CW1314_BEL_WiFi Module

Version V1.0
DATE: 2023.12.07

Disclaimer and Notice

Version History

Version	Date	Author	Description
V1.0	2023/12/07	Howell	First draft

持续-开放-包容-绿色

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1. Product overview

The CW1314_BEL_WiFi module is a complete BLE5.2+ WiFi network solution that can operate independently or as a slave to other host MCUs. The module can be booted directly from the built-in Flash when equipped with external applications and acting as the only application processor in the device; it also contains a low-power ARM- CM4 MCU, 1T1R WLAN, up to 160MHz, built-in 288K SRAM, 2Mbyte flash and rich peripheral resources.

The CW1314_BEL_WiFi module supports the IEEE 802.11 b/g/n protocol standard, BLE5.2, supports lightweight TCP/IP protocol stacks, and supports STA, AP, AP+STA modes. Users can use the module to add networking capabilities to existing devices or build stand-alone network controllers.

Provide customers with complete hardware and software reference programs to shorten your product development cycle and save costs for you.

1.1 Product features

●Supports the 802.11 b/g/n/BLE5.2 standard protocol

●Built-in lightweight TCP/IP protocol stack

●Built-in TR switch, Balun, LNA, PA, and integrated on-board antenna (compatible with external antennas)

●MCU up to 160M clock frequency +288KB SRAM

●Built-in 2Mbit Flash

●Support remote firmware OTA upgrade, can be initiated through mobile APP, AT command to start the upgrade

●Support STA, AP, AP + STA working mode

●Support WEP/TKIP/WPA/WPA2 security protocol

●Supports 802.11e and the WMM/WMM PS protocol

●Support Smart Link intelligent networking function

●Supports HT20

●Supports 6-way hardware PWM

●Supports 6-way ADC

●Maximum +16dBm output power in Wi-Fi 802.11b mode

●Bluetooth maximum output power +6dBm

●The voltage range is 2.4V to 3.6V DC, and it is recommended to operate from a single 3.3V 500mA supply

●On-board antenna, compatible with external antennas

●Size：24m*16m*2.8mm

1.2 Application products

■ Smart home appliances ■Smart sockets、lamp ■ Health products ■WIFI to serial port products

2. Product module interface
2.1Product outline drawing

The physical size of the CW1314_BEL_WiFi module is 24mm*16mm*2.8mm, and the module has a built-in 2.4dBi PCB on-board antenna.

