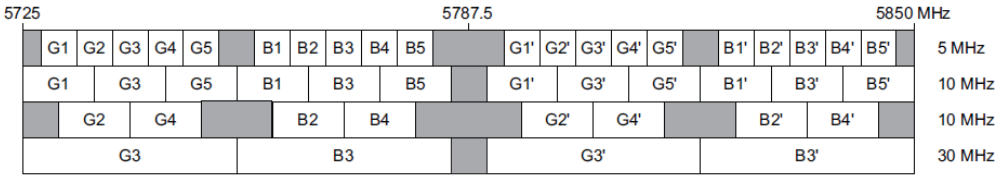
- For 9558HC frequency plan for the 5.725 and 5.850 GHz unlicensed band, see Figure 66: Frequency plan 9558HC: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210) .

Output Power: A requirement of operating in the unlicensed band is to limit transmit output power to not more than +30.0 dBm at the antenna port. It is the responsibility of the user to transmit not more than +30.0 dBm.

Note: To meet FCC part 15 requirements, output power for 9558HC 30 MHz 4QAM and 8QAM channels must not be provisioned greater than 24 dBm. This is not enforced by the user interface and is the responsibility of the operator to guarantee provisioning of the radio transmit power. For transmit power specification, refer to the Wavence MPT-HL Engineering Specifications.

Figure 64 Frequency plan MPT-HL: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210)



Transmit Channel	Frequency (MHz)	Receive Channel	Frequency (MHz)
G1	5730	G1"	5795
G2	5735	G2"	5800
G3	5740	G3"	5805
G4	5745	G4"	5810
G5	5750	G5"	5815
B1	5760	B1"	5825
B2	5765	B2"	5830
B3	5770	B3"	5835
B4	5775	B4"	5840
B5	5780	B5"	5845

1. The drawing above shows the 5 MHz channels used by the JF6-9558H/5933B-9558MPT radio. Gray channels are designated "G". Blue channels are designated "B". Transmit and receive channels have a 65 MHz separation.
2. RF filters are centered on channels G3, B3, G3", and B3".
3. The flexibility of the JF6-9558H/6933B-9500MPT allows any radio to grow to 183 Mb/s without a hardware upgrade.

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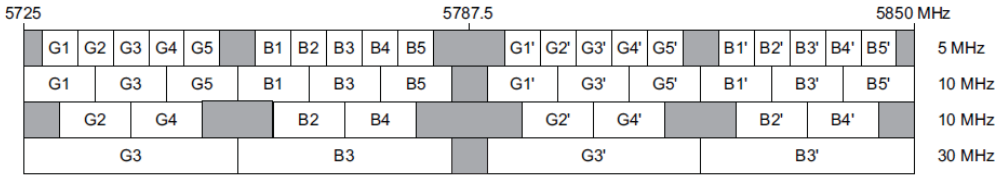
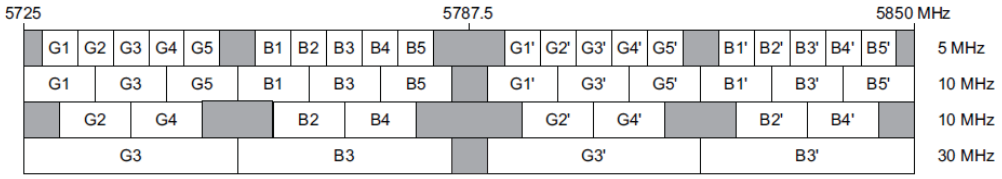
Figure 65 Frequency plan 9558HLC: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210)



Transmit Channel	Frequency (MHz)	Receive Channel	Frequency (MHz)
G1	5731	G1"	5794
G2	5736	G2"	5799
G3	5741	G3"	5804
G4	5746	G4"	5809
G5	5751	G5"	55814
B1	5761	B1"	5824
B2	5766	B2"	5829
B3	5771	B3"	5834
B4	5776	B4"	5839
B5	5781	B5"	5844

1. The drawing above shows the 5 MHz channels used by the F6-9558L-D/6933B-9558L-D radio. Gray channels are designated "G". Blue channels are designated "B". Transmit and receive channels have a 63 MHz separation.
2. RF filters are centered on channels G3, B3, G3", and B3".
3. The flexibility of the F6-9558L-D/6933B-9558L-D allows any radio to grow to 183 Mb/s without a hardware upgrade.

