B.B. Link Adapter

Reviewer's Guide v1.0a

https://go.islandmagic.co/bb-link-reviewer-guide

This guide is for anyone who wishes to review the B.B. Link Adapter. It offers background information and guidance on the aspects of the device that should be covered. Ultimately, the product will stand on its own merit, so be sure to be honest and authentic in your assessment. If you encounter any issues, please reach out to us first to see if we can resolve them. Your unique situation might provide helpful feedback that can be incorporated to improve the product.

1. Introduction

The B.B. Link Adapter is a device that allows iPhones and iPads to access the KISS TNC modem built into the Kenwood TH-D74 and TH-D75 radios via Bluetooth.

With this adapter, iOS applications like RadioMail, aprsfi, and PocketPacket can utilize the radio's TNC to send data using the AX.25 packet protocol. This enables licensed amateur operators to use their iPhones and iPads to exchange emails, GPS positions, and short messages completely off-grid.

The B.B. Link Adapter is a creation of Georges Auberger, WH6AZ. Georges is the principal behind Island Magic Co., where he develops products specifically for amateur radio operators as a passion project from the beautiful island of Kaua'i.

The adapter available for purchase at: https://getbblink.com

It comes packaged with a handy lanyard and a quick setup card. A detailed manual is available for download at https://go.islandmagic.co/bb-link-manual

The newly released Special Edition collection introduced new colors with matching lanyards: Rapid Response Red, Covert Tactical Black, and Rescue Ready Orange. Colors subject to limited availability.

2. Background

Refresher on AX.25 TNCs

The AX.25 protocol[1] is an amateur radio extension of the X.25 protocol, which is a packet-switching protocol for data communication. Traditionally, Terminal Node Controllers (TNCs) were specialized hardware devices that acted as intermediaries between a computer and a radio transceiver for connection via AX.25.

As computers became more capable, the KISS TNC (Keep It Simple Stupid Terminal Node Controller) specification[2] was introduced. The idea was to provide a simplified version of the

[1] https://www.ax25.net

[2] https://www.ax25.net/kiss.aspx

TNC, stripping down its functionality to the bare minimum required for packet framing and modulation/demodulation only.

This allowed the separation of the lower portion of the AX.25 stack, delegating AFSK (Audio Frequency-Shift Keying) modulation/demodulation and HDLC (High-Level Data Link Control) framing to the TNC, while the higher portion of the protocol was handled by software applications.

One way to think of a KISS TNC is as a modem, where an application can send digital data, and the modem modulates that digital data into analog signals. Additionally, it controls the timing of the radio PTT (Push-To-Talk), which is critical for simplex transmission.

AX.25 is at the core of APRS (Automatic Packet Reporting System) and is one of the connection-oriented protocols used by the Winlink email gateways. Having access to a TNC opens the door for many applications.

The Problem

The Kenwood TH-D74 and TH-D75 radios contain a KISS TNC that can be accessed via USB or Bluetooth. The radio uses Bluetooth Serial Port Profile (SPP) to expose the internal KISS TNC modem, likely because TNCs have traditionally been serial devices.

On iOS, Apple does not allow applications to use SPP and only permits Bluetooth Low Energy (BLE)[3]. Note that SPP is supported on macOS, indicating its explicit absence on iOS is a deliberate design decision, possibility due to battery consumption concerns.

This combination results in a frustrating incompatibility where iPhones and iPads can't natively pair with those radios to let applications access the built-in KISS TNC modem.

While in theory device manufacturers could participate in Apple's certification MFi program[4], which allows some restricted access, there is scant evidence of manufacturer doing that. The Lego Mindstorm is one of the few example cited.

Note that macOS and Android operating systems allow applications to access devices via SPP, so these platforms can access the TNC natively.

The Solution

The idea is to create a Bluetooth bridge so that each device has an interface they can connect to and be satisfied.

On the radio side, the Serial Port Profile has been around for a while and is pretty standard. The difficulty lies in pairing the two devices, with the added complications of PIN confirmation. This can be solved by providing an iOS application that can perform basic configuration and provide a user interface to the user.

On the BLE side, there is no standard way to access a serial device. However, there is a well-documented method to expose an AX.25 KISS TNC over BLE. This was created by Hessu, OH7LZB, who runs aprs.fi. It has since been implemented in devices such as the Mobilinkd TNC3 and TNC4 and the PicoAPRS radio. Applications such as RadioMail (an email client for

---

[3] https://support.apple.com/en-us/102842

[4] https://mfi.apple.com/en/home

Winlink), aprs.fi, and PocketPacket (APRS clients) support it. The protocol allows for zero-configuration discovery of the device, making the pairing process very easy.

