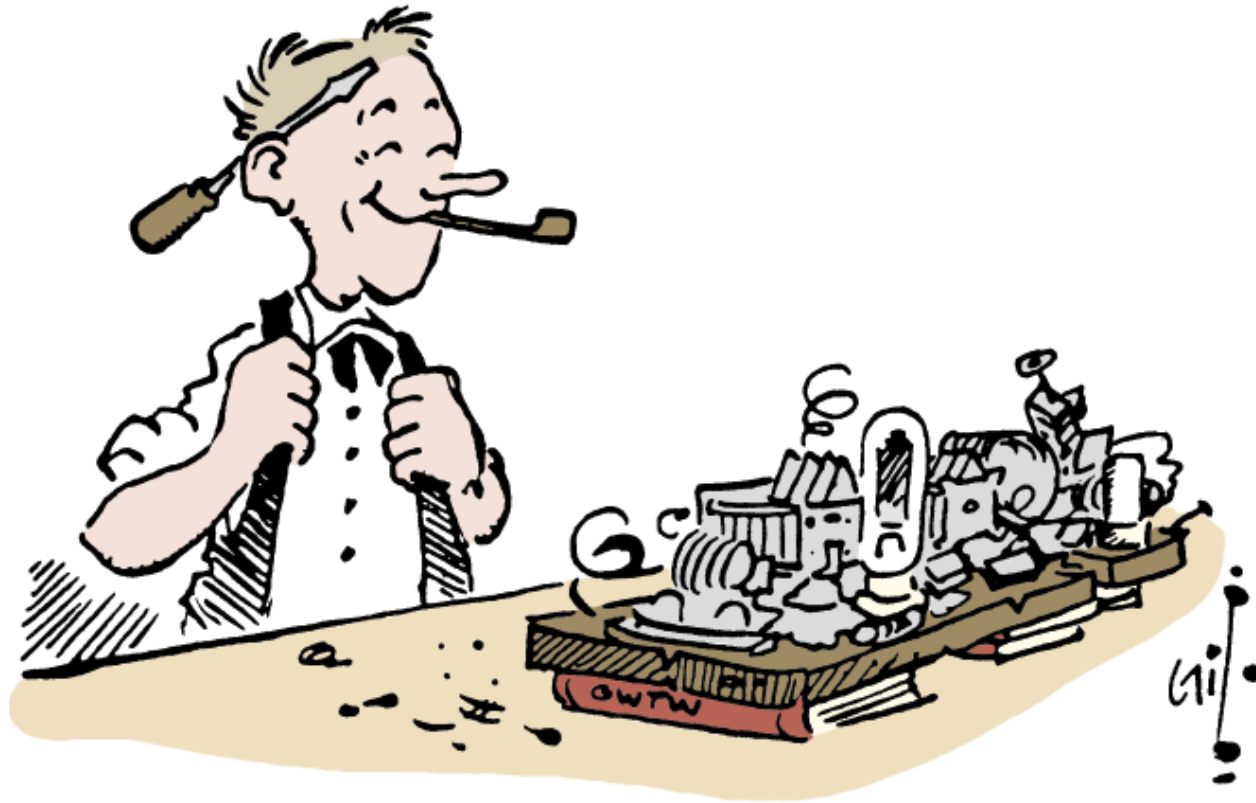


# D-STAR Compatible Homebrew



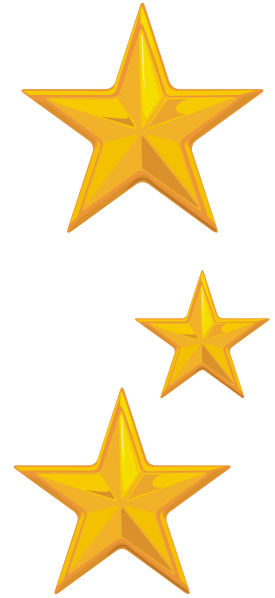
**Jim Moen – K6JM**  
**16 May 2014**  
**Drury Inn**  
**Dayton**

