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RE: Certification Application
FCC ID: PV7-WIBEAR11N-DF1 and PV7-WIBEAR11N-DF2

Software security and software configuration description

To whom it may concern:

Software Security Description

This document demonstrates how the module with above declared FCC ID fulfils the requirements of 594280 D01 Software Configuration Control v02r01 and 594280 D02 U-NII Device Security v01r03.

In this document the following definitions is used to describe the different level of parties. There are three different levels of parties.

1. **Host-Product manufacturer** is the party responsible for integrating the module into the host-product and is under direct control of u-blox AG by a contractual agreement and as such not to be considered as third party.
   The contractual agreement ensures that modules installed into the host-product can be operated only within their authorization.
2. **Installer** or professional installer is the party responsible for putting the end-product into operation. The end-product can either be the host-product or a product containing the host-product
3. **End-user** is the party using the end-product.

General description

1. ***Q: Describe how any software/firmware updates for elements than can affect the device's RF parameters will be obtained, downloaded, validated and installed.***
   For software that is accessed through manufacturer's website or device's management system, describe the different levels of security as appropriate.

   A: The device's RF parameters can be affected by the following elements:

   1) The firmware running on the radio transceiver chip on the device.
      The firmware image is distributed in binary form only by the radio transceiver manufacturer, MARVELL Semiconductors, and is part of the device driver software package that is made available by u-blox via password-protected FTP server to its customers that have signed a software license agreement and the before mentioned contractual agreement. The host product manufacturer is permitted by this agreement to operate the device with authorized firmware images only.
   2) The radio calibration data obtained during manufacturing and stored in the device's OTP memory.
      The calibration data is permanently stored in the device's OTP memory. The OTP memory contents cannot be overwritten by the software/firmware for normal operation of the device.
   3) The device driver and in particular the configuration file(s) that define the maximum output power, modulation types and allowed operating modes per channel.
      u-blox provides the host product manufacturers with the configuration files that match the authorized modes of operation. The contractual agreement with all host product manufacturers regulates that the device may not be operated outside its authorization, i.e. the configuration may not be changed to include unauthorized modes of operation and must be protected from being modified by third-parties to unauthorized modes of operation.

2. ***Q: Describe the RF parameters that are modified by any software/firmware without any hardware changes. Are these parameters in some way limited such that any other software/firmware changes will not allow the device to exceed the authorized RF characteristics?***
   A: The software interface between the firmware running on the module and the device driver running on the host processor is defined by MARVELL. Via this software interface, the host configures the operation of the module.
   The following parameters can be set by the host

   - RF output power
   - Tx/Rx-Channel
   - Modulation scheme (bit rate)
   - Mode selection Client/Master

   u-blox provides the host product manufacturers with default configuration files with maximum RF output power, modulation scheme, and operating mode per Tx/Rx channel that match the device's authorized modes of operation. The contractual agreement between u-blox AG and the host product manufacturer regulates that the device may not be operated outside its authorization, i.e. the configuration may not be changed by the host product manufacturer to include unauthorized modes of operation and must be protected from being modified by third-parties to unauthorized modes of operation.

3. ***Q: Describe in detail the authentication protocols that are in place to ensure that the source of the RF-related software/firmware is valid. Describe in detail how the RF-related software is protected against modification?***
   A: At module power-up the RF-related firmware necessary for the module to operate is downloaded from the host to the module. This firmware is provided by MARVELL, the manufacturer of the radio transceiver on the device. The firmware from MARVELL is available as a binary image only. The sources for this software are not disclosed by MARVELL to anyone. Modifications of the firmware require in-depth knowledge of the transceiver chip operation, it is therefore not possible to easily manipulate this firmware by third parties.

   In addition, the contractual agreement between u-blox AG and the host product manufacturer regulates that the device may not be configured to be operated outside its authorization, in particular using other firmware than authorized by the grantee, and must be protected from modifications by third parties to unauthorized modes of operation.

