RFSPACE
CLOUD-IQ

GETTING STARTED GUIDE

Table of Contents

Legal Notices

This User Guide provides user information and is provided "as is." RFSPACE and its affiliated companies, directors, officers, or employees assume no responsibility for any typographical, technical, content or other inaccuracies in this User Guide. RFSPACE reserves the right to revise this User Guide or withdraw it at any time without prior notice. The latest version can be found at www.rfspace.com.

Warranty Period

RFSPACE warrants this hardware product against defects in materials and workmanship under normal use for a period of ONE (1) YEAR from the date of retail purchase by the original end-user purchaser . If a hardware defect arises and a valid claim is received within this Warranty Period, at its option and to the extent permitted by law, RFSPACE will either (1) repair the hardware defect at no charge, using new or parts equivalent to new in performance and reliability, (2) exchange the product with a product that is new or equivalent to new in performance and reliability and is at least functionally equivalent to the original product, or (3) refund the purchase price of the product. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes RFSPACE's property. When a refund is given, the product for which the refund is provided must be returned to RFSPACE and becomes RFSPACE's property.

Supplied Accessories

The Cloud-IQ ships with a US or EU power supply, USB to 5.5mm power cable, ethernet cable, and SpectraVue software installation CD. The pdf of this document, CloudSetup and SpectraVue manuals are included in the CD. The power supply is 90-264 Volt capable and can be used with a plug adapter.

Precautions

CAUTION! There are no user replaceable parts inside.

CAUTION! Never put the receiver in any unstable place . This may cause damage to the receiver or might cause personal injury.

CAUTION! Never exceed 5.5 volts on DC input jack. Internal circuitry will shut down the radio, but damage might still occur.

CAUTION! Never transmit into the antenna input connector or transmit into antennas in close proximity to the Cloud-IQ antennas. This might cause damage to the sensitive front end circuitry. When using adjacent antennas, make sure an RF limiter or relay is installed on the RF input port. Damage to input RF circuitry might result in costly repairs.

CAUTION! Never operate the receiver with wet hands. Make sure antenna does not touch high voltage power lines.

WARNING! Do not store or operate the device at temperatures below 0°C (+32°F) or above +40°C (+104°F).

Hardware Specifications

SPECIFICATIONS		
Direct sampling frequency range	0.009 - 55 MHz	Usable 56 MHz +
Antenna ports	Dual antenna ports	*remote selectable or auto*
ADC Fs / SNR / SFDR	122.88 MHz / 74.2 dBFS / 91 dB	
I/Q mode output sample rates	0.00375 MHz - 1.288 MHz	*24 bit resolution*
Spectrum analyzer I/Q modes	2.458 MHz - 12.288 MHz	*16 bit / 16384 FFT points*
Spectrum analyzer real mode	56 MHz wide / 122.88 MHz sample rate	*16 bit / 32768 FFT point*
Minimum discernible signal	-137 dBm/Hz / -135 dBm/Hz	*in 500 Hz BW PGA on/off at 15 MHz*
Clipping point	-15 dBm	*at 30 MHz*
Cloud mode audio compression	G726,G711, Raw	*phase continuous*
Cloud mode demodulation	AM,FM,WFM,SSB,CW,SAM,DSB,ASK,OOK,PSK31,RAW IQ	
Cloud mode audio rates	16 kb/s - 64 kb/s	audio is 8 KHz sample rate
Cloud mode RAW IQ	500 samples/sec - 16 ksamples/sec	*at 8 bits resolution after AGC*
Cloud mode spectrum display	0.001 MHz - 10 MHz wide / 2048 FFT points	*with simultaneous demod*
TCXO	<2.5ppm over 0-40 °C	
Remote server boot time	10 seconds	*availability online after power cycle*
Power comsumption	5 Volts - 0.8 Amps	
Compliance	CE, FCC, IC	
Dimensions	4.8 x 4.0 x 1.2 inches	
Serial Port	RS-232 levels for external radio control and debug	
Warranty	1 year parts and labor. International shipping paid by customer	

Introduction

The Cloud-IQ radio is a high performance networked software defined radio with 0.009-56 MHz frequency coverage. The Cloud-IQ uses a high performance ADC running at 122.88 MHz. The output IQ bandwidth is configurable via software up to a maximum of 1.288 MHz at 24 bits. PC communications are handled over a 100 base-T port using TCP control packets. The IQ streams to the PC via UDP packets.

