inmarsat

Vobal Technologies' S2 Solution: Optimized VoIP for FBB & BGAN

High Quality, Pre-paid Telephony Service using Standard IP Data

Version 01

vobal TECHNOLOGIES

Contents

1 Overview

Vobal Technologies has developed the Vobal S2 System: a prepaid Voice over IP (VoIP) telephony service that utilizes a unique, propriety, and patented protocol designed specifically for use on Inmarsat FleetBroadband and BGAN Standard IP Data circuits. Vobal VoIP has been independently certified1 to provide high quality voice service with Standard IP bandwidth consumption being less than 0.05MB, per minute. This low bandwidth usage by an established product means that Vobal's systems are the first commercial solutions to meet the data usage requirements of Very Large Allowance (VLA) pricing plans.

Vobal Technologies also provides the only VoIP technology that provides multi-satellite telephony service in hybrid environments which use failover routers. This unique capability includes automatic adjustment and notification of end user VoIP termination rates based on cost of bandwidth considerations related to the actual satellite "backhaul" used to terminate VoIP traffic. One advantage of this system is that it is, in theory, poised to handle future Global Xpress™ routed traffic as well as today's standard FBB, though, of course, robust testing will be performed once Global Xpress becomes available.

2 Hardware

2.1 Vobal VoIP System (S2)

The basic VoIP configuration consists of a VoIP server (small microcomputer), Cisco Voice Gateway and analog telephone.

[1] **Bandwidth and Quality Analysis – Illinois Institute of Technology**

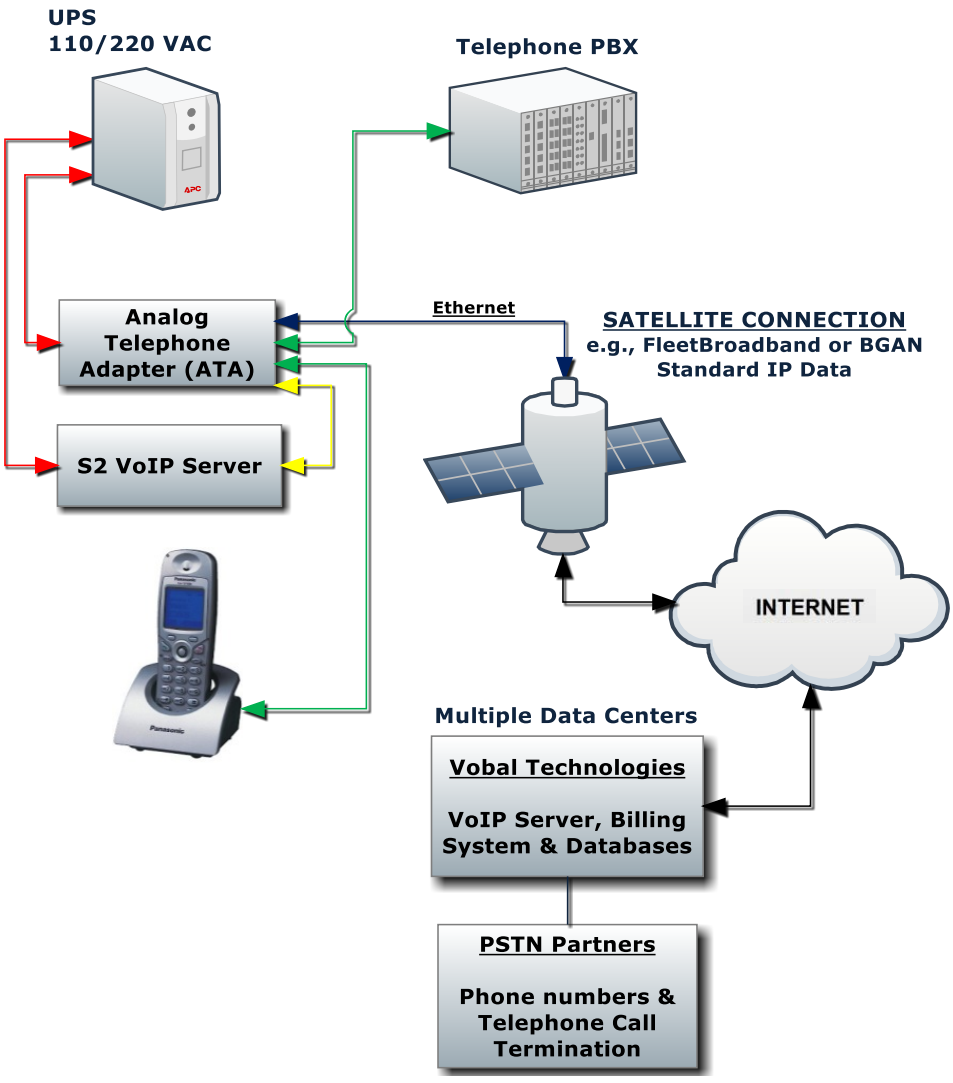
2.2 S2 Technical Specifications

Technical Specifications

Compatibility:
– "Always-on" broadband satellite connections
– Approved for use with Inmarsat "managed services"
Number of calls:
– Up to 8 simultaneous calls
– Can integrate with many PBXs
– Supports both dedicated and "pay phone" lines
Bandwidth consumption:
– Less than 5MB/month idle bandwidth
– ~6kbps for average call (total voice+overhead)