Artwork by  
"Gil" Gildersleeve  
W1CJD

Buy "Gil - A Collection  
of Classic Cartoons  
from QST" at the ARRL  
store

# Topics

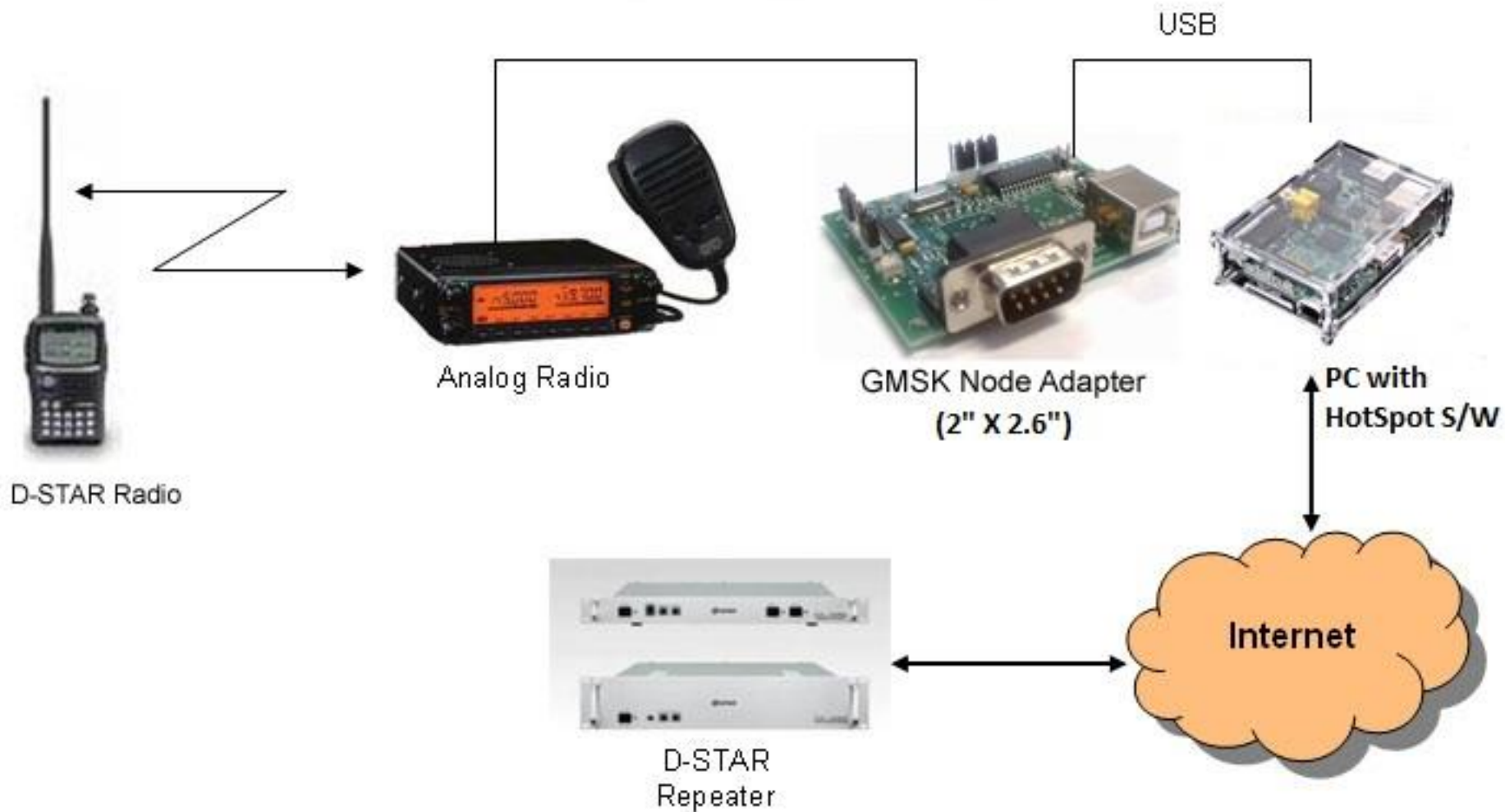
- **Homebrew and D-STAR?**
- **Current State**
- **What's coming down the Pike?**



# Homebrew?

- Experimentation is intrinsic to our hobby
- In US: One purpose of Amateur Radio:  
“Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art”
- Homebrewing includes everything where the Ham participates in making it happen
- Antennas, kits, computers...
- D-STAR has a lot of this going on

# An Example "Hotspot"



# Does Homebrew compete with ICOM?

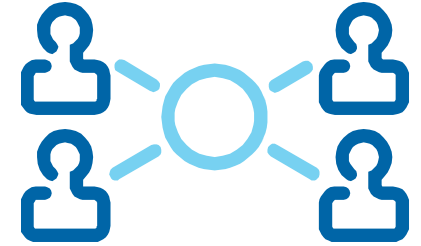
- Perhaps a little, but mostly it complements ICOM's activities
- We always recommend first getting a D-STAR radio to newbies
- Then if there's no nearby repeater, they can get a DVAP or build a Hotspot
- Bottom line:
  - Homebrewing usually leads to D-Star radio purchases
  - Homebrewing is a fun way to learn
  - It increases participation in the hobby
  - There's a sense of accomplishment when it works