The Cloud-IQ is compatible with the SpectraVue, SDR-Radio, SDR#, CuteSDR and other software. The SpectraVue software includes demodulation and I/Q capture of spectrum at up to a 1.2288 MHz BW. For those interested in writing their own applications, RFSPACE supplies a fully documented protocol for communicating with the hardware as well as an open source application for MacOS, Windows and Linux. There is no need to calculate the downconverter DSP parameters. The Cloud-IQ just needs the center frequency, attenuator, output sample rate and mode to begin streaming data. The Cloud-IQ utilizes straight TCP/IP and ethernet for all communications. This offers the highest possible performance due to the highly optimized ethernet drivers on PC, Mac and Linux systems.

The Cloud-IQ packets are fully routable. This means that the receiver can be placed at remote locations. Multiple receivers can also be combined and it's data transported over a higher data rate ethernet pipe using simple switches and routers. In this application, each Cloud-IQ can be set to a different IP address or port.

The Cloud-IQ includes a low bandwidth internet mode for remote operation. In this mode, the radio performs all demodulation and spectral FFTs onboard. The compressed data is then sent to the client over a TCP link. This allows the placement of the Cloud-IQ anywhere in the world with an internet connection. The RemoteSDRclient and Android SDRanywhere applications are used as clients.

Front Panel

1. Mode LED indicator. Used to indicate if the receiver is booting or operating in IQ or Cloud mode.

2. Status LED indicator. Used to indicate if the receiver is connected and active.

3. Clip LED indicator. Blinks red if the ADC full scale level is exceeded. Select the minimum attenuator required to minimize clipping. Do not exceed max input levels to prevent input circuitry damage.

Rear Panel
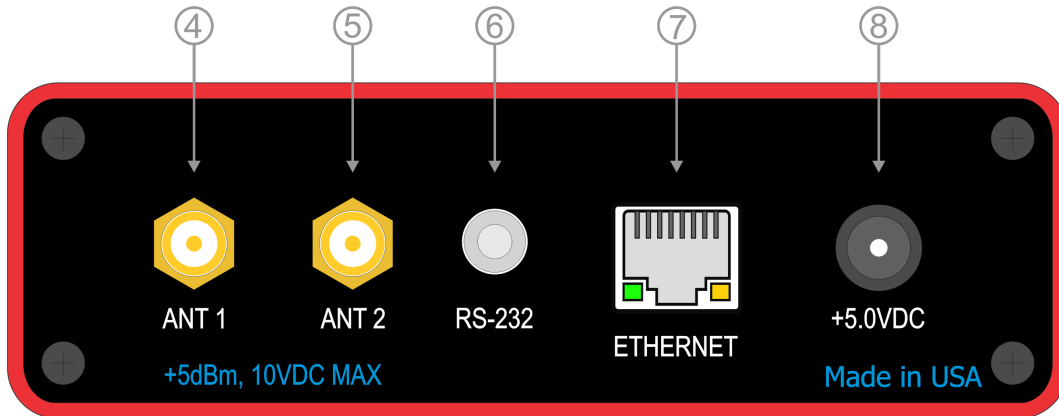
4. Antenna 1 input SMA connector. This is the main RF input connector for 0.009 - 56 MHz. This connector is user selectable or can be configured to automatically switch based on a user specified frequency range.

5. Antenna 2 input SMA connector. This is the secondary RF input connector for 0.009 - 56 MHz. This connector is user selectable or can be configured to automatically switch based on a user specified frequency range.

6. Bidirectional RS-232 3.5mm jack. This port is used for debug and external radio control. Connection diagram shows wiring used to connect to PC. Switch pins 2/3 to connect to a radio or use a null modem adapter.
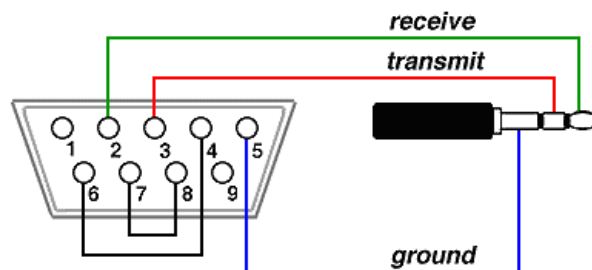
7. 100 Base-T Ethernet connection. Connects to PC or router for IQ mode. Connects to WAN or router for Cloud mode.

