

**WiReach BK**

# **WiReach BK**

## **Data Sheet**

Ver. 1.30



Connect One Ltd.  
20 Atir Yeda Street  
Kfar Saba 44643, Israel  
Phone: +972-9-766-0456  
Fax: +972-9-766-0461  
Email: [sales@connectone.com](mailto:sales@connectone.com)  
[www.connectone.com](http://www.connectone.com)

Information provided by Connect One Ltd. is believed to be accurate and reliable. However, Connect One assumes no responsibility for its use, nor any infringement of patents or other rights of third parties, which may result from its use. No license is granted by implication or otherwise under any patent rights of Connect One other than for circuitry embodied in Connect One's products. Connect One reserves the right to change circuitry at any time without notice. This document is subject to change without notice.

The software described in this document is furnished under a license agreement and may be used or copied only in accordance with the terms of such a license agreement. It is forbidden by law to copy the software on any medium except as specifically allowed in the license agreement. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including but not limited to photocopying, recording, transmitting via fax and/or modem devices, scanning, and/or information storage and retrieval systems for any purpose without the express written consent of Connect One.

**WARNING:** THE WiReach BK IS AN RF MODULE INTENDED FOR EMBEDDING IN A HOST DEVICE. LOCAL RELEVANT RF REGULATIONS SUCH AS ALLOWED FREQUENCIES AND USAGE IN COMMERCIAL FLIGHTS MUST BE OBSERVED. SAFETY INSTRUCTIONS MUST BE INCLUDED IN THE MANUALS OF THE HOST DEVICE. CONNECT ONE ASSUMES NO LIABILITY FOR CUSTOMER FAILURE TO COMPLY WITH THESE PRECAUTIONS.

**Modifications**

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Option could void the user's authority to operate the equipment.

**This device complies with Part 15 of the FCC rules.**

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.

**Exposure Information to Radio Frequency Energy**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

iChip, WiReach BK, IP Communication Controller, SerialNET, AT+i and Connect One are trademarks of Connect One Ltd.

Copyright © 2008 – 2011 Connect One Ltd. All rights reserved.

## Revision History

### 11-4400-03

| Version | Date          | Description                   |
|---------|---------------|-------------------------------|
| 1.00    | August 2010   | Initial preliminary version   |
| 1.10    | August 2010   | Updated Mechanical Dimensions |
| 1.15    | August 2010   | Misc. Updates                 |
| 1.20    | August 2010   | Formatting                    |
| 1.30    | February 2011 | Added FCC Notices             |

# Contents

|          |   |            |
|----------|---|------------|
| <b>1</b> | <b>Introduction.....</b>                  | <b>1-1</b> |
| 1.1      | General Description .....                 | 1-1        |
| 1.2      | Hardware Description.....                 | 1-1        |
| 1.3      | Performance Specifications .....          | 1-1        |
| <b>2</b> | <b>Features.....</b>                      | <b>2-1</b> |
| 2.1      | Security .....                            | 2-1        |
| 2.2      | Protocols .....                           | 2-1        |
| 2.3      | Additional Features .....                 | 2-1        |
| <b>3</b> | <b>Typical Applications .....</b>         | <b>3-1</b> |
| <b>4</b> | <b>Connector Pin Description .....</b>    | <b>4-1</b> |
| 4.1      | Pin Numbers.....                          | 4-1        |
| 4.2      | Pin Functional Description .....          | 4-2        |
| <b>5</b> | <b>Interfaces.....</b>                    | <b>5-1</b> |
| 5.1      | Serial Interface .....                    | 5-1        |
| 5.2      | USB Interface .....                       | 5-1        |
| <b>6</b> | <b>Electrical Specifications .....</b>    | <b>6-1</b> |
| 6.1      | Absolute Maximum Ratings .....            | 6-1        |
| 6.2      | DC Operating Characteristics .....        | 6-1        |
| 6.3      | Tx Specifications .....                   | 6-2        |
| 6.4      | Rx Specifications.....                    | 6-2        |
| <b>7</b> | <b>Mechanical Dimensions.....</b>         | <b>7-1</b> |
| <b>8</b> | <b>Ordering Information .....</b>         | <b>8-2</b> |
| <b>9</b> | <b>Internet Protocol Compliance .....</b> | <b>9-3</b> |

# Figures

|  |            |
|--|------------|
| <b>Figure 4-1: Pin-out for WiReach BK.....</b> | <b>4-1</b> |
| <b>Figure7-1: Mechanical Dimensions .....</b>  | <b>7-1</b> |