Figure 66 Frequency plan 9558HC: 5.725 to 5.850 GHz unlicensed band (FCC Part 15 and ISED RSS-210)



Transmit Channel	Frequency (MHz)	Receive Channel	Frequency (MHz)
G1	5730.5	G1"	5794.5
G2	5735.5	G2"	5799.5
G3	5740.5	G3"	5804.5
G4	5745.5	G4"	5809.5
G5	5750.5	G5"	5814.5
B1	5760.5	B1"	5824.5
B2	5765.5	B2"	5829.5

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B3	5770.5	B3"	5834.5
B4	5775.5	B4"	5839.5
B5	5780.5	B5"	5844.5

1. The drawing above shows the 5 MHz channels used by the JF6-9558HC/6933B-9558HC radio. Gray channels are designated "G". Blue channels are designated "B". Transmit and receive channels have a 64 MHz separation.
2. RF filters are centered on channels G3, B3, G3", and B3".
3. The flexibility of the JF6-9558HC/6933B-9558HC allows any radio to grow to 185 Mb/s without a hardware upgrade.

2.5.2.29 Radio configurations with MPR-e

The following radio configurations are available with MPR-e:

- 1+0 full outdoor with MPT ODU
- 1+0 repeater (with MPT-HC/XP/HC-HQAM/XP-HQAM only)
- co-channel XPIC full outdoor (with MPT-HC/XP/HC-HQAM/XP-HQAM) used to establish a 2 x (1+0) radio link.

2.5.2.30 Radio configurations with MSS-1c

The following radio configurations are available with MSS-1c:

- 1+0 in split-mount
- 2x(1+0) repeater

1+0 in split-mount configuration for MSS-1c

A 1+0 configuration is setup with one MSS-1c and one MPT. See Figure 67: 1+0 in split-mount configuration .

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Indication of the intended use of the equipment: Point to Point PDH/Ethernet Transport radio Link

1.3.3 Safety rules

General rules

Before you perform any installation, turn-on, tests or operation and maintenance operations, carefully read the related sections of this manual, specifically:

- Hardware Installation
- Commissioning
- Maintenance and Upgrade

Observe safety rules

When equipment is operating, do not access the inside of the equipment parts which are protected with Cover Plate Shields removable with tools.

If access is required to the equipment parts when it is operating, only service personnel, where service personnel or technical assistance is meant:

- "personnel which has adequate technical knowledge and experience necessary to be aware of the danger that may occur when performing an operation and of the necessary measurements to reduce the danger to a minimum for themselves and for others".
- The service personnel can only replace the faulty units with spare parts.
- The service personnel is not allowed to repair, and therefore, the access to the parts that are not specified is not permitted.
- The keys and/or the tools used to open doors, hinged covers to remove parts which provide access to compartments in which are present high dangerous voltages must belong exclusively to the service personnel.

For the cleaning of the external parts of the equipment, do not use any inflammable substance or substances which in some way may alter the markings, inscriptions, or other labels.

It is recommended to use a slightly wet cleaning cloth.

The Safety Rules stated in the handbook describe the operations and/or precautions to observe to safeguard service personnel during the working phases and to guarantee equipment safety; for example, do not expose persons, animals, things to the risk of being injured/damaged.

When the safety protection features have been impaired, *REMOVE POWER*.

To cut off power, switch off the power supply units and cut off the power station upstream (rack or station distribution frame).