Front
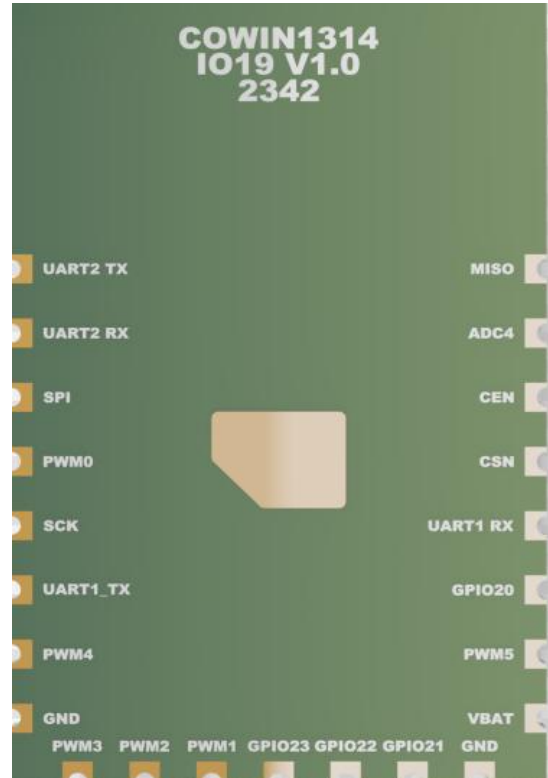
Opposite

Product shape

2.2Product package dimension drawin
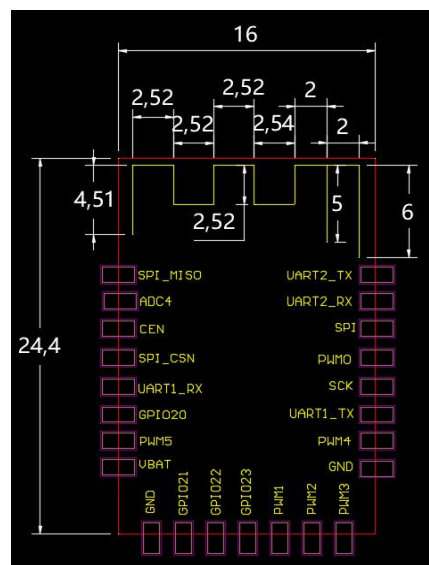
Package dimension

Module model	Long (mm)	Wide (mm)	High (mm)	PADsize (mm)	Pin spacing (mm)	thickness (mm)
CW1314_BEL_WiFi	24	16	2.8±0.2	3.1X1.0	2.0	0.8

2.3 Pin definition

The CW1314_BEL_WiFi module connects a total of 22 interfaces, of which GPIO has 16.
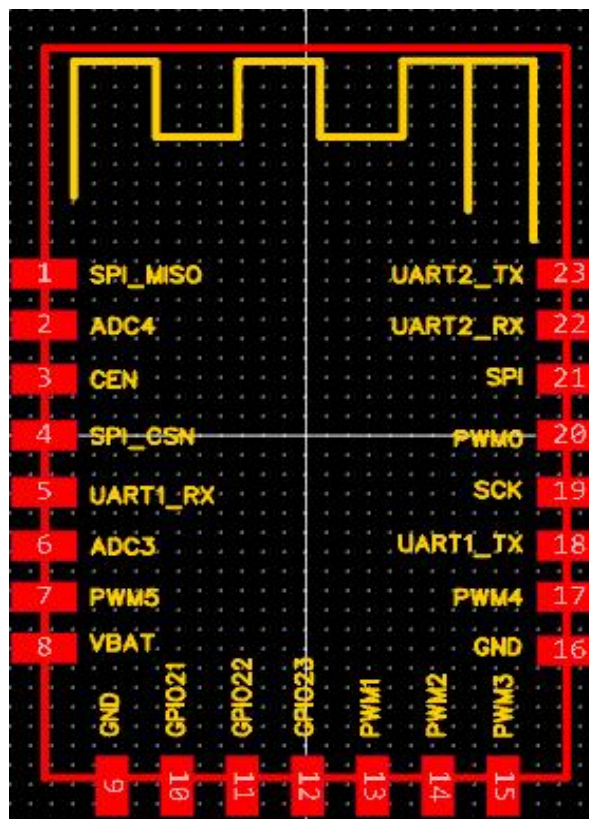
CW1314_BEL_WiFi pin schematic

Table 2.3 Pin function definitions

Number	Pin	Function description
1	MISO	General IO,SPI Burn the mouth.
2	ADC4	General IO, ADC4

3	CEN	General IO
4	CSN	General IO,SPI_CSN,IIC_SCL
5	UART1_RX	General IO,UART1_RXD（Communicate with MCU),ADC6
6	ADC3	General IO,ADC3
7	PWM5	General IO, PWM5,ADC1,IIC_SDA
8	VBAT	Module total power input ，Voltage2.7V~3.6V, Recommend3.3V 500mA
9	GND	-
10	GPIO21	General IO
11	GPIO22	General IO
12	GPIO23	General IO
13	PWM1	General IO,PWM1
14	PWM2	General IO,PWM2
15	PWM3	General IO,PWM3
16	GND	-
17	PWM4	General IO,PWM4,ADC2,IIC_SCL
18	UART1_TX	General IO,UART_TX,DL_TX
19	SCK	General IO,SPI_SCK
20	PWM0	General IO,PWM0
21	SPI	General IO,SPI_MOSI
22	UART2_RX	General IO,UART2_RX
23	UART2_TX	General IO,UART2_TX