## Tables

|  |            |
|--|------------|
| <b>Table 4-1: Connector Signal Description .....</b> | <b>4-2</b> |
| <b>Table 6-1: Absolute Maximum Ratings.....</b>      | <b>6-1</b> |
| <b>Table 6-2: DC Operating Characteristics.....</b>  | <b>6-1</b> |
| <b>Table 9-1: Internet Protocol Compliance .....</b> | <b>9-3</b> |

# 1 Introduction

## 1.1 General Description

WiReach BK is a secure serial-to-Wireless LAN device server module that also acts as a bridge to connect serial devices to 802.11b/g Wireless LANs. It includes the iChip™ CO2144 IP Communication Controller™ chip and Marvell 88W8686 WiFi chipset. It is packaged in RoHS-compliant ultra-slim form factor and uses an industry standard pin-out.

WiReach BK offers much more than many other device servers on the market. It acts as a security gap between the application and the network; supports up to 10 simultaneous TCP/UDP sockets; two listening sockets; a web server with two websites; SMTP and POP3 clients; MIME attachments; FTP and TELNET clients, and SerialNET™ mode for serial-to-IP bridging.

WiReach BK supports the SSL3/TLS1 protocol for secure sockets, HTTPS and FTPS, WEP, WPA and WPA2 WiFi encryption.

WiReach BK minimizes the need to redesign the host device hardware. It easily inserts into headers on the host PCB and connects to an external antenna. Minimal or no software configuration is needed for WiReach BK to access the Wireless LAN.

Connect One's high-level AT+i™ API eliminates the need to add WiFi drivers, security and networking protocols and tasks to the host application. The AT+i SerialNET operating mode offers a true plug-and-play mode that eliminates any changes to the host application.

WiReach BK firmware – the IP stack and Internet configuration parameters – are stored in an external flash memory. The module is power-efficient: the core operates at 1.2V, while I/Os operate at 3.3V. Power Save mode further reduces power consumption.

## 1.2 Hardware Description

Size: 46.2 x 25.4 x 5.0 mm

(46.2 x 25.4 x 6mm with shielding option)

Core CPU: 32-bit RISC ARM7TDMI, low-leakage, 0.13 micron, running at 48MHz

Operating Voltage: +3.58V+/-5%

Operating Humidity: 90% maximum (non-condensing)

Operating Temperature Range: -20° to 75°C (-4° to 167°F)

Power Consumption:

Transmit – 250mA @16dbm

235mA @12dbm (typical)

Receive – 190mA (typical)

Power Save mode – 8mA

RF Connector: U.FL of Hirose

- Connector: Low profile 70 pin (Molex #53748-0708)
- Host Interface: TTL Serial and USB device.

RoHS-compliant; lead-free

## 1.3 Performance Specifications

Host Data Rate: up to 3Mbps in serial mode

Serial Data Format (AT+i mode):

Asynchronous character; binary; 8 data bits; no parity; 1 stop bit

SerialNET mode: Asynchronous character; binary; 7 or 8 data bits; odd, even, or no parity; 1 stop bit

Flow Control: Hardware (-RTS, -CTS) and software flow control.

### Internet Protocols

ARP, ICMP, IP, UDP, TCP, DHCP, DNS, NTP, SMTP, POP3, MIME, HTTP, FTP and TELNET

### Security Protocols

SSL3/TLS1, HTTPS, FTPS, RSA, AES-128/256, 3DES, RC-4, SHA-1, MD-5, WEP, WPA and WPA2

### Protocols Accelerated in HW

AES, 3DES and SHA

### Application Program Interface

Connect One's AT+i protocol  
SerialNET mode for transparent serial data-to-Internet bridging

### Wireless Specifications

Standards Supported: IEEE 802.11b, IEEE 802.11g

- Frequency:
  - Europe – 2.412-2.472GHz
  - USA – 2.412-2.462GHz
  - Japan – 2.412-2.484GHz
- Channels:
  - Europe – 13 channels
  - USA – 11 channels
  - Japan – 14 channels

### Recommended Antenna

iW-ANT2-BL Antenna: 2.4GHz, 2.0dBi, 50Ω, omni-directional, 1/4 wavelength dipole configuration, VSWR≤2.0,