The ESP32-PICO by Espressif is the microcontroller selected for this solution. It is ubiquitous and supports both BLE and Bluetooth Classic.

The last problem is figuring out how to power the adapter. A lithium battery is an obvious choice for a standalone device, but it adds complexity with the necessary charging circuit and requires the user to worry about battery charge levels.

With the advent of Apple adopting USB-C as a standard port on the iPhone 15 and newer iPad models, a more interesting solution emerged. USB-C can provide power to devices, even though Apple is still limiting USB-C OTG use (similar to the Lightning connection), meaning you don't have access to the full array of USB profiles. However, power delivery is available.

In its final form, the B.B. Link Adapter sports a USB-C connector. Because everything happens via Bluetooth, the adapter only uses USB-C for power. As such, it can be plugged into a standard power bank with a USB-C port, or more interestingly, the iPhone 15 and newer iPads.

Of note, only iOS devices with a native USB-C port can be used as a power source. Older generations of devices with a Lightning connector won't power accessories. Lightning-to-USB-C adapters will not provide power to a connected device; they only exist so that USB-C cables can be used to charge the phone.

Chronology

Sometimes things take a while to incubate before they come to light. The release of the TH-D75 was the catalyst that ensured renewed interest in this solution.

May 2020	Release of AX.25 KISS over BLE specification[5]
June 2020	Release of proof-of-concept code for adapter and video showcasing APRS[6]
Dec 2022	Release of RadioMail 1.0
Dec 2022	Validation that proof-of-concept code works with RadioMail
Dec 2023	Release of Kenwood TH-D75
Feb 2024	Release of new firmware and how-to build DIY adapter video[7]
May 2024	Launch of ready-made USB-C custom hardware version of adapter

3. Review

First Impressions

Describe your first impression with the packaging and design. Review what's included. How does the product look? Is it visually appealing. Is the form factor suitable for the use?

---

[5] https://github.com/hessu/aprs-specs/blob/master/BLE-KISS-API.md

[6] https://www.youtube.com/watch?v=j5k3T9hIcPM

[7] https://github.com/islandmagic/bb-link

Usage and Features

Setup

Describe the setup process. Is it easy and straightforward?

Are the instructions on the quick setup card clear?

Download the manual. Is the manual useful? Are the instructions clear?

Highlights:

- Adapter needs to be paired only once
- Adapter can only pair with one radio at a time
- Adapter firmware can be updated over-the-air

Core Features

Highlight the main features of the adapter:

- Ubiquitous USB-C connector. Can be powered from any USB-C portable bank, iPhone 15, newer iPad or in-vehicle USB-C charger.
- Automatically identifies the correct VFO for data connections and switches the radio to KISS TNC mode when an app connects.
- Allows applications like RadioMail to change frequencies as needed.
- Automatically returns the radio to its previous frequency and KISS mode once you're done.
- Comes with a handy lanyard to keep your adapter within easy reach.

User Experience

Is it user friendly? How is the attention to detail. Anything missing?

Performance

Does the adapter perform consistently? Is it reliable?

Use Cases

Who would benefit the most from this product. Provide examples of scenarios where the product would be particularly useful.

Suggestions:

- Showcase email exchange session with RadioMail
- Showcase GPS position beaconing with aprsfi or PocketPacket
- Showcase messaging with aprsfi or PocketPacket

Final Thoughts

Summarize your overall impression on the product. Synthesize the pros and cons. How does it compare to other solutions available? Would you recommend this product to others? If so, why?

Call to Action

Where to buy the B.B. Link Adapter: https://getbblink.com

Encourage others to use social media to spread the word about how they use their adapter.

Content Guidelines

Your original content is preferred. When possible, show the adapter in use and choose settings that demonstrate its portability, such as outdoors or in a vehicle.

Try to avoid jargon or alternatively define terms when possible. Keep the tone light and entertaining—this is a fun hobby, after all!

If necessary, you can use photos from our media library.

Resources

B.B. Link Adapter - https://getbblink.com
B.B. Link Configurator - https://apps.apple.com/us/app/b-b-link-configurator/id6476163710
B.B. Link Operator Manual - https://go.islandmagic.co/bb-link-manual
B.B. Link FAQ - https://islandmagic.co/bb-link-faq

RadioMail - https://radiomail.app
APRSfi - https://geo.itunes.apple.com/app/aprs.fi/id922155038
PocketPacket - https://koomasi.com/pocketpacket

4. Contact Information

Questions or suggestions, email aloha@islandmagic.co