Power:
– 110-240V, 50/60Hz
Temperature/Humidity:
– 3C to 45C
– 0% to 90% non-condensing
Size:
– Base station: smaller than 25cm X 25cm X 10cm
– Ethernet/PBX interface: 10cm X 10cm X 3cm
Interface:
– Ethernet

2.3 S2 Topology



3 VoIP Technology

3.1 Proprietary VoIP Protocol

Vobal Technologies utilizes a unique, patented protocol which provides high quality voice, optimized for transmission via satellite connections with low-bandwidth, high delay, and high jitter.

Highlights:

- One Vobal VoIP telephone call uses ~6 kbps (total) of bandwidth per call, on average.
- Vobal significantly compresses media and provides voice quality which is comparable to telephone services which utilize considerably more bandwidth. Lab measurements of the Mean Opinion Score of Vobal VoIP voice quality is 3.34 versus 3.4 for a typical satellite telephone call and 3.7 for a typical VoIP call over an ideal land network.

- Vobal VoIP overhead is greatly reduced compared to standard VoIP
- Vobal VoIP Idle bandwidth is less than 5 MB per month for an entire system, including multiple phones
- Vobal VoIP telephone traffic on FleetBroadband Standard IP consumes less than 0.05MB, per minute

3.2 Independent Validation of Vobal's VoIP Protocol

VoIP Lab at Illinois Institute of Technology

Simultaneous Calls	Packet Headers*: Ethernet and IP			Packet Headers*: IP Only		
	Kilobits per second (kbps)	Megabytes per minute (MB/min)		Kilobits per second (kbps)	Megabytes per minute (MB/min)	
		MB as 1,048,576 bytes	MB as 1,000,000 bytes		MB as 1,048,576 bytes	MB as 1,000,000 bytes
One	6.1800	0.0442	0.0463	5.5851	0.0399	0.0419
Three (for each call)	4.9467	0.0354	0.0371	4.7032	0.0336	0.0353

Note: Satellite system data transfer protocols do not include Ethernet headers, only IP headers.

4 Making VoIP calls using Vobal

Vobal VoIP is a prepaid service. VoIP telephone service can be funded in several ways - depending on specific customer requirements.

4.1 Shared line

Typically, in situations where multiple Crewmembers or Passengers will be accessing the Vobal VoIP telephone service, prepaid airtime is sold in the form of pre-paid PIN Codes. The value and denomination of these pre-paid PINs are established during the sales order process.

Initiating a ship-to-shore telephone call

Prior to initiating a telephone call, have your PIN code available.

1. Pick up the telephone and listen for a dial tone. A dial tone indicates the VoIP telephone system is operational and ready to provide service.
2. Input your destination telephone number using the following convention

<country code><area code><telephone number>

Example of call to New York City, NY, USA

1-212-5551234

3. The Vobal VoIP “auto attendant” will ask for your PIN code

Carefully input your 12 digit PIN

4. The auto attendant will inform you of the remaining balance (in minutes and seconds) of your pre-paid PIN.
5. The telephone call will be processed

4.2 Dedicated line

Sometimes a ship will choose to have a dedicated line set up (for ship’s business, for instance). These lines do not require entering a PIN code prior to each call, but are funded through a number of other ways that may be established during the sales process.

Initiating a ship-to-shore telephone call

1. Pick up the telephone and listen for a dial tone. A dial tone indicates the VoIP telephone system is operational and ready to provide service.
2. Input your destination telephone number using the following convention

   <country code><area code><telephone number>

Example of call to New York City, NY, USA

1-212-5551234

The auto attendant will inform you of the remaining balance (in minutes and seconds) of your dedicated line.

3. The telephone call will be processed

4.3 Receiving incoming (shore-to-ship) telephone calls

The only requirement for receiving telephone calls is to insure that the VoIP telephone system is online and connected to the "internet".

The "internet" is available when the FBB or BGAN unit's Standard IP Data circuit is active and connected.

Please note that shoreside correspondents calling your telephone number will also be informed of your prepaid balance (in minutes and seconds remaining for the call, not in dollar value) prior to the call being connected.

