

D-STAR for the Technically Curious

A quick overview of current development projects and building blocks for the D-STAR experimenter or integrator.

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Disclaimer

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The use of the term D-STAR in this presentation means “compatible with the D-STAR protocol” and does not represent the views, sanction, or endorsement of Icom Incorporated or the JARL.

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Hardware

- Dongles (by AA4RC)
 - DV Dongle
 - DVAP
- Node Adapters
 - Satoshi Yasuda 7M3TJZ/AD6GZ
 - Mark Phillips G7LTT/NI2O
 - Fred van Kempen PA4YBR/KA4YBR

DV Dongle



Image courtesy of AA4RC

- AMBE Chip to generate D-STAR voice
- Computer Interface USB
- No radio component
- No GMSK Modem
- DVDongle.com
- OpenDSTAR.org

DVAP Dongle



Image courtesy of AA4RC

- 2 meter transceiver
- Built-in GMSK modem
- No AMBE Chip
- D-STAR air protocol
- Analog FM
- Program by AA4RC
- USB Interface

Node Adapter Basics

- Radio Interface (9600 baud Ports tend to work)
 - Discriminator
 - Modulator
 - PTT
 - COR (opt)
- Computer Interface
 - USB (2.0)
- Contain GMSK Modem
- Firmware to talk to computer
- 2 firmware lines: “Satoshi” and “Fred”

“Satoshi” Node Adapter



Image from d-star.dyndns.org

- Earliest Commercial Entry
- Now in Seventh Generation
- Kits and Assembled
- 7M3TJZ Design
- d-star.dyndns.org

Not Quite So Mini-Hotspot

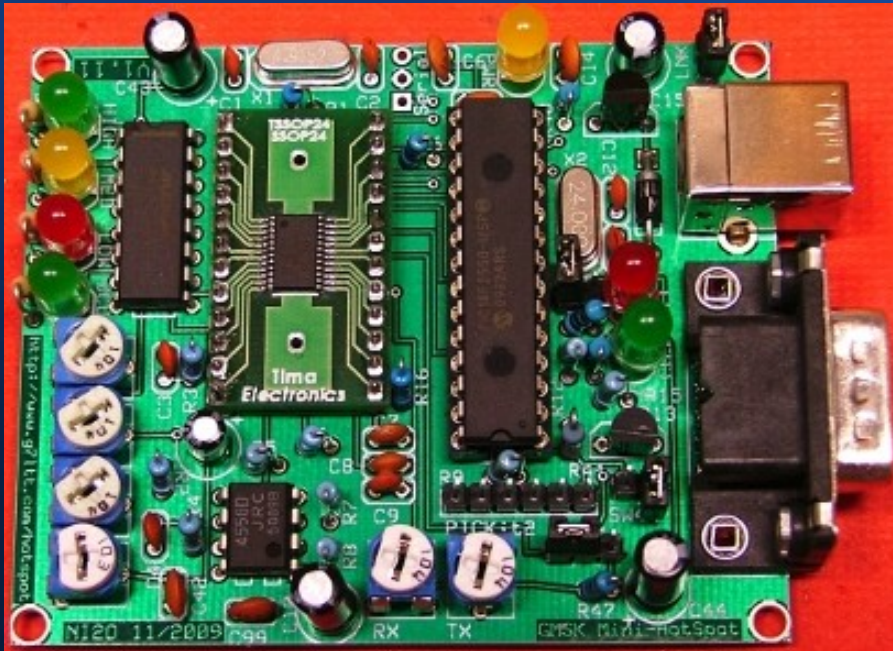


Image courtesy of NI20/G7LTT

- US Distribution
- Refined from multiple generation design
- USB Firmware Loads
- Kits and Assembled
- G7LTT Design
- enicomms.com