# ICOM's Role

- D-STAR RF spec is Open
- ICOM has done the heavy lifting to make it a complete and growing system
- 3<sup>rd</sup> party add-ons have helped too
  - DV Dongle, DVAP, Modems, Software....
- New ICOM radios are incorporating linking concepts developed by 3<sup>rd</sup> parties
- ICOM continues to develop new D-STAR equipment with exciting features
- Full disclosure: I love my ID-51A! (And my next Ham Radio purchase will be a 5100)

# What's fun about D-STAR?



## Answer: The D-STAR Network

- You can connect repeaters to other repeaters  
Or to “Reflectors” (Conference Servers)
- Access hundreds of reflectors, 1000s of repeaters and hotspots
- You can build your own “garage” D-Star compatible Hotspot or Repeater  
And that can connect to reflectors around the globe

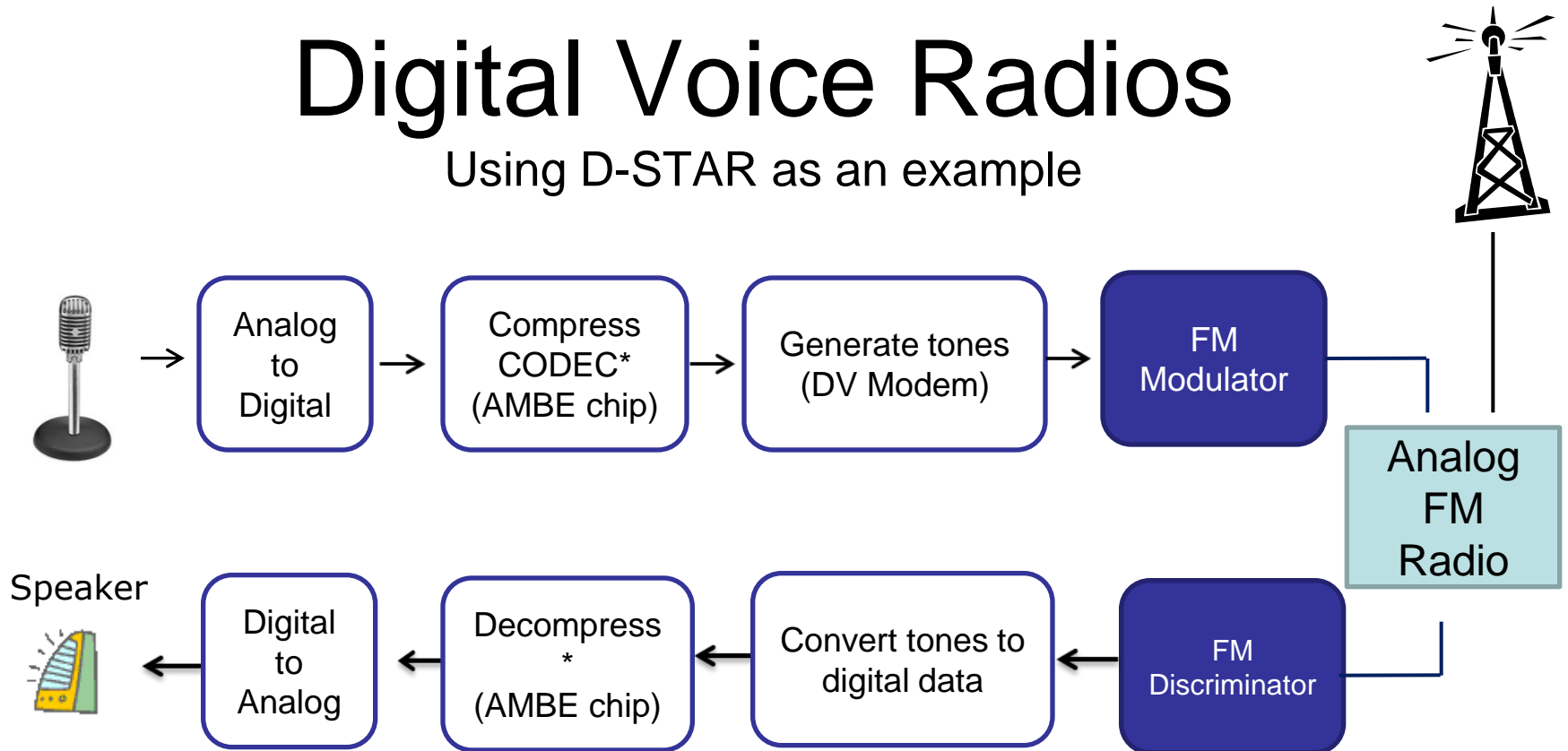
# Current State – 3<sup>rd</sup> Parties