The safety rules described in this handbook are distinguished by the following symbol and statement: Labels indicating Danger, Forbidding, Command

1.3.4 Labels indicating Danger, Forbidding, Command

Follow the instructions printed on the labels affixed to the units and assemblies.

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- Dangerous electrical voltages
- Risks of explosions
- Moving mechanical parts
- Equipment connection to earth
- Heat-radiating mechanical parts
- Microwave radiations (EMF norms)
- Harmful optical signals

Pay attention to the information stated in the following, and proceed as instructed.

The symbols presented in following paragraphs are all the possible symbols that could be present on Nokia equipment, but are not all necessarily present on the equipment this handbook refers to.

Dangerous electrical voltages

Labeling:

The warning label in Figure 3: Dangerous voltage is affixed next to dangerous voltages (>42.4 Vp; >60 Vdc).

Figure 3 Dangerous voltage

If it is a Class 1 equipment connected to mains, then the label in Figure 4: Ground protection warning states that the equipment must be grounded before you connect it to the power supply voltage; for example:

Figure 4 Ground protection warning

Safety instructions:

DANGER!
DAMAGE

Carefully observe the specific procedures for installation / turn-up and commissioning / maintenance of equipment parts where D.C. power is present, described in the relevant installation / turn-up and commissioning / maintenance documents and the following general rules:

- Personal injury can be caused by -48VDC. Avoid touching powered terminals with any exposed part of your body.

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- Short circuiting, low-voltage, low-impedance, DC circuits can cause severe arcing that can result in burns and/or eye damage. Remove rings, watches, and other metal jewelry before working with primary circuits. Exercise caution to avoid shorting power input terminals.

Risks of explosions

Labeling:

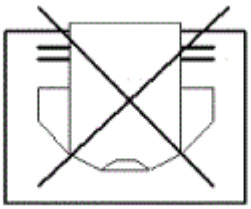
This risk is present when batteries are used, and it is signaled by the label in Figure 5: Risk of explosion:

Figure 5 Risk of explosion

Safety instructions:

Therefore, slits or apertures are made to let air circulate freely and allow dangerous gasses to down flow (battery-emitted hydrogen). A 417-IEC-5641 Norm. compliant label, as shown in Figure 6: Openings must not be covered , is affixed next to it indicating that the openings must not be covered up.

Figure 6 Openings must not be covered



Moving mechanical parts

Labeling:

The warning label in Figure 7: Moving mechanical parts is affixed next to fans or other moving mechanical parts:

Figure 7 Moving mechanical parts

Safety instructions:

Before carrying out any maintenance operation see that all the moving mechanical parts have been stopped.

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Equipment connection to earth

Labeling:

Terminals for equipment connection to earth, to be done according to international safety standards, are pointed out by the symbol in Figure 8: Equipment connection to earth .

Figure 8 Equipment connection to earth

Safety instructions:

The position of earth connection terminals is specified in the Hardware Installation section.

Heat-radiating mechanical parts

Labeling:

The presence of heat-radiating mechanical parts is indicated by the warning label in Figure 9: Heat-radiating mechanical parts in compliance with IEC 417 Norm, Fig.5041:

Figure 9 Heat-radiating mechanical parts

Safety instructions:

Carefully observe the specific procedures for installation / turn-up and commissioning / maintenance of equipment parts where heat-radiating mechanical parts are present, described in the relevant installation / turn-up and commissioning / maintenance documents and the following general rule:

Personal injury can be caused by heat. Avoid touching powered terminals with any exposed part of your body.

Microwave radiations (EMF norms)

Equipment emitting RF power (Reminder from site preparation procedure):

The site must be compliant with ICNIRP guidelines or local regulation if more restrictive.

