BDR-50

DMR Digital-Analog Repeater

Note: Ext I/O not functional

Note: IP Network Option not functional or available

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Dear Users,

Thanks for buying our digital-analog repeater.

This digital-analog repeater is a 5W-50W professional repeater, adopting high-performance radio frequency modules, easy to use control panel, power supply module and built-in duplexer (Optional).

This repeater uses a modular high-performance design that is easy to maintain, convenient to update and simple to interface.

The main function of this repeater is extending the range of two-way communications both local and networked.

Thanks for choosing our repeater.

Best Regards.

BridgeCom Systems

Contents

User instructions

- Please carefully read this manual before attempting to use this product. These instructions will explain the various features and operations of this repeater.
- Please keep these instructions for future reference.
- ***BridgeCom Systems*** reserves the right to make changes, additions and modifications without prior notice. This manual is for reference only.
- ***BridgeCom Systems*** retains final interpretation.

Safety Instruction

For safe and effective operation of this product, please read and note the information below carefully.

- There are high voltages and high temperature components within the repeater enclosure. Exercise caution to prevent electric shock and burns.
- The repeater shall be maintained by professionals. Do not attempt to open enclosure and self-service unless qualified.
- Repeater must be set-up and deployed per appropriate regulatory bodies in the area.
- Repeater should be grounded via the attached ground terminal for safety and performance.
- The repeater antenna shall have the appropriate lightning protection and grounding to insure safe operation.
- Installation of the repeater system including repeater, lightning protection, feed lines, combining, and power shall be completed by qualified professionals.

Open-package Inspection

Please exercise care when opening the shipping box. Confirm that all items noted in the table have been included and are in good condition. An electronic version of this manual is located on the BridgeCom Systems Support page.

Item	No.
Repeater	1
AC power supply line	1
USB data line	1
User manual	1

Product Introduction

Front panel introduction

Front view

Large view for front panel

Indicators Introductions

Indicator	Color	Functional description
TX	green	Always on, the repeater is transmitting signals
RX	green	Always on, the repeater is receiving signals
LNK	green	Always on, the link is successful
ERROR	red	On or flashes, error occurred
DC	green	Always on, DC power supply equipment
POWER	green	TS B transmit
A, B	green	Digital time slot one receives signal, A light on. Digital time slot two, B light on. Analog doesn't light.

Repeater Display Instruction

The display consists of a two-digit numeric display that provides the following information:

a. Selected channel number
b. Display of current menu option or function parameters related to key operation.
c. Error code display

Front Panel Mic Connector

The front panel microphone connector consists of a RJ-45. It provides the interface for a local handheld microphone with PTT to be connected directly to the repeater for local operation.

Key function detailed description

Button	Name	Menu guide function	Description
C	C	1.short press back to last or root menu 2. long press back to standby mode and lock the keyboard	Clear or cancel current parameter value
◄	Left	1. Up level menu 2. Shortcut menu: decrease channel	Value decreases
►	Right	1. Next level menu 2. Shortcut menu, increase channel	Value increases
OK	OK	Enter next level menu	Confirm and save
F1	F1	Function key 1 (Password Entry)	Key equals password number
F2	F2	Function key 2 (Password Entry)	Key equals password number
F3	F3/V_	1.Function key 3 (Password Entry) 2. Shortcuts menu: volume down	Key equals password number/Volume control
F4	F4/V+	1. Function key 4 (software defines) 2. Shortcuts menu: volume up	Key equals password number/volume control

Back panel introduction

Rear view

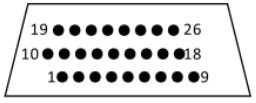
Outside interface picture

Power supply interface and switch picture

Rear panel port introduction

Port name	Function Declaration
USB	Connects to PC, used for programming and software update.
EXT-I/O	External interface, including the signal connected with outside and control the Pin, use as specific expanding function. Outside look structure define the interface.
RJ11	Connection to PSTN or analog PBX for inbound and outbound phone calls.
ANT/RX	Connect receiver antenna when duplexer NOT installed.
AUX/TX	Connect transmit antenna with or without duplexer installed.