### Warranty

One year

### Certifications

- Radio and EMC:
  - USA
    - o CFR Title 47
    - o IFCC Part 15.247
    - o FCC Part 15/ICES-003 class B
  - Canada
    - o Industry Canada ICES-003, RSS-Gen, RSS-210
  - EU
    - o EN 300 328 V1.7.1 (2006-10)
    - o EN 301 489-1 V1.8.1 (2008-04)
    - o EN 301 489-17 V 1.3.2 (2008-04)
  - CE – Self declaration
  - Japan
    - o Article 38-2 Paragraph1 Item 1: Low Power Data Communications System in 2.4 GHz Band
- Safety:
  - o UL 60950
  - o CAN/CSA-C22.2 No. 60950
  - o EN 60950-1, Low Voltage Directive (2006/95/EC)

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 UNDESIRE OPERATION. (\*)

### Installation Requirements

The WiReach BK must be installed within a full-enclosure device that is safety certified.

(\*) NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.



## 2 Features

### 2.1 Security

- Acts as a security gap between the host application and the network
- One secure SSL3/TLS1 socket
- Provides WEP, WPA and WPA2 Wireless LAN security
- Supports multiple Certificate Authorities and both client-side and server-side authentication
- Secure FTP and HTTP clients (over SSL3)
- Includes a true hardware random number generator
- AES, 3DES and SHA accelerated in hardware

### 2.2 Protocols

- Up to 10 simultaneous TCP/UDP sockets and two listening sockets
- HTTP client
- HTTP web server with two on-chip websites: configuration site and application site
- FTP and TELNET clients
- DHCP client and server
- Sending and receiving textual email and binary email with MIME attachments

### 2.3 Additional Features

- Non-volatile, on-chip operational parameter database
- Supports infrastructure and ad-hoc Wireless LAN networks
- SerialNET mode for serial-to-IP bridging (port server mode)
- Local firmware update
- Remote configuration and firmware update over the Internet
- Retrieval of time data from a Network Time Server
- Immediate baud rate change on High Speed USART up to 3Mbps with the AT+iBDRI command.
- Change WiFi country specific configuration with the AT+iWPRF parameter.

**Note:** For a detailed description of all available features, see the *AT+i Programmer's Manual*.

## 3 Typical Applications

Adding IP communications over WiFi to serial embedded devices.

Adding SSL security to M2M solutions.

### **WiReach BK supports several operational modes:**

- **SerialNet™ Serial to WiFi Bridge** - allowing transparent bridging of Serial over WiFi, using a 3Mbps fast UART. This is a true plug-and-play mode that eliminates any changes to the host application.
- **PPP modem emulation** – allowing existing (i.e. modem) designs currently using PPP to connect transparently over WiFi.
- **Full Internet Controller mode** – allowing simple MCU to use the WiReach BK's rich protocol and application capabilities to perform complex Internet operations such as E-mail, FTP, SSL, embedded Web server and others. It also acts as a firewall, providing a security gap between the application and the network.

## 4 Connector Pin Description

The WiReach BK module includes the iChip CO2144 IP Communication Controller and the Marvell 88W8686 802.11b/g WiFi chipset mounted on a socket form-factor module.