Safety instructions:

The following rules should be strictly applied by the customer:

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- Non authorized persons should not enter the compliance boundaries, if any, for the general public.
- Compliance RF boundaries, if any, related to Electro Magnetic Field exposure must be marked.
- Workers should be allowed to switch-off the power if they have to operate inside compliance boundaries.
- Assure good cable connection.
- Install the antenna as high as possible from floor or area with public access (if possible the cylinder delimiting the compliance boundaries, if any, or the cylinder corresponding to the transmission area directly in front of antenna with the same diameter as the antenna, more than 2 meters high).
- Install the antenna as far as possible from other existing equipment emitting RF power.

Remind persons standing in front of the Wavence antenna may cause traffic shutdown.

Place the warning sticker, as shown in Figure 10: EMF emission warning, as follows:

Figure 10 EMF emission warning

- On the site when applicable (when people can cross the compliance boundaries and/or the transmission area of the antenna; for example, roof top installation): Warning label "Do not stand on the antenna axis"
- On the mast (front side): EMF emission warning sign (yellow and black) to be placed at bottom of antenna, visible by someone moving in front of the antenna (roof top installation)
- On the antenna (rear side): EMF emission warning sign, placed on the antenna

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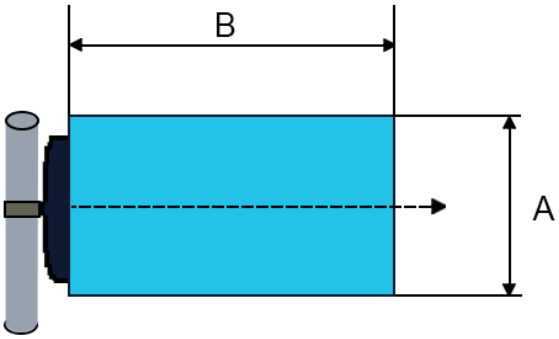
Figure 11 Compliance boundaries for Wavence transceivers with 1ft (30 cm) antenna



System Modulation	Worst Configuration	A(m)	B(m)

1.3.5 Electromagnetic compatibility (EMC norms)

The equipment's EMC norms depend on the type of installation being carried out (such as cable termination or grounding) and on the operating conditions (such as, equipment, setting options of the electrical/electronic units, presence of dummy covers).

Before you perform any installation, turn-on, tests & operation, and maintenance operations, carefully read the related sections of this manual.

The norms set down to guarantee EMC compatibility, are distinguished inside this manual by the symbol and term:

Figure 12 EMC norms

1. EMC general norms - installation
    - All connections (towards the external source of the equipment) made with shielded cables use only cables and connectors suggested in this manual or in the relevant Plant Documentation, or those specified in the Customer's "Installation Norms" (or similar documents)
    - Shielded cables must be suitably terminated
    - Install filters outside the equipment as required
    - Ground connect the equipment utilizing a conductor with correct diameter and impedance
    - Mount shields (if used), previously positioned during the installation phase, but not before having cleaned and degrease it.
    - Before you insert the shielded unit proceed to clean and degrease all peripheral surfaces (such as contact springs and connection points).
    - Screw fasten the units to the subrack.

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- To correctly install EMC compatible equipment follow the instructions given.

2. EMC general norms - turn-on, tests & operation
   - Preset the electrical units as required to guarantee EMC compatibility
   - Check that the equipment is operating with all the shields correctly positioned (such as dummy covers and ESD connector protections).
   - To correctly use EMC compatible equipment, follow the provided information.
3. EMC general norms - maintenance
   - Before you insert the shielded unit, which replaces the faulty or modified unit, clean and degrease all peripheral surfaces (such as contact springs and connection points).
   - Clean the dummy covers of the spare units.
   - Screw fasten the units to the subrack.

Cables:

WARNING!
Wavence equipment must be connected to surge suppressors that meet the power surge requirements of GR-1089-CORE. Non-compliant surge suppressors may not have the required secondary surge protection or current limiting function during specific, valid operating states. Connecting Wavence equipment to non-compliant surge suppressors could result in damage to Wavence equipment.