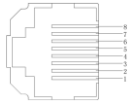
Rear panel EXT-I/0 port definition (not functional)

Pin No.	Definition	 26 Pin Description
Pin1	-13v	Power
Pin2	O_CLKX	CLKX output a LVTTL_3.3V signal via optical coupler (MsBSP Clocking)
Pin3	UART3_RX	UART3_RX serial port receiving
Pin4	IO_PTTI	PTTR input signal, opt coupler, LVTTL_3.3V
Pin5	SEL0_IN/SEL0_OUT	Extend port IO-0 Input/output a LVTTL_3.3V (selectable)
Pin6	DG	Digital Ground
Pin7	AG	Analog Ground
Pin8	EXT_IO_UF_OUT	Extend port audio frequency output
Pin9	EXT IO_UF_IN	Extend port audio frequency input
Pin10	+13v	12V_OUT 500mA_max
Pin11	IO_DX	(McBSP) Data transmit (output) to external devices
Pin12	IO_FSX	(McBSP) Frame Synch ronizatio transmit (output) a signal LVTTL_3.3V via optical coupler
Pin13	IO_CLKR	CLKR input a LVTTL_3.3V signal via optical coupler (MsBSP Clocking)
Pin14	SEL1_IN/SEL1 OUT	Extend port IO-1 Input/output a LVTTL_3.3V (selectable)
Pin15	DG	Digital Ground
Pin16	AG	Analog Ground
Pin17	NDET_OUT	Extend port noise level(0-3V) output
Pin18	NDECT_IN	Extend port noise level(0-3V) input
Pin19	UART3_TX	UART3_TX serial port transmit
Pin20	O_PTTO	PTTR output a LVTTL_3.3V signal via optical coupler
Pin21	IO_DR	(McBSP) Data receive (input) from external devices

Pin No.	Definition	26 Pin Description
Pin22	IO_FSR	(McBSP) Frame Synchronization receive (input) a signal LVTTL_3.3V via optical coupler
Pin23	DG	Digital Ground
Pin24	AG	Analog Ground
Pin25	RSSI OUT	Extend port Received Signal Strength level(0-3V) output
Pin26	RSSI_IN	Extend port Received Signal Strength level(0-3V) input

RJ45 PIN Definition

Hand microphone interface description



Pin	Pin definition	Pin description	Remark
1	3.3V	+3.3V output	
2	VCC	+12V output	Hand MIC Supply voltage
3	GND	Ground wire	
4	PTT	Transmit/send data	Push-To-Talk switch
5	ME	Microphone (MIC) connected to the ground wire	
6	MIC	Microphone (MIC)signal input	Voice input
7	USB-	Receive data	Hand MIC signal input
8	DKEY	Digital keypad command input	Hand MIC with digital keypad

Introduction of Functions

1). DMR digital audio transmit
When the RX port of the repeater receives an uplink signal from a device, the repeater will transmit via its TX port if it meets the programmed signaling parameter of the color code (CC) in DMR.

2). Analog Audio Transmit
TX and RX CTCSS or CDCSS may be set on an analog per channel basis.

3). DTMF modulation and demodulation
The hardware support DTMF and FSK modulation and demodulation channel.

4). Digital / Analog Channel Support
The repeater may be programmed to support both analog and digital operation. If a digital signal is received on the mixed mode channel, the repeater will transmit digital. If an analog signal is received, the repeater will transmit in analog. Programming establishes the signaling for both modes.

5). PSTN support
Support for external phone calls and DTMF dialing.

6). Channel Reserve Function
When no traffic is seen on the receiver, the repeater will continue to transmit for the duration of the channel reserve time. This minimizes communications turn-around time. The reserve time may be set between one to 50 seconds in intervals of one second. Default is six seconds.

7). IP Network
The IP network connection via the optional network card allows for the networking of repeaters via the TCP/IP protocol. Networking supportsboth voice and data communications allowing them to occur over a larger footprint available from a single repeater site.

(Not functional or available)

8). Operational Mode Switch
Allows the switching the repeater between repeater and test mode via software.

Repeater operation

1. Turn on/ off repeater

Toggle the power switch on the repeaters back panel to turn on. The speaker will provide an audible indication and the two-digit front panel display will light.

2. Audio / Data Transmit

When the RX port of the repeater receives an uplink signal from a device, the repeater will transmit it via its TX port if it meets the programmed signaling parameter of color code (CC) in DMR.