8. Power input. Apply 5 Volts at less than 1 Amp. Do not exceed 5.5 Volts or radio will power off.

Installation

The Cloud-IQ ships configured for IQ streaming mode and with DHCP turned on. This mode is the most common mode of operation. In this mode, the radio streams the raw IQ stream to the PC where software like SpectraVue processes the data.

Connect the Cloud-IQ Ethernet port to the router and connect the power cable to the Cloud-IQ and a PC USB port. Some USB ports might not offer enough current to power the radio. In this case, use the included 5V USB power supply. The radio will obtain an IP address from the DHCP server. Open Spec-traVue and select the Cloud-IQ Setup. The Find button will search for the Cloud-IQs present in the net-work. Select the Cloud-IQ you wish to operate and click OK. Exit the setup menu and start SpectraVue by pressing Start or F12.

If you need to configure the Cloud-IQ with a manual IP address or you wish to connect the Cloud-IQ directly to a PC, follow the instructions for the CloudSetup application included in the CD.
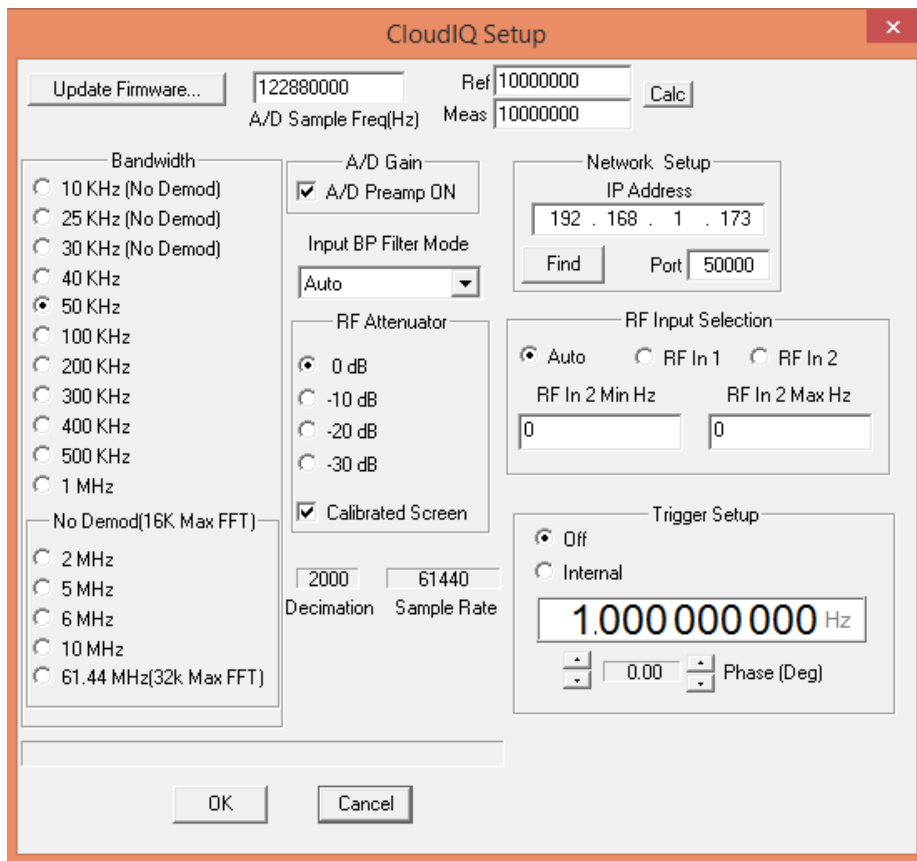
SDRanywhere Android App

The SDRanywhere application is an Android app that allows remote operation of an RFSPACE Cloud-IQ radio from anywhere in the world. The SDRanywhere application receives the demodulated audio and waterfall information from a remote radio.

To download. Browse to http://www.sdranywhere.com and install the .APK file from your Android device.