Dutch*Star Mini Hotspot

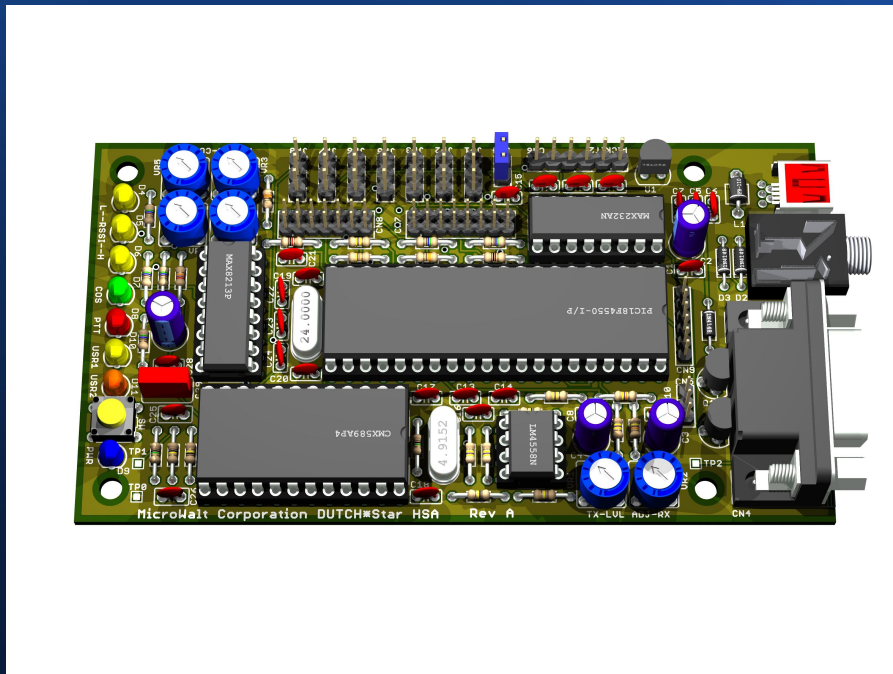
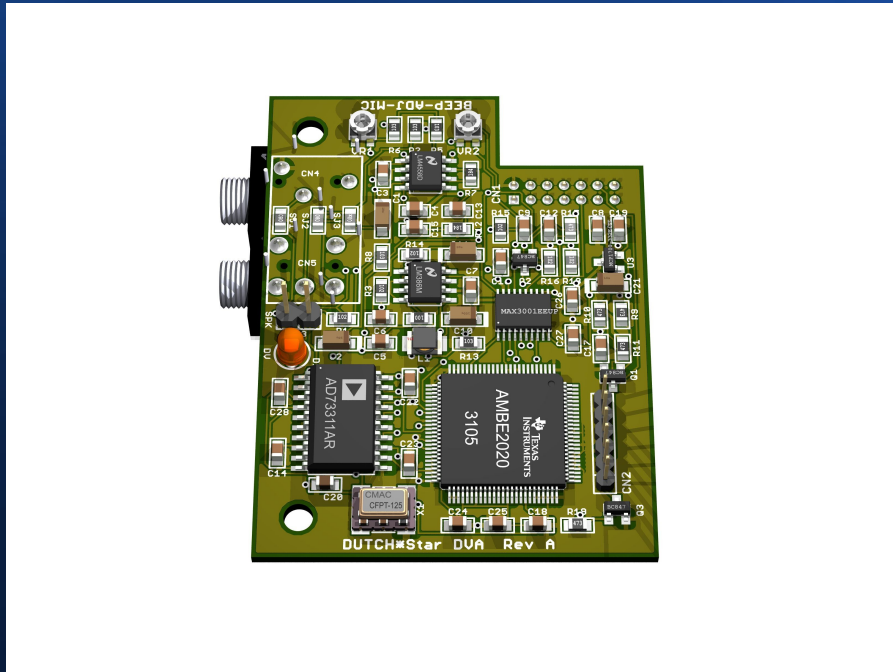


Image courtesy of PA4YBR

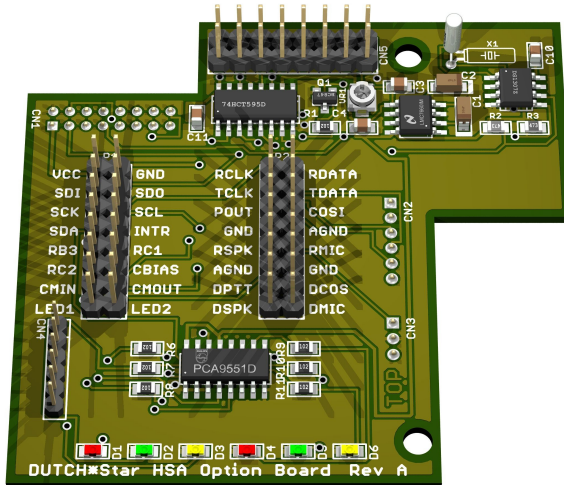
- Compatible Fork from G7LTT Designs
- European Distribution
- Kit or Assembled
- Part of family of products by PA4YBR
- dutch-star.eu

Dutch*Star DVA



- Digital Voice Adapter
- Mates to Hotspot
- AMBE 2020

Dutch*Star Option Board



- Display Driver
- Accessible Data Pins
- Real Time Clock
- Temp Sensor

Dutch*Star (In Design)

Analog Repeater board; implements a dual-mode DV/Analog repeater

Icom RP2C connector, as per Michael Carey VK5ZEA's work

Analog Link, implementing an analog mini-transceiver for LPD/PMR/FRS access and DV Access Point mode

Node Adapter Firmware

- Satoshi
 - Closed Source
 - Assembly
 - High fees for non-Satoshi hardware
 - Restrictive licensing
- Dutch*Star
 - Closed Source
 - Compiled “C”
 - Simple fee for any board that will run it
 - “Common Sense” licensing

Software Projects - Repeaters

Open or Available Source

- PCRepeaterController by G4KLX (Free)
- RPTR / RPTR_MUX by KI4LKF et al (Free)

Closed Source

- Firmware from Satoshi or Dutch*STAR (Pay)
- NI-STAR component by G4ULF (Free)

PC Repeater Controller by G4KLX

- Open Source. Linux and Windows
 - Soundcard for GMSK encode/decode or
 - Node Adapter with Satoshi Firmware (beta) or Dutch*Star Firmware (soon)
 - GUI or CLI (w/configuration)
 - Full analog repeater controller (dual mode possible)
 - Yahoo! Group [pcrepeatercontroller](#)

RPTR / RPTR_MUX

- Written by KI4LKF with the assistance of others such as DG1HT
- Not currently being developed or maintained.
- Uses a node adapter for radio interface.
 - Satoshi OK
 - Dutch*Star special build (minor issue)

RPTR / RPTR_MUX (cont.)