3. RX / TX Indicators

1). When the repeater is operational, the TX/ RX indicators and A/ B slot indicators will light. If "A" is illuminated then slot #1 is in use. "B" indicates that slot #2 is being used.

2). If neither A or B light then operation is analog.

4. Panel key board and display

Key and Display

5. Key warning tone

1). Key warning tones indicate modifications of working parameters or optional menu keys. A single beep will be heard.

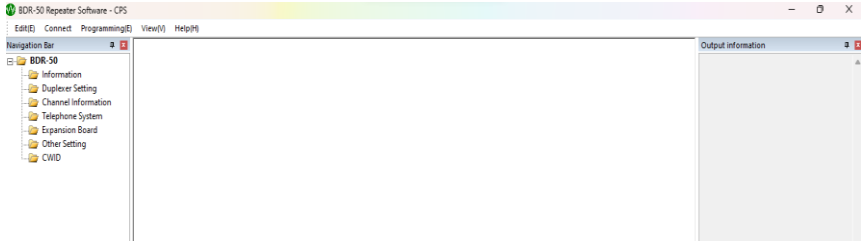
2). Tones indicate error or invalid operation. Two beeps will be heard.

6. Programming software operation

1). Connect the repeater to the PC using a USB cable.

2). Open the previously installed repeater programming software; power on the repeater.

3). Select the channel parameters; you will see the following window.

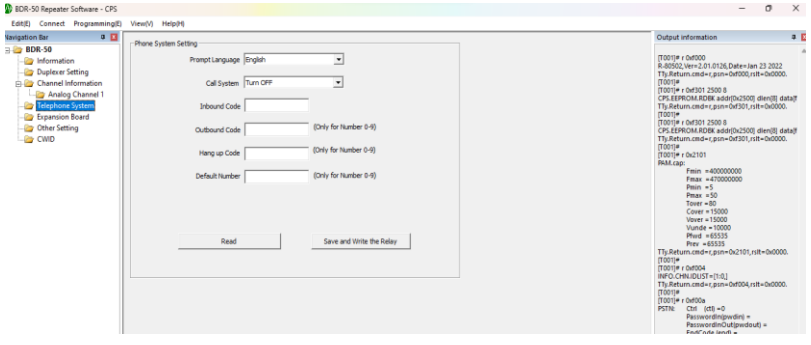


Please refer to BDR-50 repeater programming software to set up repeater.

7. Two-way radio calling

1). Repeater Telephone System Configuration

① Find "telephone system " in BDR-50 program software, configuration as below



a). Call System: Per the required telephone use, define the parameters necessary for telephone operation. Settings are available for off, inbound only, outbound only, or inbound/ outbound.

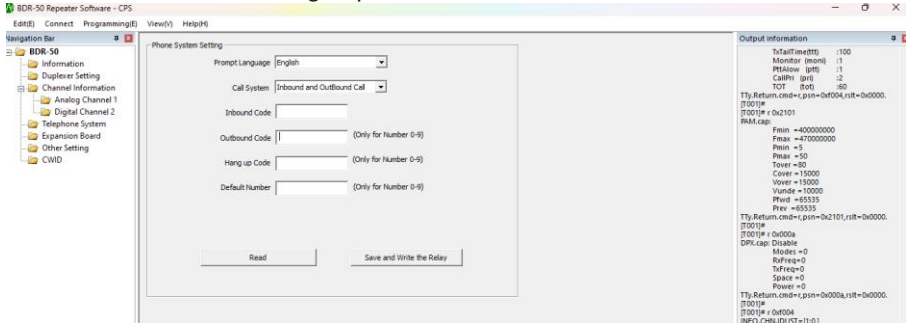
b). Inbound Code: defines the numeric values (0 to 9) used to access the repeater via phone line from the outside.

c). Outbound Code: defines the numeric values (0 to 9) used to access the external phone line from the repeater.

d). Hang up Code: the numeric values (0 to 9) used to terminate the phone line after a call

e). Default Number: This is the default numeric value (0 to 9) for the repeater

(2) Note: The Telephone System only functions on a digital channel. Inbound calls use the ALL CALL group.



2). Two-way Radio Configuration -Telephone System

The repeater is compatible with most DMR radios on the market.

3). Answer and make a phone call

① handset makes a phone call (for example: call out password is: 222)

a). Dial any number: press the PTT button, input: call out password+*+ phone number+#.

