Using Satcom Gadgets Push To Talk BGAN

Version 01

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1 Overview

The Push to Talk BGAN (PTTBGAN) by SATCOM GADGETS is a field deployable Radio Interconnect controller, capable of extending access into a connected two-way radio to any authorised user via the Inmarsat BGAN satellite link.

Utilising the global Inmarsat BGAN network and VoIP technology, the PTTBGAN can be connected to a two-way radio network operating in virtually any location on the planet and can provide secured access to this network via a connected Thrane & Thrane BGAN portable terminal.

With the flick of a switch, the PTTBGAN interfaces directly to the Thrane & Thrane range of BGAN terminals to establish and maintain satellite link connectivity to the radio network without additional software or Operator intervention.

This device provides a bridge between a two-way radio mobile or base station located in an operational area and a remote user anywhere that has access to either the Public Switched Telephone Network (PSTN) or the Internet.

Once deployed and enabled, authorised remote users anywhere can access the device via either conventional telephone or via remote console and establish communications with radio users within range of the radio network.

Radio network users can establish connections to a maximum of 12 pre-programmed destinations within the PSTN or Internet on demand to communicate with remote offices or individuals well beyond their existing radio coverage areas.

2 Background

PTTBGAN is designed to link a remotely deployed two-way radio network to the world's telephone or PSTN network via an Inmarsat BGAN terminal. The PTTBGAN is capable of functioning either with a hosted voice service or as an extension of a terrestrially located SIP PBX. Connectivity between the attached two-way radio network and terrestrial services is maintained via a connected BGAN terminal.

3 Typical Users

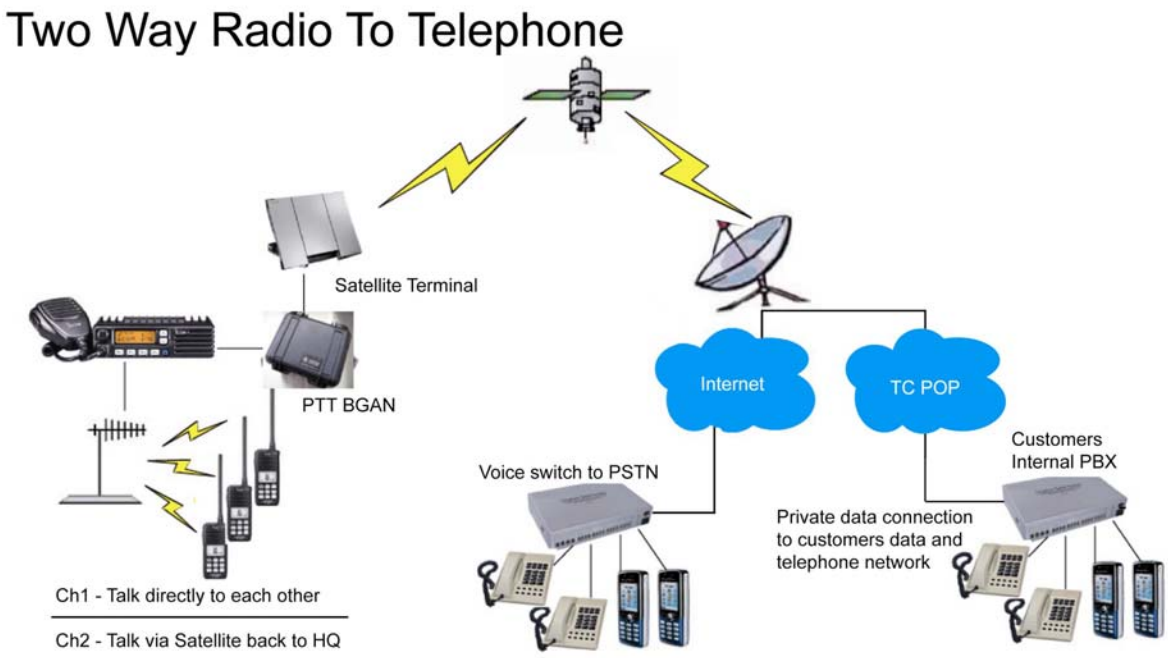
The PTTBGAN is an indispensible tool for any organization that currently utilitises a two-way radio network for their 'on-field' operations. This ability to communicate directly with HQ using existing radio system increases both situational awareness and communication efficiency. Perfect for Aid Agencies, Emergency Services, Defence and NGO's.