- Sources can be found. Open Source status in question.
- Written in C++ for both Linux and Windows.
- Looks like an Icom controller to a gateway (Almost)
- MUX allows multiple instances and/or an RP2C to interface to a gateway.

NI-STAR and Firmware

- NI-STAR

- Closed Source
- Integral part of NI-STAR Package
- Works with Satoshi and Dutch*Star

- Firmware

- Closed Source
- Allows standalone repeater with just a Node Adapter

Realtime Routing Updates IRCDDDB

- Free Open Source
- Uses Internet Relay Chat to update gateways of routing changes. (PTT update as station moves from one location to another)
- Voluntary and OK to use on the USRoot Trust, standalone gateways, and Multi-Trust
- Enables callsign routing between networks
- ircddb.net

Gateway Software

- NI-STAR
- Open G2
- IRCDDDB based

NI-STAR

- Closed Source developed by G4ULF
- Authorized on the USRoot Trust, should work on Multi-Trust
- Release “any picosecond now” (running on NW7DR)
- Works with DPLUS, JavaAPRS/DPRS, etc.
- Includes both repeater control on Node Adapters using either firmware with all gateway functions
- Already deployed on several test systems.

Open G2

- Developed by KI4LKF
- Source and binaries can be found in the Yahoo! Group pcrepeatercontroller files section
- No current “owner” though builds and deploys continue

Open G2 (cont.)

- Emulates Icom G2 software (reverse engineered)
- Not approved for USRoot Trust
- Very common on the Multi-Trust
- Works with RP2C (through MUX), pcrepeatercontroller (very common), and RPTR

IRCDDDB Based Gateway

- New Project
- Will use the IRCDDDB to provide all routing information
- Does not require user radio registration
- Full feature set TBD
- G4KLX project so should be Open Source

Gateway and Reflector Linking

- Linking is not native to D-STAR
- D-STAR is mostly “stateless” on the frame/packet level.
- Linking uses a separate infrastructure from native D-STAR callsign routing to move DV around.
- Most used application of D-STAR

Gateway and Reflector Linking

- Three major implementations
 - DPLUS
 - DEXTRA
 - D-RATS (DV-DATA)

DPLUS

- Developed by AA4RC
- Uses “packet sniffing” on the gateway to find traffic and commands.
- Uses separate UDP/TCP ports to transfer traffic
- Enables DVDongle, DVAP, and Reflectors
- Used by DVAR Hotspot
- Closed source
- Security Enhancements

DEXTRA

- Developed by KI4LKF, being enhanced by G4KLX
- Available source (Yahoo! Group pcrepeatercontroller)
- Copies base functionality of DPLUS, but does use security enhancements or interoperate with DPLUS
- Has clients for DV Dongle, R2G2 “Hotspot” functionality and Reflectors (Linux and Windows)
- Not common on USRoot Trust, “preferred” on Multi-Trust

D-RATS

- Attend the D-RATS session by Dan Smith KK7DS
- Open Source, multi-platform



DVAR Hotspot

- Closed source Windows application by KB9KHM
- DPLUS Only – uses Node Adapter to RF
- Large user base for simplex/repeater access points
- Does not provide native D-STAR networking, no callsign routing
- Used to link to repeaters and reflectors.

Digital Voice by G4KLX

- Three Open Source Applications
 - DExtraClient
 - DStarClient
 - DVToolReader
- groups.yahoo.com/group/dstar_development/files
- Open Source

DExtraClient

- Requires DV Dongle
- Windows Application
- Connect to predefined list of DExtra Reflectors and Gateways
- Equivalent to DPLUS / DVTool

DStarClient

- Requires:
 - DVDongle
 - Windows Computer
 - 2 soundcards (Node Adapter planned)
 - Radio fit for 9600 baud packet
 - Control (Velleman, Serial, URI, ...)

= Home built DV compatible radio!

Other Programs

- AE7Q
 - D-STARCOM
 - D-STARLET
- Others
 - DSTAR TV
 - DSTAR CHAT
- KK7DS
 - ChiRP
- Others that I have missed.

Some things I'd like to see...

- D-STAR to SIP gateway for Autopatch/Reverse Autopatch – DID to Callsign mapping.
- Callsign routed “Net/Roundtable” server (I've started coding this)
- DD compatible box
 - 23 cm
 - Sealed Box
 - POE
 - Couple of watts
 - N – Connector
 - Control by Web

Questions and Comments?

Your Ideas?

Visit

k7ve.org

dstarusers.org

dstarinfo.com

Yahoo! Group [dstar_digital](#)

Thank You

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