For example, call 26000000, press the PTT button, input 222+ 26000000 on keyboard at the same time, then release PTT button, you can see the radios send the phone call from the display, you have a call when answered.

b). Dial embedded number: press PTT button on two-way radios, inputcall out password+ #, for example, the embedded number is 075526000000, press the PTT button, input 222# on keyboard, then release PTT, after a few seconds you can have a call with 075526000000.

(2) A handset answers an incoming phone call via the repeater using the call-in password (111).

If the other side uses the phone to call the handset (repeater) after answering, you will need to input the call password +# (111#) then youcan proceed with the call.

@Handset (repeater) hang up the phone, (the hang up password is 333 etc.):

When the call is over, if the other side does not hang up, the repeater will hang up itself, the operation is: press the PTT, then input: hang up password+# (333#).

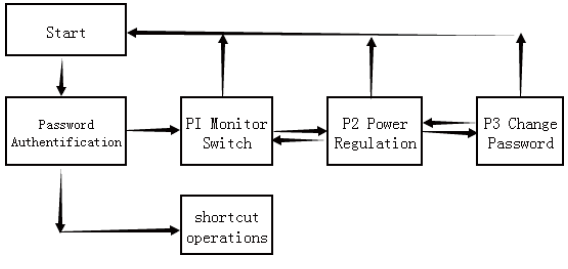
Panel basic operation

1. Power-on State

When the repeater is powered on and is idle, the display will show the current selected channel number.

2. Menu function

Panel function operation include: channel switching, monitor volume adjustment, monitor switch (P1), transmit power regulation (P2), password (P3), channel switching and volume adjustment are shortcut functions others are general function. The operation mode process is below:



If the repeater does not open for password entry, press "OK" to bypass authentication.

3. Password authentication

1). If the current state is menu lock, press "OK" or shortcuts function button enter password authentication, the display will show - - to enter password. The password consists of "1" "2" "3" "4" in any random order, six figures, corresponding button is F1 F2 F3 F4

2). After input of the password, press OK , if the password is correct it will enter the menu "P1" or performs shortcuts, or a warning will occur.

(Password authentication)

3). Press C before OK will remove the password number you input.

4). In any menu press C , the device will enter password lock state and go idle.

5). If there are no button presses for 30 seconds or more, the repeater will enter the password lock and idle state.

4. Channel switching

Channel switching function is in the shortcut's menu function, directly press ◄ or ► to change the current channel, if the menu has a password lock, you need the password authentication, the channel number will display "01-99", when you press ◄ or ►, digital display illuminates, when changing to target channel, then press OK to confirm, repeater will changeto target channel, press C to return to the idle state, and display the current work channel number.

5. Volume adjustment

Volume adjustment function, press F3 or F4 , changing speaker volume, the volume can be U1 to U8 level, U1 is the lowest, U8 is the highest, when you press F3 or F4, the digital display will illuminate, when you adjust to target volume level, and press OK to confirm, the device monitor volume will be set to this new target volume level. The following picture shows a volume setting of U8. It becomes effective when C is pressed. Once pressed, the repeater returns to its idle state.

(Volume adjustment)

6. Monitor switch

1). In the idle state, press OK to enter monitor switch menu, digital display "P1", and then press ▶ " to enter menu option, press OK then enter monitor switch set up.
2). Digital display "ON" or "OF", respectively represent on or turn off monitor switch.
3). Press OK to confirm, the value will be saved and become effective, press C to cancel the operation.

(Monitor open)

4) . Press C again back to P1 menu interface.

7. Power regulation

In the idle state, press OK . In the P1 interface, press ▶ to enter power regulation menu option, digital display "P2", press OK to enter power regulation set up operation interface, see below:

(P2 interface)

1). The digital display shows the current RF power level from L1 to L9. The levels correspond as L1 = 5W and L9 = 50 W. The figure shows a setting of L6 or 30 Watts.
2). Press ◀ or ▶ to decrease or increase the power level, alternately displays new level "L1 to L9" and responding power value.
3). Press OK to confirm, the value will be saved, and becomes effective, press C to cancel the operation.
4). Press C to cancel the operation.