- Modems and Hotspots
- DVAPs and DV Dongles
- Multi-platform software
- Adapting Analog Radios for HF DV QSOs

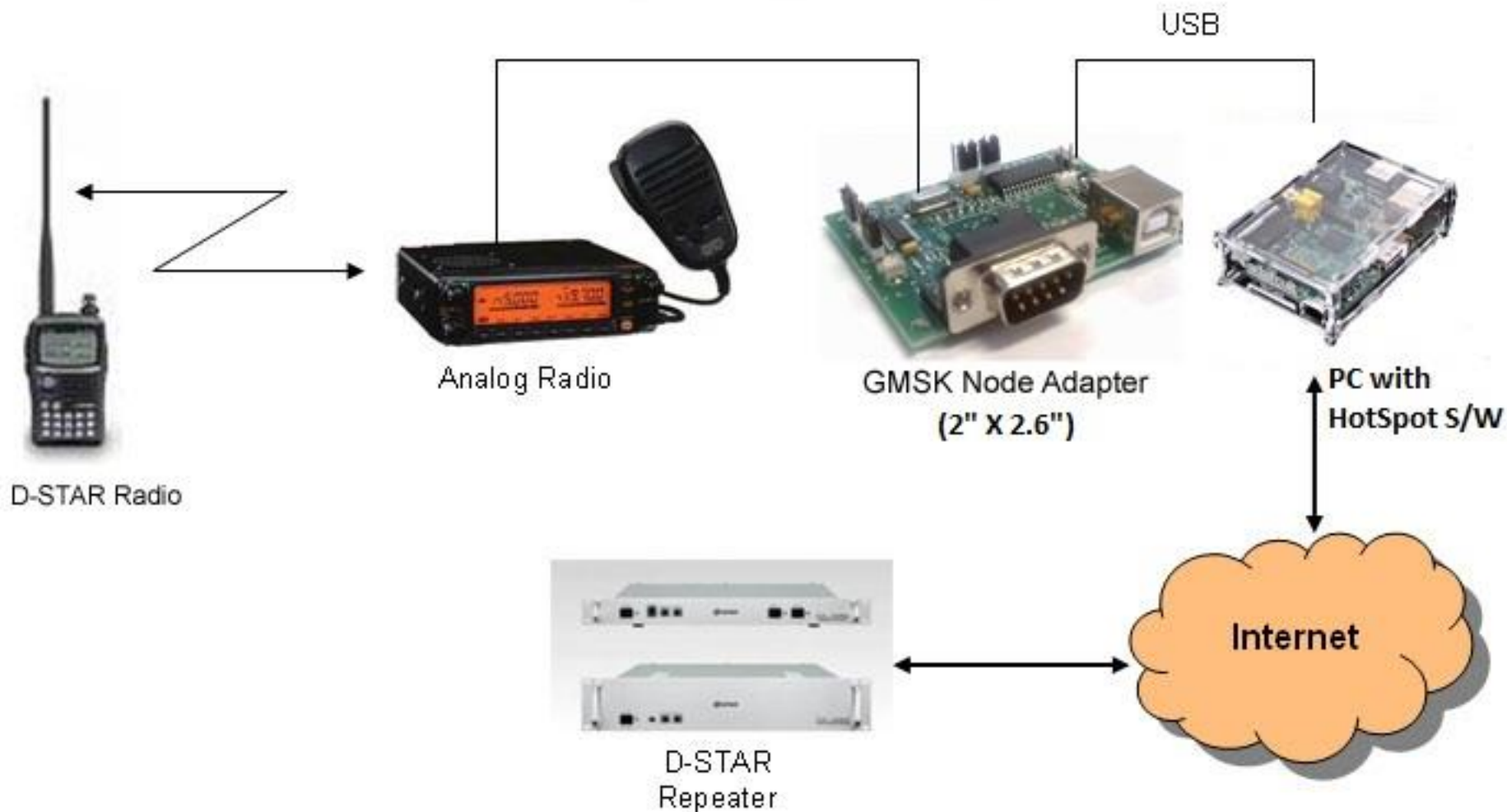


# Digital Voice Radios

Using D-STAR as an example



# DV Modems & Hotspots



# Modems



- Convert the analog tones to digital
- And vice-versa
- Various kinds
  - GMSK (uses hardware modem chip)
    - Examples: DUTCH\*Star, Satoshi, ...
  - DSP (uses software for modem function)
    - Examples: DVPRTR-V1 (Canada), DVRPTR-V2/V3 (Germany)