5 Installation Instructions

5.1 Equipment Contents

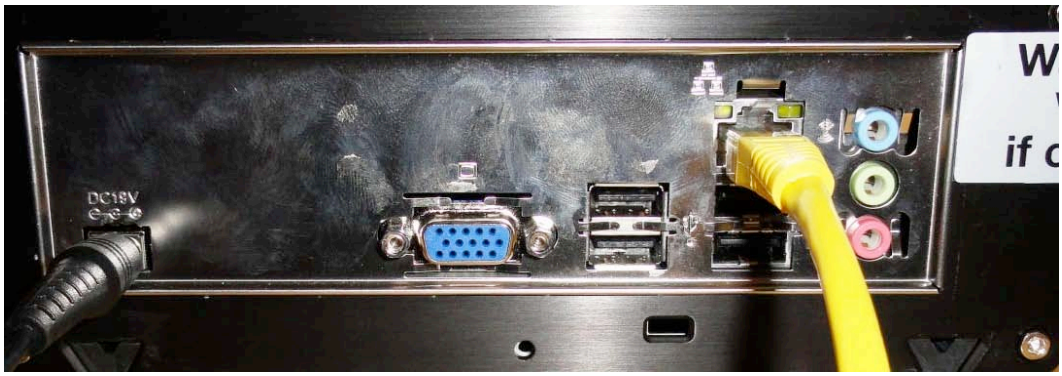
S2 Server + power adapter cabling (small black computer) Two (2) Ethernet cables – one blue, one yellow Analog Telephone + cable (RJ11 connectors)	Analog Telephone Adapter (ATA) + power cabling – Unit that connects the S2 to the Internet and to the analog telephone or PBX

5.2 Equipment Setup

1. Connect one end of the yellow Ethernet cable into the Ethernet port in the back of the Vobal S2 Server.

2. Connect the power cord into the back of the S2 Server.

   Example:



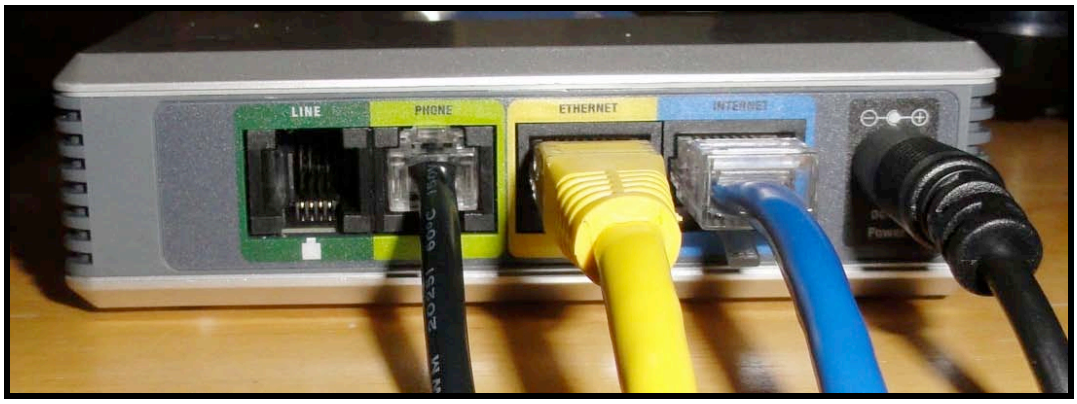
3. Connect the analog telephone phone cable to both the telephone base unit and to the green port of the ATA, (Phone).

4. Connect the free end of the yellow Ethernet cable into the yellow port of the ATA (Ethernet).

5. Connect one end of the blue Ethernet cable into the blue port of the ATA (Internet) and the other end into the Internet source.

6. Connect the ATA power cord to both the ATA unit and the power source. After several seconds you should see 2 green lights on the ATA indicating power and Internet. If you do not, check that the Internet connection is live and that power is applied to the ATA.

   Example:



   Note: The ATA provided may have 2 Phone lines rather than a Phone and Data line as shown in this photo.

7. Connect the S2 Server's power cord into the power source**.**

8. If **less than 30 seconds** have passed since powering on the ATA, **wait**. Otherwise power on the S2 Server by pressing the power button on S2 front panel.

9. After about 2 minutes, a third green light on the ATA lights up indicating that telephone service is available.

10. Pick up the analog telephone handset and dial a test telephone number - with or without a leading 00 prefix. For example, a U.S. telephone number would be dialed "1-312-444-3456" or "001-312-444-3456".

11. The Vobal VoIP automated attendant will inform you of the available pre-paid balance (in minutes and seconds remaining) prior to connecting your telephone call.

If you have a dedicated line, please note that shoreside correspondents calling your telephone number will also be informed of your remaining calling balance (in minutes and seconds, not in dollars) prior to the call being connected.

6 Further Information and Support

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