### 4.1 Pin Numbers

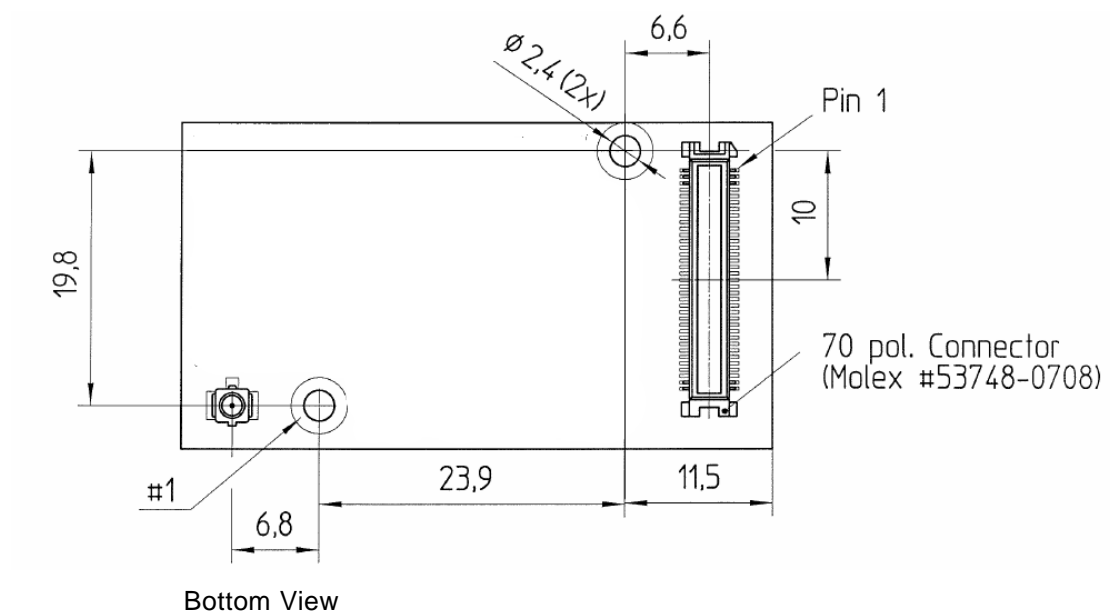


Figure 4-1: Pin-out for WiReach BK

Connector: Molex [53748-0708](#)

Mate with: Molex [52991-0708](#)

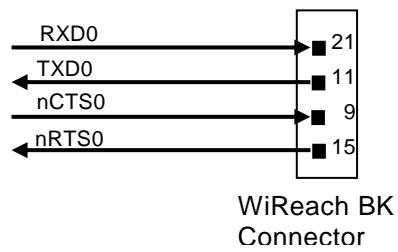
## 4.2 Pin Functional Description

| Pin       | Signal | type           | Description                   |
|-----------|--------|----------------|-------------------------------|
| 1         | GND    | power          |                               |
| 2         | GND    | power          |                               |
| 3         | GND    | power          |                               |
| 4         | GND    | power          |                               |
| 5         | VDD    | Power          |                               |
| 6         | VDD    | Power          |                               |
| 7         | VDD    | Power          |                               |
| 8         | VDD    | Power          |                               |
| 9         | nCTS0  | Digital Input  | UART 0 clear to send          |
| 11        | TXD0   | Digital Output | UART 0 transmit               |
| 12        | DDP    | Analog         | USB device positive           |
| 14        | DDM    | Analog         | USB device negative           |
| 15        | nRTS0  | Digital Output | UART 0 request to send        |
| 21        | RXD0   | Digital Input  | UART 0 receive                |
| 25        | VREF   | Digital Output | 3.3V from internal regulator. |
| 28        | MSEL   | Digital Input  | Mode select                   |
| 53        | nRESET | Digital Input  | Reset Module.                 |
| 59        | GND    | power          |                               |
| All other | N.C    |                | Not Connected                 |

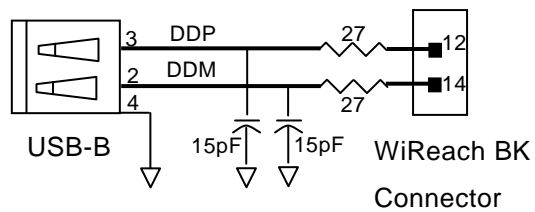
*Table 4-1: Connector Signal Description*

## 5 Interfaces

### 5.1 Serial Interface



### 5.2 USB Interface



## 6 Electrical Specifications

### 6.1 Absolute Maximum Ratings

| Parameter                                       | Rating                          |
|---|---------------------------------|
| VDD supply respect to ground                    | -0.3V to +5V                    |
| Voltage at any other pin with respect to ground | -0.3V to +3.5V                  |
| Operating temperature                           | -20°C to 75°C (-4°F to 167.5°F) |
| Storage temperature                             | -65°C to 125°C (-85°F to 257°F) |

Table 6-1: Absolute Maximum Ratings

### 6.2 DC Operating Characteristics

| Parameter   | Min   | Typical | Max   | Units |
|---|-------|---------|-------|-------|
| VDD   | 3.4   | 3.58    | 3.76  | Volts |
| High-level Input                                    | 2.0   |         | +3.5V | Volts |
| Low-level Input                                     | -0.3  |         | 0.8   | Volts |
| High-level Output @2mA                              | 2.8   |         |       | Volts |
| High-level Output @0mA                              | 3     |         |       | Volts |
| Low-level Output @2mA                               |       |         | 0.4   | Volts |
| Low-level Output @0mA                               |       |         | 0.2   | Volts |
| Input leakage current                               |       |         | 10    | μA    |
| Power supply current from VDD (Transmit Mode)       |       | 260     | 280   | mA    |
| Power supply current from VDD (Receive Mode)        |       | 190     | 210   | mA    |
| Power supply current from VDD (Power Save Mode)     |       | 8       |       | mA    |
| Input Capacitance                                   |       |         | 5.3   | pF    |
| Radio Frequency Range (subject to local regulation) | 2.412 |         | 2.484 | GHz   |