# Why HotSpots?



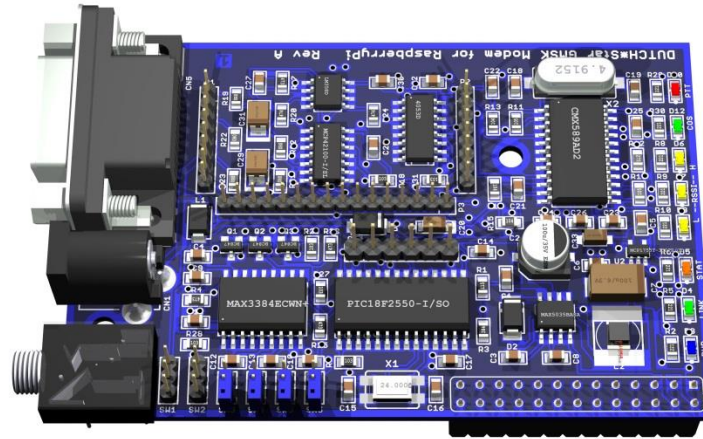
- **Brings D-STAR network to your neighborhood**
  - If your QTH has no RF access to a D-Star repeater
  - Or (like my QTH) is in a multipath shadow
  - Or you want to link to whatever repeater whenever you want
  - Or you need extra power for extra range
- **It's an interesting Do It Yourself project**
- **What is needed?**
  - Modem (many available for D-STAR)
  - Computer (e.g. Raspberry Pi computer for < \$50)
  - Analog FM transceiver that supports 9600 Packet
  - Software (free)

# What's New



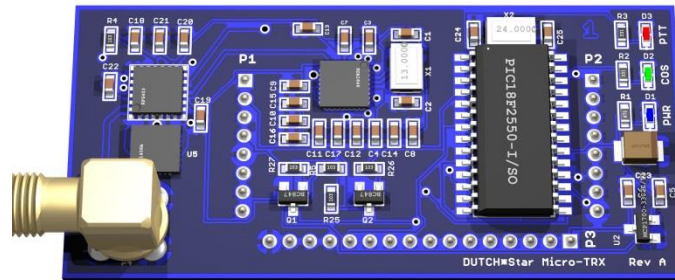
- More Software with more features
- More use of SOC computers (RPi, BBB)
- Accessories like LCD plates
- More modems integrated with Pi, etc.
- More configurations (Combo Hotspot + PC with AMBE)
- RF Add-ons

# DUTCH\*Star Pi GSMK Modem



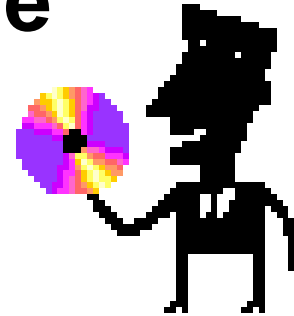
- Tiny, fits on Raspberry Pi's GPIO pins (SPI bus)
- Runs on 3.3v, won't overload Pi's power system
- Stackable (e.g. 2 boards for multiple radios)
- Has GSMK chip & DUTCH\*Star firmware
- Can add micro RF transceiver board

# DUTCH\*Star Pi Transceiver Board



- Fits on Pi GSM Modem board
- Creates tiny, low power full-featured Hotspot
- No cables
- Under development

# HotSpot/Repeater Software



- **DVAR Hot Spot – Mark McGregor KB9KHM**
  - First and still most popular
  - Easy to configure, supports DPlus linking
- **WinDV – DUTCH\*Star – Fred van Kempen PA4YBR**
  - DPlus, Dextra, DCS linking, ircDDB Gateway & Callsign Routing
  - Works with GMSK Modem, DVAP, DV Dongle
  - DTMF commands over RF...
- **DStarRepeater & ircDDBGateway – Jonathan Naylor GK4LKX**
  - Windows and Linux
  - DPlus, DExtra & DCS, ircDDB and CCS Callsign Routing
  - STARnet Digital
- **DVRPTR Control Center**
  - Works with DVRPTR boards
  - DPlus, DExtra, DCS, ircDDB Gateway & CCS Callsign Routing
- **ConDV (New DUTCH\*Star software)**
  - Similar WinDV features
  - Multi Platform (Win, Linux, Android...)



# Summary



- D-Star is moving beyond original ICOM vision
- This stuff is fun and we can all do it
- Lots of support available
  - Getting Started: [www.k6jm.com/dstar](http://www.k6jm.com/dstar)
  - Yahoo Groups:
    - gmsk\_dv\_node
    - dstar\_development, pcrepeatercontroller, ircddbgateway
    - gmsk\_dv\_modem
    - DVRPTR