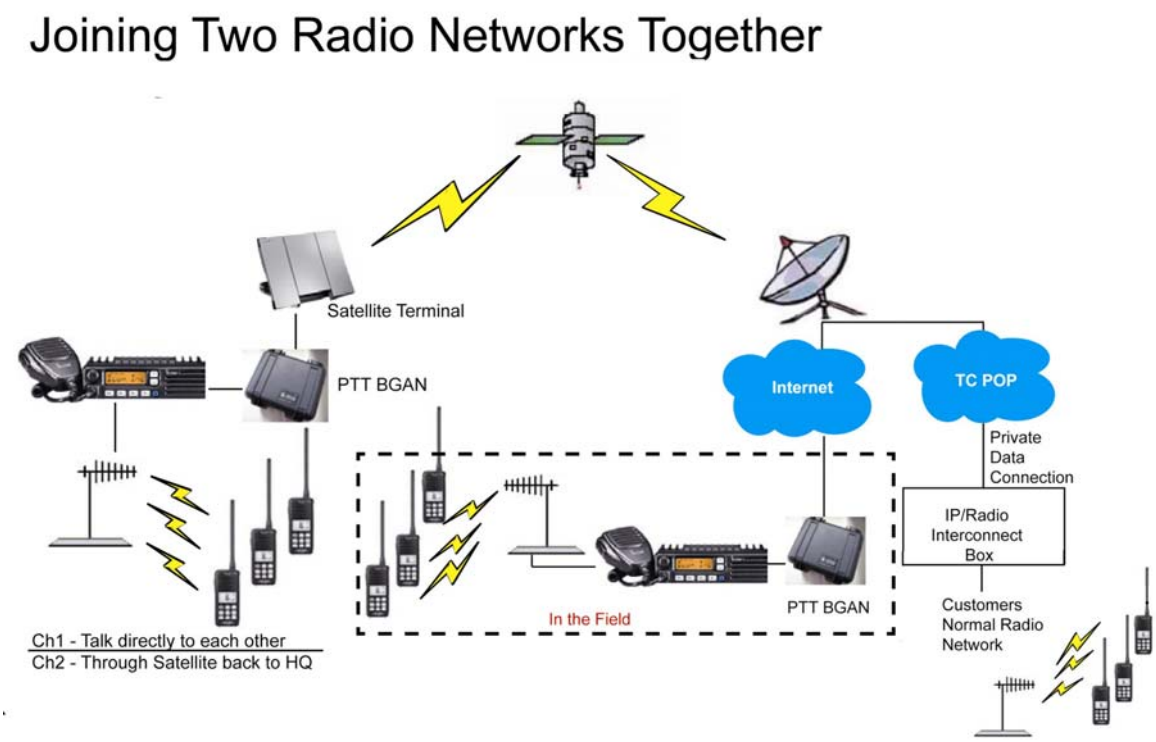
4 Key Features

- Extends the reach of existing 2-way radio networks
- Security and traffic encryption available
- Capable of functioning either with a hosted voice service or as an extension of a terrestrial SIP PBX
- Designed to work with virtually any brand of commercial radio including Motorola, ICOM, Kenwood and Tait to name but a few.

5 Benefits to BGAN users

- Links radio network to telephone network regardless of location
- Can be used to link two separate radio networks
- Works with most existing radion networks
- Inexpensive running costs – similar to satphone call rates
- Numbers are pre-programmed to limit non-approved calls





6 Setting up

The PTT-BGAN is supplied as a kit consisting of the following:

- ✓ PTT-BGAN110 main unit
- ✓ AC power supply
- ✓ Operators Manual
- ✓ Ethernet cable
- ✓ Radio Interface connector and backshell – DB37M

Setting up the PTT-BGAN requires the following:

- ✓ Establish a VoIP account for SIP compliant gateway operation via PSTN, if required
- ✓ Assemble a cable to connect your radio to the 37 pin ‘Radio’ connector of the PTT-BGAN
- ✓ Connect the power supply to the DC in connection of the PTT- BGAN
- ✓ Connect the supplied Ethernet cable between the ‘BGAN’ socket of the PTT-BGAN and your Thrane & Thrane BGAN terminal
- ✓ Configure the PTT-BGAN for required operation