The following safety requirements apply to the cable connections for intra-building ports:

- To comply with the GR-1089-CORE requirements for electromagnetic compatibility and safety, all intra-building ports are specified for use with shielded and grounded at both ends.
- The intra-building ports of the equipment or sub-assembly are suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building ports of the equipment or sub-assembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

1.3.6 Equipment protection against electrostatic discharges

Before you remove the ESD protections from the monitors, connectors, or other equipment, observe the stated precautionary measures. Ensure that the ESD protections have been replaced and after terminating the maintenance and monitoring operations.

Most electronic devices are sensitive to electrostatic discharges, therefore, the warning labels in Figure 13: Electrostatic sensitive have been affixed.

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Figure 13 Electrostatic sensitive

Observe the stated precautionary measures when touching the electronic parts during the installation/maintenance phases.

Workers are supplied with anti-static protection devices consisting of an elasticized band worn around the wrist and a coiled cord connected to the elasticized band and to the stud on the subrack. See Figure 15: Electrostatic protection kit .

1.3.7 Cautions to avoid equipment damage

Electrostatic-sensitivity

WARNING!
Common plastic, white foam, cellophane, and masking adhesive tapes must not come in contact with ESDs or their packaging.

An Electrostatic-Sensitive Device (ESD) can withstand voltage spikes of only 10 to 100 V and can be damaged or effectively destroyed by a discharge that might go unnoticed by a technician. Some devices have built-in protection. However, because this protection is effective only against the lower levels of electrostatic charges, a false sense of security often prevails.

Common plastics (synthetic insulating materials), clothing, and paper or cardboard are the most common sources of static charges.

Observe special precautions when the ESD sign is displayed. See Figure 14: Electrostatic-sensitive sign .

Figure 14 Electrostatic-sensitive sign

The following items are examples of ESDs:

- MOS (Metal Oxide Semiconductor) capacitors, transistors, Integrated Circuits (ICs)
- CMOS (Complementary Metal Oxide Semiconductor) transistors, ICs
- JFET (Junction Field Effect Transistors)
- IGFET (Insulated Gate Field Effect Transistors)

Handling cards

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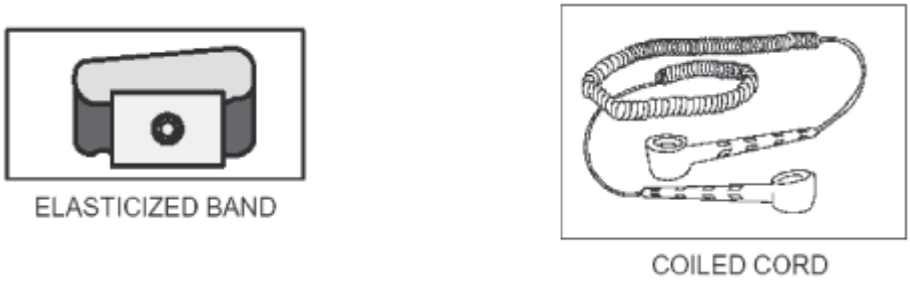
Although the risk of damage to an ESD is reduced considerably after it is assembled into a circuit designed to protect sensitive components, take the following precautions to reduce static charges to harmless levels:

- Handle all cards as ESDs unless they are known not to contain electrostatic-sensitive parts.
- Wear wrist ground strap, connected to grounded coiled cord before and while touching or handling cards containing ESS devices. See Figure 15: Electrostatic protection kit for an illustration of the wrist strap with cord. The wrist strap (PN 1AD 01247 0001) is an elasticized band connected to the coiled cord connected to the rack frame ground.
- Store (even temporarily), pack, and ship cards in antistatic bags or containers.
- Do not handle printed circuit board or components unnecessarily. Use plastic handle.
- Do not use synthetic bristled brushes or acid brushes to clean cards.
- Handle failed cards with same precautions as good cards.

ESD components are protected when correctly packaged in conductive or antistatic packaging. Acceptable packaging is marked as either conductive or antistatic.