4. ***Q: Describe in detail any encryption methods used to support the use of legitimate RF-related software/firmware?***
   A: As described in the answer to the previous question (3.) it is not possible to easily manipulate this firmware by third parties since the firmware from MARVELL is available as a binary image only and the sources for this software are not disclosed by MARVELL to anyone.

   As pointed out in answer (1.), the RF calibration data is not part of the firmware, but stored permanently in OTP memory on the device. It is therefore not possible to modify the RF parameters by manipulating the firmware.

5. ***Q: For a device that can be configured as a master and client (with active or passive scanning), explain how the device ensures compliance for each mode? In particular if the device acts as master in some band of operation and client in another; how is compliance ensured in each band of operation?***
   A: The module is certified to operate as both client and master on channels 1 - 11 (2412 - 2462 MHz), 36 - 48 (5180 - 5240 MHz), 52 - 64 (5260 - 5320 MHz), 100 - 116 (5500 - 5580 MHz), 132 - 140 (5660 - 5700 MHz) and channels 149 - 165 (5745 - 5825 MHz). The module is certified as both master and slave on all bands of operation thus compliance is ensured.

Third party access control

1. ***Q: Explain if any third parties have the capability to operate a U.S.-sold device on any other regulatory domain, frequencies, or in any manner that may allow the device to operate in violation of the device's authorization if activated in the U.S?***
   A: Third parties do not have the capability to operate the U.S.-sold devices in a manner which would violate the FCC authorization.

   A contractual agreement between u-blox AG and the host product manufacturer regulates that modules installed into the host product will operate only within its authorization.
   The agreement specifies that the host manufacturer must not offer any interface to the end-user or installer of this end product that could make the device operate in violation of the device authorization.

2. ***Q: Describe, if the device permits third-party software or firmware installation, what mechanisms are provided by the manufacturer to permit integration of such functions while ensuring that the RF parameters of the device cannot be operated outside its authorization for operation in the U.S. In the description include what controls and/or agreements are in place with providers of third -party functionality to ensure the devices' underlying RF parameters are unchanged and how the manufacturer verifies the functionality?***
   A: The device does not permit third-party software or firmware installations which would violate the FCC authorization.

   In our answer to question (1.) under General description we listed the software elements that influence the RF parameters of the device.
   The host product manufacturer is permitted by the contractual agreement with u-blox AG to operate the device with authorized firmware images only.
   The agreement further regulates that the host product manufacturer may not provide an interface to third parties to upload any firmware image into the device or give the possibility to change all or parts of the device driver software running on the host product.

3. ***Q: For Certified Transmitter modular devices, describe how the module grantee ensures that host manufacturers fully comply with these software security requirements for U-NII devices. If the module is controlled through driver software loaded in the host, describe how the drivers are controlled and managed such that the modular transmitter RF parameters are not modified outside the grant of authorization?***
   A: We refer to our answer in the General description (1.). The device is controlled through device driver software running on the host product and in particular by configuration file(s) that define the maximum output power, modulation types and allowed operating modes per channel. The device driver software package is made available by u-blox via password-protected FTP server to its customers that have signed a software license agreement. u-blox provides the host product manufacturers with configuration files that match the authorized modes of operation.

   The contractual agreement between u-blox AG and the host product manufacturer regulates that the device may not be operated outside its authorization, i.e. the configuration may not be changed to include unauthorized modes of operation and must be protected from being modified by third-parties to unauthorized modes of operation.

User Configuration Guide

1. ***Q: Describe the user configurations permitted through the UI. If different levels of access are permitted for professional installers, system integrators or end-users, describe the differences***
   A: A contractual agreement between u-blox AG and the host product manufacturer regulates that modules installed into the host-product only will operate within its authorization.
   The agreement specifies that the host product must not offer any interface to the end-user or

professional installer that allows the end product to operate outside its authorization.

a. ***Q: What parameters are viewable and configurable by different parties?***
   A: There are three levels of parties.
   i. The Host Product manufacturer can view and configure the RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).

   ii. The installer or professional installer may view the following parameters:
   RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).
   The installer or professional installer may within the limitations of the authorization configure the following parameters:
   RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).