This file and instructions are also included in the install CD.
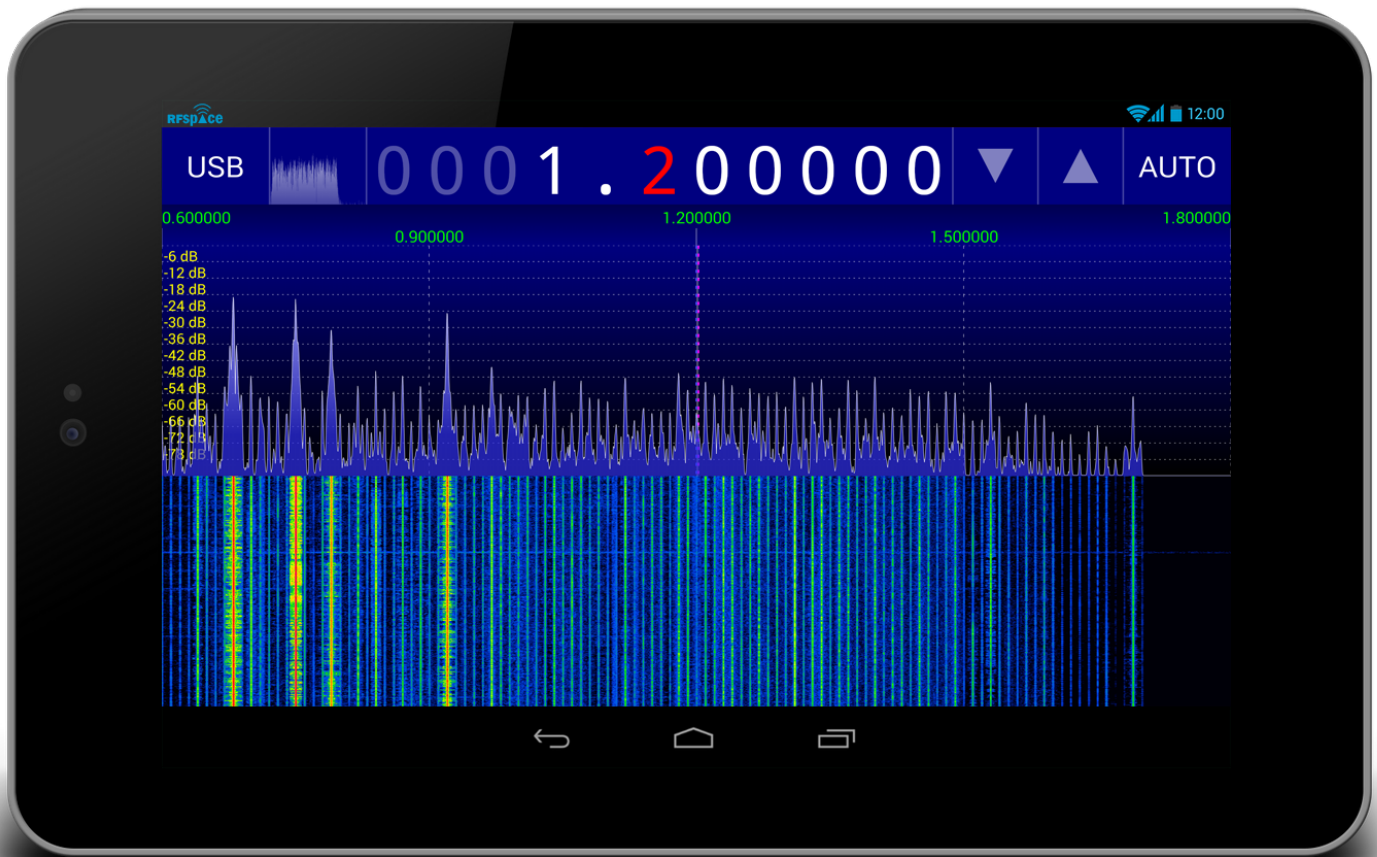
Cloud-IQ Interface Specs

Please contact info@rfspace.com for the latest version of the Cloud-IQ Interface Specification Document. This document is available under NDA.

CuteSDR

RFSPACE supplies a simple, open-source application for the Cloud-IQ radio. This application is written using the QT framework and will compile for MacOS, Windows and Linux operating systems. This software is supplied with a free license to be used by RFSPACE customers wishing to create their own applications.

information at : http://sourceforge.net/projects/cutesdr/

RemoteSDRclient

RFSPACE supplies a simple, open-source application for the Cloud-IQ radio operating in the low bandwidth Cloud mode. This application is written using the QT framework and will compile for MacOS, Windows and Linux operating systems. This software is supplied with a free license to be used by RFSPACE customers wishing to create their own applications.

information at : http://sourceforge.net/projects/remotesdrclient/files/

Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device as applicable, 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 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. The user must use the accessories and cables supplied by the manufacturer to get optimum performance from the product.

FOR HOME OR OFFICE USE