Table 6-2: DC Operating Characteristics

## 6.3 Tx Specifications

| Item                                | Condition        | Min        | Typ | Max | Unit |
|-------------------------------------|------------------|------------|-----|-----|------|
| Transmit Power Levels               | 11b              |            | 15  |     | dBm  |
|                                     | 11g              |            | 15  |     | dBm  |
| Transmit Spectrum Mask              | 11b              | Fc+/-11MHz |     | 40  | dBc  |
|                                     |                  | Fc+/-22MHz |     | 60  | dBc  |
|                                     | 11g              | Fc+/-11MHz |     | 30  | dBc  |
|                                     |                  | Fc+/-20MHz |     | 40  | dBc  |
|                                     |                  | Fc+/-30MHz |     | 50  | dBc  |
| Transmit Center Frequency Tolerance | Temperature=25°C |            | ±10 |     | ppm  |

Table 6-2: Tx Specifications

## 6.4 Rx Specifications

| Item   | Condition                         | Min | Typ | Max | Unit |
|--|-----------------------------------|-----|-----|-----|------|
| Receiver Minimum Input Level Sensitivity                               | 802.11b Data Rate=11Mbps, PER<8%  |     | -88 |     | dBm  |
|  | 802.11g Data Rate=54Mbps, PER<10% |     | -74 |     | dBm  |
| Adjacent Channel Rejection<br>Desired channel is 3dB above sensitivity | 802.11b Data Rate=11Mbps, PER<8%  |     | 48  |     | dBc  |
|  | 802.11g Data Rate=54Mbps, PER<10% |     | 15  |     | dBc  |

Table 6-3: Rx Specifications

PER(%)=(Number of all packets – Number of received packets)/(Number of all packetsX100)