   iii. The end-user may be able to view the following parameters:
   RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).
   Within the limitations of the authorization the end-user may configure the following parameters:
   RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).

b. ***Q: What parameters are accessible or modifiable to the professional installer or system integrators?***
   A: Within the limitations of the authorization the professional installer or system integrator can configure the following parameters:
   RF output power, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).

   i. ***Q: Are the parameters in some way limited, so that the installers will not enter parameters that exceed those authorized?***
   A: Yes, the parameters are limited and the installer does not have access to configure the parameters in such a way that would violate the FCC authorization.
   The contractual agreement between u-blox AG and the host product manufacturer prohibits the possibility for the installer to enter parameters that exceed those authorized into the end product.
   ii. ***Q: What controls exist that the user cannot operate the device outside its authorization in the U.S.?***
   A: The user does not have access to configure the parameters in such a way that would violate the FCC authorization.
   The contractual agreement between u-blox AG and the host product manufacturer prohibits the possibility for the end-user to enter parameters that exceed those authorized into the end product.

c. ***Q: What parameters are accessible or modifiable by the end-user?***
   A: Within the limitations of the authorization the end-user may configure the following parameters:
   Reduce RF output power from its default value, channel selection, modulation scheme (bit rate), and mode of operation (Client/Master).

   i. ***Q: Are the parameters in some way limited, so that the user or installers will not enter parameters that exceed those authorized?***
   A: Yes, the parameters are limited and the user or installer does not have access to configure the parameters in such a way that would violate the FCC authorization.
   The contractual agreement between u-blox AG and the host product manufacturer

prohibits the possibility for the end-user to enter parameters that exceed those authorized into the end product.

ii. ***Q: What controls exist that the user cannot operate the device outside its authorization in the U.S.?***
A: The user does not have access to configure the parameters in such a way that would violate the FCC authorization.
The contractual agreement between u-blox AG and the host product manufacturer prohibits the possibility for the end-user to enter parameters that exceed those authorized into the end product.

d. ***Q: Is the country code factory set? Can it be changed in the UI?***
A: The country code is factory set to US. The contractual agreement between u-blox AG and the host product manufacturer prohibits the possibility for the installer or end-user to enter parameters that exceed those authorized into the end product. This includes any change of the country code via a UI.

i. ***Q: If it can be changed, what controls exist to ensure that the device can only operate within its authorization in the U.S.?***
A: A contractual agreement between u-blox AG and the host product manufacturer regulates that modules installed into the host-product will operate only within its authorization and country code settings are not accessible through the UI.
The agreement specifies that the host manufacturer must not offer any interface to the end-user or installer of this end product that could make the device operate in violation of the device authorization, including the country code setting.

e. ***Q: What are the default parameters when the device is restarted?***
A: The default parameter is determined by the host product manufacturer. The contractual agreement between u-blox AG and the host product manufacturer regulates that modules installed into the host product will be operated only within its authorization at any time including restart.

2. ***Q: Can the radio be configured in bridge or mesh mode?***
If yes, an attestation may be required. Further information is available in KDB Publication 905462 D02.
A: No the device cannot be configured in bridge or mesh mode.

3. ***Q: For a device that can be configured as a master and client (with active or passive scanning), if this is user configurable, describe what controls exist, within the UI, to ensure compliance for each mode. If the device acts as a master in some bands and client in others, how is this configured to ensure compliance?***
A: The module is certified to operate as both client and master on all channels.
A contractual agreement between u-blox AG and the host product manufacturer regulates that modules installed into the host-product will operate only within its authorization. The agreement covers specifically that it may not be possible to configure the module to non-authorized operation via a UI.

4. ***Q: For a device that can be configured as different types of access points, such as point-to-point or point-to-multipoint, and use different types of antennas, describe what controls exist to ensure compliance with applicable limits and the proper antenna is used for each mode of operation? (See Section 15.407(a))***
A: The directional gain of the antennas listed in the grant of this module does not exceed 6dBi and are therefore not limited to specific use such as point to point or point to multipoint.