(Power Level 6)

8.Password Change

In the P2 interface, press ▶ to enter password changing menu interface,the display shows P3, you need verify old password before you change password, after the verification of the password, you can change the password, and the default factory password is "1 1 1 1 1 1":

(P3 Interface)

1). Press OK , password authentication, the display shows - - , for thedetailed process please refer to the "Password Authentication"
2). After the password authentication a tone will mean you are correct, and then you can start to set your new password.
3)Press any combination of F1 F2 F3 F4 , set new six figures password, and then press to confirm.

4). Repeat the process, when the two passwords are the same, the repeater will emit a tone to indicate the entry is correct. The display will revert back to P3 indicating that the new password is in effect. If a warning tone is heard then the entry has failed in setting up the new password. Please input the new password again.

5). Press C to cancel the operation and press C again to return to the idle state.

(Be prompted for the password)

Troubleshooting guide

Description	Reason	Solution
Boot problem	1.The power cord has poor contact 2. The power cord is broken. 3. The fuse of power supply loose or blown. 4. Switching power supply failure	1.Re-plug the power cord 2. Replace the power cord 3. Replace the fuse 4.Replace the switching power supply
Programming software fails to connect	Control line is broken	Replace the control line.
Failed to set up a call	1. Frequency of transmission and reception, color code of transmission and reception, re-tuned code, are different from the handsets. 2. Channel parameter beyond the duplexer working bandwidth, equipment trouble light will be lite, the speaker will be warning alarm, the fault code is 12; 3. Receive module failed, the fault code is 30,31,32. 4. Stimulus module failed, the fault code is 20,21,22. 5. Control panel failed, the fault code is 40,41 ,42.	1. Inspect channel parameter: the repeater high frequency transmits, low frequency receives: repeater transmit frequency is corresponding to the handsets receive parts, repeater's receive frequency is corresponding to the handsets transmit frequency, the color code and re-tuned code is the same with handsets. 2. Change the channel parameter in the frequency of duplexer working range or change the channel parameter frequency of the duplexer. 3. Replace the receive module 4. Replace the stimulus module 5. Replace the control panel.
Communication distance becomes shorter	1. Antenna is damaged or feeder has water in it. 2. Antenna is in poor connection 3. Frequency disruption 4. Repeater transmit power decrease 5. Receive module sensitivity decrease	1. Examine the antenna. 2. Replace the antenna. 3. Find out if the frequency disrupted σchanged. 4. Replace the power amplifier module. 5. Replace the receive module.
Indicator light not displayed, no speaker audio	1. Flat cable broken. 2. The display board broken	1. Replace the flat cable. 2. Replace the display board.

When the repeater has an error, the error light will turn on, and the speaker will emit a warning alarm, display will show the fault code. After the warning, check if the communication is OK, if not, restart the repeater, if error still occurs, please contact the dealer.

The fault code as below:

Alarm class	Alarm item	Fault condition	LED display code
RF power amplifier	0.not detected at RF power amplifier	I2C is blocked	10
	1.E2PROM fault	I2C is blocked	11
	2.RFpower amplifierfault	PA _ ERRLED= 1	12
	3.RFpower amplifieroverheat	PA_TEMPDECT>PA_CAP_TEMP	13
	4.RF power amplifieroverflowing	PA_CURRENT>PA_CAP_CURRENT	14
	5.RFpower amplifier overvoltage	PA_VOLTAGE>PA_CAP_V_MAX	15
	6.RF power amplifierunder voltage	PA_VOLTAGE<PA_CAP_V_MIN	16
Stimulus module	0.not detected stimulus module	I2C is blocked, EX_PLLLD=0	20
	1.E2PROM fault	I2C is blocked	21
	2.Transmit frequencylosing lock	EX_PLLLD=0	22
Receive module	0. Not detected receive module	I2C is blocked, EX_PLLLD=0	30
	1.E2PROM fault	I2C is blocked	31
	2.receive frequency is locked.	RX-PLLLD=0	32
Control panel	0.Control panel issue		40
	1.E2PROM issue		41
	1. Digital module fault	HR500_RESET _INT=O, SPI cannot read	42
Channel parameter fault	1. Transmit frequency is over range	Stimulus module parameter power amplifier module duplexer module	01
	2.Receive frequency is over range	Receive module parameter	02
	3.Board-band, narrow-band	Stimulus module parameter, receive module parameter	03
	4.Transmit power isover range	Power module, duplexerparameter	04