# 7 Mechanical Dimensions

Note: All measures are in millimeters

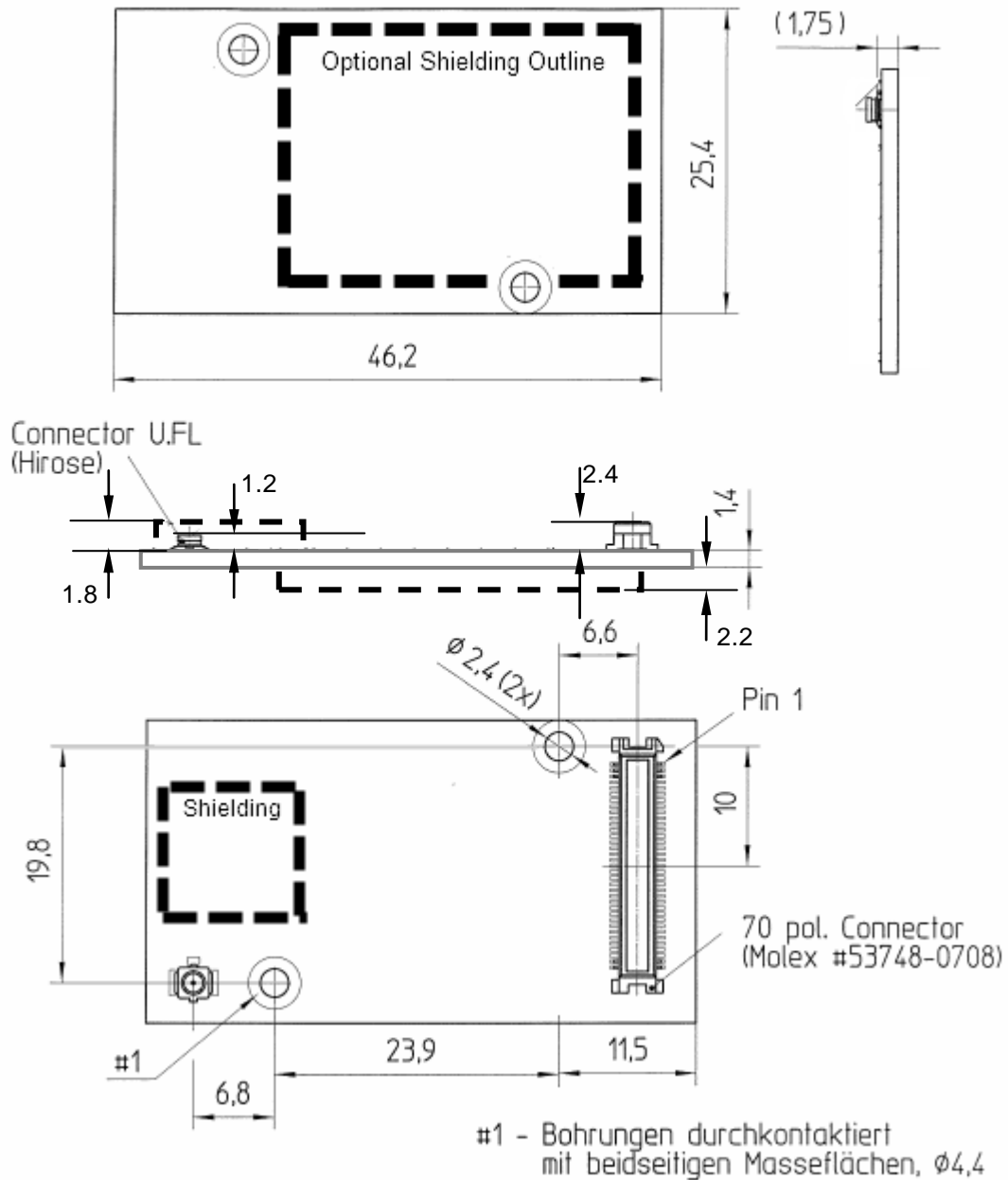


Figure7-1: Mechanical Dimensions



## 8 Ordering Information

| Ordering Information |   |
|----------------------|---|
| Part Number          | Description   |
| CO-IW-SM2144N2-BIO   | WiReach BK module   |
| iW-CAB-150           | Miniature coaxial w/ pigtail cable. UFL-SMA connectors. 150mm length.                   |
| iW-ANT2-BL           | 2.4GHz WiFi antenna, 2.0dBi, 50Ω, omni-directional, 1/4 wavelength dipole configuration |

## 9 Internet Protocol Compliance

WiReach BK complies with the Internet standards listed in the following table.

|                 |   |
|-----------------|---|
| <b>RFC 768</b>  | User datagram protocol (UDP)  |
| <b>RFC 791</b>  | Internet protocol (IP)  |
| <b>RFC 792</b>  | ICMP – Internet control message protocol  |
| <b>RFC 793</b>  | Transmission control protocol (TCP)   |
| <b>RFC 821</b>  | Simple mail transfer protocol (SMTP)  |
| <b>RFC 822</b>  | Standard for the format of ARPA Internet text messages                              |
| <b>RFC 826</b>  | Ethernet address resolution protocol (ARP)  |
| <b>RFC 959</b>  | File transfer protocol (FTP)  |
| <b>RFC 854</b>  | TELNET protocol specification   |
| <b>RFC 857</b>  | Telnet ECHO option  |
| <b>RFC 858</b>  | Telnet suppress go-ahead option   |
| <b>RFC 1034</b> | Domain names (DNS) - concepts and facilities  |
| <b>RFC 1035</b> | Domain names (DNS) - implementation and specification                               |
| <b>RFC 1073</b> | Telnet window size option   |
| <b>RFC 1091</b> | Telnet terminal type option   |
| <b>RFC 1321</b> | MD5 message digest algorithm  |
| <b>RFC 1939</b> | Post office protocol - version 3 (POP3)   |
| <b>RFC 1957</b> | Some observations on the implementations of the post office protocol (POP3)         |
| <b>RFC 2030</b> | Simple network time protocol (SNTP)   |
| <b>RFC 2045</b> | Multipurpose Internet mail extensions (MIME) part one: internet message body format |
| <b>RFC 2046</b> | MIME part two: media types  |
| <b>RFC 2047</b> | MIME part three: message header extensions for non-ASCII text                       |
| <b>RFC 2048</b> | MIME part four: registration procedures   |
| <b>RFC 2049</b> | MIME part five: conformance criteria and examples                                   |
| <b>RFC 2068</b> | Hypertext transfer protocol HTTP/1.1  |
| <b>RFC 2131</b> | Dynamic host configuration protocol (DHCP)  |
| <b>RFC 2132</b> | DHCP options (only relevant parts)  |
| <b>RFC 2228</b> | FTP security extensions   |
| <b>RFC 2246</b> | The TLS protocol version 1.0  |

*Table 9-1: Internet Protocol Compliance*