STEP BY STEP

Once you have the PTT-BGAN set up, operation of the unit is as follows:

1. Position the BGAN terminal and adjust for best signal [1]
2. Apply power to the PTT-BGAN110
3. Allow approximately 60 seconds for the unit to initialise, then check that the “BGAN Link” indicator on the PTT-BGAN110 is illuminated.
4. Move the BGAN Link Control switch into the “Connected” position
5. Observe the “BGAN Connected” indicator illuminates after approx 30 seconds, indicating that the satellite link is available
6. The PTT-BGAN is now on line and able to register with the terrestrial service or console that it has been configured to use.
7. Once the PTT-BGAN is available via satellite link, remote stations are able to connect to the device, or radio operators are able to initiate connections to remote services, depending on the configuration of the PTT-BGAN.
8. When a call is made to the PTT-BGAN, the caller contacts the SIP registrar being used, which will remember that the PTT-BGAN has registered and the IP address of the PTT-BGAN. It will forward the call request to the PTT-BGAN and the caller will be connected. From this point on the PTT-BGAN and the caller will send audio data directly, without involving the SIP registrar.
9. The PTT-BGAN can be set up so that any radio user can connect to a maximum of 12 SIP speed dial numbers. Each number can be assigned a SELCALL or DTMF sequence to connect and disconnect.
10. When a radio user wants to call an external phone number, they send the corresponding tone sequence, the PTT-BGAN communicates with the SIP registrar that forwards the request on to the phone number. From this point on the PTT-BGAN and the callee will send audio data directly, without involving the SIP registrar.

7 Testing

Compliance Notice

CE (Europe)

Conformance testing to the following standards is currently in progress:

- EN 61000-6-1: Electromagnetic Compatibility – Generic Immunity Standard
- CISPR 22.1997 Class A: IT Equipment – Radio Disturbance Characteristics

This will ensure that the above equipment is in compliance with all essential requirements of Directive 89/336/EEC.

The technical documentation pertaining to the above equipment can be made available for inspection on application to TC Communications Pty Ltd.

[1] Refer to the BGAN Operators Manual for pointing instructions.

RoHS

TC Communications Pty Ltd confirms that the PTTBGAN will comply with the Directive 2002/95/EC (RoHS).

SAA (Australia)

To ensure compliance with ACA Technical Standards, this equipment has been tested and complies with the following standard:

1. AS/NZS CISPR 22.1997 Class A: IT Equipment – Radio Disturbance Characteristics

FCC (USA)

Part 15

This equipment has been tested and found to comply with FCC Rules and Regulations, Part 15 with the limits of a Class B digital device, designed to provide reasonable protection against harmful interference. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause interference harmful to radio communications.

8. Bandwidth Usage

The following discussion calculates the worst-case bandwidth usage of a single channel in one direction. This is worst case as no channel should be on constantly.

NOTE: All of these calculations / requirements are in **bits per second** not bytes per second.

In the PTTBGAN voice is converted to a packet every 40 milliseconds, we send 25 packets per second. Each packet carries an IP/UDP/RTP header overhead of 320 bits.

Packets per second	25 per second
Overhead per packet	320 bits
Overhead per second	8000 bits per second

Therefore, header/overhead add 8000 bps to the bandwidth requirement for VoIP

The bandwidth requirements for the various codec schemes are:

G.711:	64 kbps + 8 kbps	= 72 kbps
G7.26 ADPCM -32:	32 kbps + 8 kbps	= 40 kbps
GSM:	14 kbps + 8 kpb	= 22 kbps

NOTE: This is the bandwidth consumed while transmitting one half duplex channel. Channels will only transmit when the radio is busy and / or Voice Activity Detection is active, so actual bandwidth usage will be lower than this figure.

In addition to voice packets, the PTTBGAN also sends RTCP (Real Time Control Protocol) Packets. However these are only sent once every 5 seconds and hence the amount of bandwidth used by these packets is negligible. For SIP connection no data is sent at all when a connection has not been made.

When multiple connections are active, either from multiple SIP connections or from conferencing mode, then each VoIP channel will consume the amount of bandwidth shown: If the PTTBGAN has 12 active SIP channels and is transmitting to all of them at the same time, then the bandwidth used will be, worst case, 12 x 72 kbps = 864 kpbs

9 Further Support and Details

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