3.Hardware design

3.1 Minimal system
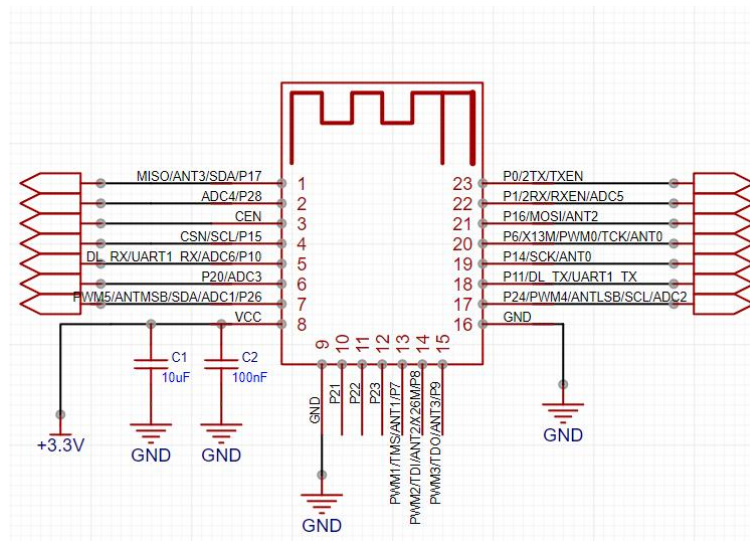
CW1314_BEL_WiFi module minimum system diagram

Explain:

1. The module does not need additional components, only need to supply the module to work normally, the supply voltage is recommended 3.3V, the supply current is greater than 500mA;GPIOMaximum drive current is 8mA；

2. 1-pin RST, low active, there is a 10K pull-up resistor inside the module, which requires external MCU IO control；

3. The module's UART1 is connected to the external MCU's TXD, and the module's TXD isconnected tothe RXD of the external MCU；

4. Module online upgrade, just connect the UART2 port, and then pull the RST down more than 15ms and then release it, or it can be reset by software;

4. Serial 5V-3V level translation reference circuit
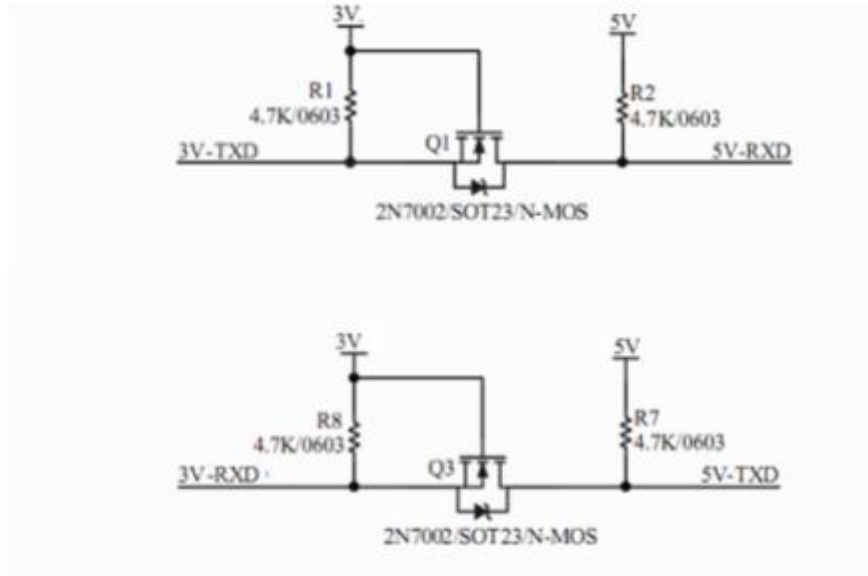
5V-3V level translation reference circuit