Figure 15 Electrostatic protection kit



Screw fixing

In normal operation conditions, all screws (such as for unit box closing and cable fixing) must be always tightened to avoid item detachment and to ensure the equipment EMI-EMC performance.

- The screw tightening torque must be:
  - 2.8 kg x cm (0.28 Newton x m) ±10%
  - 2.4317 in lb. (0.2026 ft lb.) ±10%
- Exceeding this value may result in screw breaking.

MSS-ODU cable disconnection / connection

To avoid equipment damage, always unplug the card first before you disconnect the MSS-ODU cable (at MSS or ODU side).

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1.3.8 Fan, equipment rack, and equipment cabinet precautions

DANGER!
DAMAGE

- Keep your fingers away from the rotating fan blades. Pull the fan-tray card by the thumbscrews only and wait for the fan blades to stop spinning before you attempt to remove the FAN card completely from the MSS-4/8 shelf.
- The Wavence may require two people to support, align, and attach it to an equipment rack. To prevent equipment damage or personal injury, make sure you have enough help.
- To prevent personal injury and equipment damage due to unbalanced loading of the equipment rack or cabinet, make sure the equipment rack or cabinet is correctly secured to the floor, ceiling, or other rigid structure before mounting the Wavence in it. For approved methods of securing the equipment rack, read the equipment-rack installation instructions or contact the equipment-rack manufacturer.

1.3.9 Electrical precautions

Take appropriate safety precautions when you perform procedures on electrical equipment. Hazardous electrical potentials are present when system power is on.

Some procedures in this manual require working with small conductive objects, such as screwdrivers, fuses, washers, screws, and nuts. When working on a shelf at the top of an equipment rack, a dropped object that falls into a lower shelf can cause physical damage and electrical short circuits. To prevent this, place a piece of paper or other cover over the lower shelf to catch fallen objects. Remove the paper or other cover when work is complete.

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Note:
!
DAMAGE
Remain aware of the following:

- Install the Wavence in a restricted-access area only. Entrance to a restricted-access area is intended for qualified or trained personnel and access to it is controlled by a locked barrier.
- The MSS-1/-4/-8 shelves does not contain main overcurrent protection devices. The user must provide circuit breakers or fuses and disconnects between the power source and the Wavence. Each power feed from a source (-48 VDC and Return) requires a DC-rated fast-trip circuit breaker or fuse and disconnect. Circuit breakers or fuses must meet applicable local and national electrical safety codes and be approved for the intended application. Circuit breaker or fuse size is dependent upon site configuration. Refer to site engineering documentation for the correct Circuit breaker or fuse size.
- The MPT-HL shelf does not contain main overcurrent protection devices. The user must provide circuit breakers or fuses and disconnects between the power source and the Wavence. Each power feed from a source (+ 24VDC or-48VDC and Return) requires a DC-rated fast-trip circuit breaker or fuse and disconnect. Circuit breakers or fuses must meet applicable local and national electrical safety codes and be approved for the intended application. Circuit breaker or fuse size is dependent upon site configuration. See the site engineering documentation for the correct Circuit breaker or fuse size.
- Make sure you connect the node to a + 24VDC or - 48VDC source that is electrically isolated from the AC source and is reliably connected to earth ground.
- For personal safety, make sure you connect and secure the installation site"s frame-ground (earth ground) wire to the frame-ground terminal on the Wavence before you connect any other wires to the node.
- A DC-power source provides high energy, which can cause serious injury or equipment damage. Only Nokia qualified personnel should connect the DC power to the Wavence. To prevent serious injury or equipment damage, make sure the power source cables are de-energized before you handle or connect them to the node.

1.3.10 Harmful optical signals

Laser precautions

The label in Figure 16: Class 1 laser is applied when the equipment contains Class 1 laser components according to IEC 60825-1 (par. 5).

Figure 16 Class 1 laser

The laser source is placed in the optional SFP plug-in, which is installed in multiple boards and radio units. The laser source is placed in the left side of the SFP plug-in.