General Specifications:

Frequency	136-174MHZ, 400-470MHZ, 470-512MHZ
Channel Spacing	25 kHz/12.5 kHz
Voltage Requirements	100~264VAC~50/60Hz
Antenna Port Spurious Emission 9KHz~1GHz:	≤-36dBm、TX Mode ≤-57dBm、standby mode
1GHz~12.75GHz:	≤-30dBm、TX Mode ≤-47dBm、standby mode
Case Port Spurious Emission 9KHz~1GHz:	≤-36dBm、TX Mode ≤-57dBm、standby mode
1GHz~12.75GHz:	≤-30dBm、TX Mode ≤-47dBm、standby mode
Antenna Impedance	50Ω
Speaker Impedance	40Ω
Operating Temperature Range	-10℃~+55℃
Size (L*W*H)	482mm×440mm×89mm
Weight	≤15KG

Safety Specifications:

Insulation Resistance	≥100MΩ（Testing Voltage DC500V），Insulation Resistance in Hot flashes Environment≥2MΩ
Dielectric Strength	Withstanding Alternating Voltage 1000V（Leakage Current≤5mA），1min，NO Breakdown Flashover and Corona

Receiver:

Digital Sensitivity (BER5%)	≤-117dBm
Adjacent Channel Selectivity	≥65dB
Intermediation Disturbance Rejection	≥70dB
Intermediation Disturbance Rejection	≥90dB
Audio output power	3.0W

Transmitter:

Frequency Stability	≤2.5 ppm
Transmitting Power	25W/50W
Adjacent Channel Power	±12.5kHz：≤-60 dB，±25kHz：≤-70 dB
Transient Switchover Adjacent Channel Power	±12.5kHz：≤-50 dB，±25kHz：≤-60 dB
Modulation	4FSK
4FSK Digital Modulation	Date 7K60FXD、Date plus voice 7K60FXW
Digital Speech Encoder	AMBE++
Transmitting Bit Error Rate	≤1.5%

BDR-50 (DC13.6V)		
Standby current	420mA	
Output Power	**Transfer current**	
	Minimum Volume	Maximum Volume
5W	3.35A	3.43A
10W	4.29A	4.37A
25W	6.8A	6.88A
45W	9.5A	9.58A

WARRANTY AND SERVICE

Limited Warranty This product is warranted by BridgeCom Systems, Inc. to be free of defects in materials and workmanship for a period of two years from the date of purchase. If a defective part causes this product to operate improperly during the one-year warranty period, we will service it to the original owner free of charge if shipped to BridgeCom Systems at the owner's expense. This warranty does not apply to any parts damaged due to improper use or violation of instructions. It does not extend to damage incurred by misuse or abuse, unauthorized modifications, natural causes such as lightning, fire, floods, and other such catastrophes; nor to damage caused by environmental extremes, such as power surges and/or transients, theft, or accidents. All warranties must be performed at BridgeCom Systems, Inc. No credit will be given for unauthorized repair work attempted by the customer. BridgeCom Systems, Inc. will repair or replace the equipment and return to the customer freight pre-paid, within the continental United States. Equipment found not to be defective will be returned at the customer's expense, and it will include the cost to ship, test, and return the equipment. Equipment returned for repair must have a return merchandise authorization (RMA) number. To obtain an RMA contact our Technical Support Department at (636)-205-1736 or email techsupport@BridgeComSystems.com. All returned equipment must have the RMA number listed on the outside of the shipping container. Ship all returns to: BridgeCom Systems, Inc. Attn: Repair 113 South Bridge Street Smithville, MO 64089 Out of warranty repairs and service charges are billed at the current hourly rate plus parts. PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. This document contains information proprietary to Bridge Embedded Systems, Inc. and BridgeCom Systems, Inc. Its contents may not be reproduced, in whole or in part, without express written permission from either Bridge Embedded Systems, Inc. or BridgeCom Systems, Inc. The information is provided "AS IS" without warranty of any kind, either expressed or implied. Bridge Embedded Systems, Inc. or BridgeCom Systems, Inc. does not assume any liability for damages. Technical information and specifications in this document are subject to change without notice. Changes or modifications to this device not expressly approved by Bridgecom Systems could void the user's authorization to operate this device.