5. Antenna clearance area

CW1314_BEL_WiFi needs to be soldered on the PCB board, in order to obtain the best RF performance, as shown in the following figure, the PCB on-board antenna

below, there can be no copper, devices, traces, PCB design needs to be the corresponding area for headroom treatment
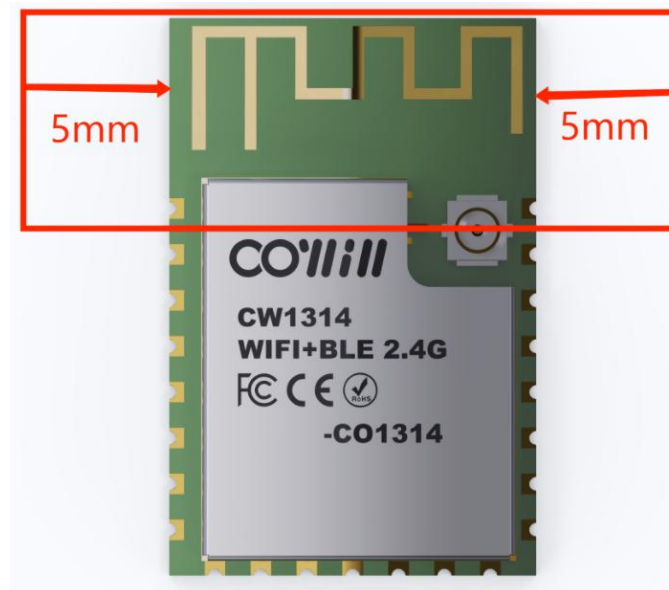
Module antenna headroom area

6. RF parameter

Parameter	MiX	Typical values	Max	Unit
Overall parameters				
Operating frequency	2412		2484	MHz
Enter the impedance		50		Ω
Transmit power				
	CH1	CH7	CH13	
Output power (802.11b@11Mbps)	17.0	16.5	16.4	dBm
Output power (802.11g@54Mbps)	15.0	15.0	15.0	dBm
Output power (802.11n@HT20,MCS7)	14	14	14	dBm
Receive sensitivity				
Sensitivity (802.11b@11Mbps,CCK)	-99.0	-99.0	-98.0	dBm
Sensitivity	-76	-76	-76	dBm

(802.11g@54Mbps,OFDM)				
Sensitivity (802.11n@HT20,MCS7)	-74	-74	-74	dBm
Sensitivity （BLE 1M）	-75	-75	-75	dBm

RF Parameter table

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7. Power consumption

The following power consumption data are measured data under 3.3V supply conditions.

Mode	Min	Type	Max	Unit
Transmit 802.11b, CCK 11Mbps, POUT=16dBm		265		mA
Transmit 802.11g, OFDM 54Mbps, POUT =15dBm		230		mA
Transmit 802.11n, MCS7, POUT =+14dBm		220		mA
Receive 802.11b,CCK,1Mbp		75		mA
Receive 802.11g,OFDM,54Mbp		82		mA
Receive 802.11n,HT20,MCS7		82		mA

Power consumption meter

8. Furnace temperature curve

Maximum temperature：<200℃

Number of times the furnace is passed：≤2
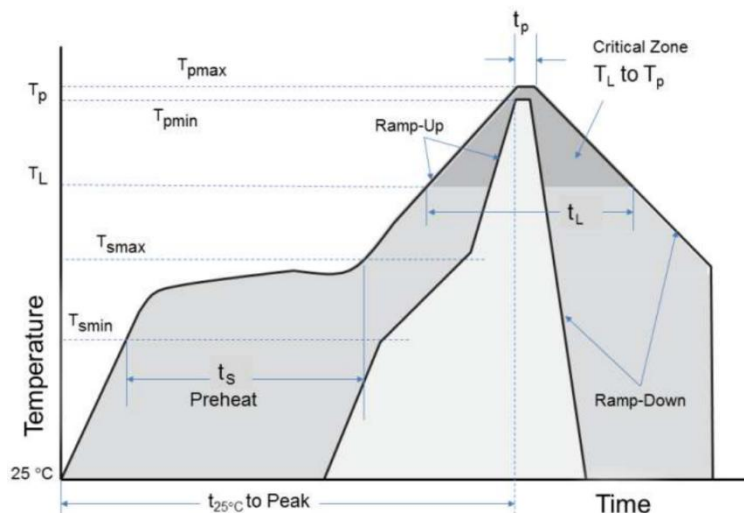
Furnace temperature curve

FCC WARNING

FCC Caution: Any changes or modifications not expressly

approved by the party responsible for compliance could void the user's

authority to operate this equipment.

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) This device may not

cause harmful interference, and (2) this device must accept any interference

received, including interference that may cause undesired operation.