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Verify that laser labels on equipment state that the system conforms to all applicable standards of 21 CFR 1040.10. If there are no danger labels, call the Nokia Technical Support Center (TSC).

The invisible infrared radiation emitted by the fiber-optic transmitter can cause eye damage. Observe local office procedures and the following dangers:

⚠ **DANGER!**
DAMAGE

- The use of controls and/or adjustments, or the performance of procedures other than those specified herein may result in hazardous infrared radiation exposure.
- Laser infrared radiation is not in the visible spectrum; therefore, it is not visible to the naked eye or with laser safety glasses. Although it cannot be seen, laser radiation may be present.
- Never look directly into an unterminated fiber-optic connector unless it is absolutely known that no optical power is being emitted by the connector.
- Never look into a broken optical fiber cable unless it is absolutely known that no laser radiation is present.
- Never look at an optical fiber splice, cable, or connector unless it is absolutely known that no laser radiation is present in the fiber. Laser radiation can come from a fiber-optic transmitter, an Optical Time Domain Reflectometer (OTDR), or other optical test equipment.
- Never look directly into an unterminated optical connector or cable with a magnifier/microscope unless it is absolutely known that no laser radiation is being emitted from the connector or cable. A magnifier or microscope greatly increases the laser radiation hazard to the eyes.
- This system normally operates as a Class I Laser Product (no hazard). However, during servicing operations, when optical connectors are being connected, disconnected, or handled without dust covers, it is possible to be exposed to Class IIIb laser radiation, which can cause eye damage.
- Everyone within a 10 ft (3 m) radius of an unterminated optical fiber or connector that is connected to a powered transmitter must wear laser safety goggles or eye shields.

Laser safety goggles or eye shields are not required if the following work rules are strictly followed:

1. Always remove electrical power from fiber-optic transmitters before disconnecting fiber-optic connectors in the path between the transmitter and the receiver.
2. Never connect an unterminated optical cable to a fiber-optic transmitter. Always connect fiber-optic cables to fiber-optic receivers, test sets, or some other termination first.

1.4 ETSI Standard EN302217 compliancy

Wavence equipment is in line with EN 302 217-2.

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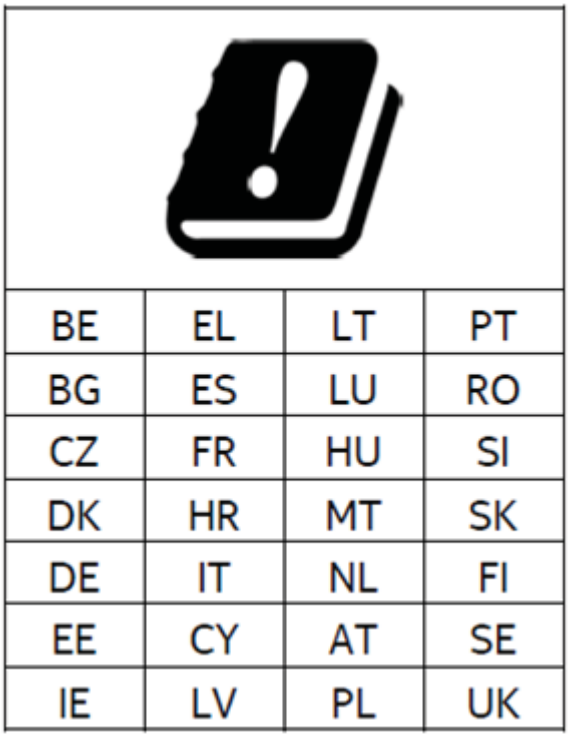
Table 4 Restrictions or Requirements in :

BE	EL	LT	PT
BG	ES	LU	RO
CZ	FR	HU	SI
DK	HR	MT	SK
DE	IT	NL	FI
EE	CY	AT	SE

Figure 17 Restrictions or Requirements in :



Note: Above, example of label on packaging for Radio Units.

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