This device and its antenna(s) must not be co-located or operating in conjunction

with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the

user shall include the following or similar statement, placed in a prominent

location in the text of the manual:

Note: This equipment has been tested and found to comply

with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful

interference in a residential installation. This equipment generates, uses and can

radiate radio frequency energy and, if not installed and used in

accordance with the instructions, may cause harmful interference to radio

communications. However, there is no guarantee that interference will not

occur in a particular installation. If this equipment does cause harmful

interference to radio or television reception, which can be determined by

turning the equipment off and on, the user is encouraged to try to correct

the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to

which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncon-

trolled environment. This equipment should be installed and operated with minimum

distance 20cm between the radiator and your body. Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an

uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other

antenna or transmitter.

The availability of some specific channels and/or operational frequency bands

are country dependent and are firmware programmed at the factory to match

the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

　"Contains Transmitter Module　"FCC ID: 2BELC-CW1314"

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the

rules that specifically establish the bands of operation, the power, spurious

emissions, and operating fundamental frequencies. DO NOT list compliance to

unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a

module grant that is extended to a host manufacturer. See also Section

2.10 below concerning the need to notify host manufacturers that further

testing is required.3

Explanation: This module meets the requirements of FCC part 15C (15.247).it Specifically identified AC
Power Line Conducted Emission, Radiated Spurious emissions, Band edge and RF Conducted Spurious
Emissions, Conducted Peak Output Power, Bandwidth, Power Spectral Density, Antenna Requirement.

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including

for example any limits on antennas, etc. For example, if point-to- point antennas

are used that require reduction in power or compensation for cable loss, then this

information must be in the instructions. If the use condition limitations extend to

professional users, then instructions must state that this information also extends

to the host manufacturer's instruction manual. In addition, certain information

may also be needed, such as peak gain per frequency band and minimum gain,

specifically for master devices in 5 GHz DFS bands.

Explanation: The product antenna uses an irreplaceable antenna with a gain of BT:3.85dBi, WIFI:3.18dBi

2.4 Single Modular

If a modular transmitter is approved as a "Single Modular," then the module

manufacturer is responsible for approving the host environment that the Single

Modular is used with. The manufacturer of a Single Modular must describe, both

in the filing and in the installation instructions, the alternative means that the

Single Modular manufacturer uses to verify that the host meets the necessary

requirements to satisfy the module limiting conditions.

A Single Modular manufacturer has the flexibility to define its alternative method

to address the conditions that limit the initial approval, such as: shielding,

minimum signaling amplitude, buffered modulation/data inputs, or power supply

regulation. The alternative method could include that the limited

 module manufacturer reviews detailed test data or host designs prior to giving

the host manufacturer approval.

This Single Modular procedure is also applicable for RF exposure evaluation when

it is necessary to demonstrate compliance in a specific host. The module

manufacturer must state how control of the product into which the modular

transmitter will be installed will be maintained such that full compliance of the

product is always ensured. For additional hosts other than the specific host

originally granted with a limited

module, a Class II permissive change is required on the module grant to register

the additional host as a specific host also approved with the module. **Explanation:**

The module is a single module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in

Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip

Antennas and traces. The integration information shall include for the TCB

review the integration instructions for the following aspects: layout of trace

design, parts list (BOM), antenna, connectors, and isolation requirements.

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna); b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered); c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout; d) Appropriate parts by manufacturer and specifications; e) Test procedures for design verification; and f) Production test procedures for ensuring compliance

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application

2.6 **RF exposure considerations**

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions
(mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: The module complies with FCC radiofrequency radiation exposure limits for uncontrolled environments. The device is installed and operated with a distance of more than 20 cm between the radiator and your body." This module follows FCC statement design, FCC ID :

2BELC-CW1314

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type").
For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product.

The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The product antenna uses an irreplaceable antenna with a gain of BT:3.85dBi, WIFI:3.18dBi

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This

includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2BELC-CW1314

2.9 Information on test modes and additional testing requirements5

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: DongGuan Cowin Intelligent Technology Co., Ltd. can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product

as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.