Newsletter October 2023 – 30th Edition

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1) ZUM Spot USB. Review and use as an RF hotspot by John ZL2TWS.

a) Preamble and history

- I was looking for an RF USB connected device that could be plugged to a Raspberry Pi3 or Pi4 running the latest version of ircDDBGateway for use as a vehicle mobile D-Star hotspot.
- The choice of RPi3 / RPi4 was to utilise the WiFi to cell phone tethering feature, for internet connectivity, while driving my vehicle and in QSO via a D-Star hand held radio.
- Previous mobile hotspots, used exclusively for D-Star, required GMSK type modems like DVmega RF hats, DV Mega with antenna and USB cable, DVRPTR connected to an FM radio or the DVAP RF Dongle plugged into a USB port.
- All of these devices used a short antenna or combination of external box with antenna and USB cable connection that got in the way and wouldn't conveniently be hidden in the vehicle glove box or centre console. Messy is the word that best describes the setup.
- G4KLX decided to move DV onto the MMDVM platform so that one modem would allow Multi Mode DV operation via an audio based modem. This seems to work well however I have found instances where this type of modem suffers intermittent drop out / lockout issues when used as a D-Star modem.
- My personal preference is to use the old type of modem however since these are now only available on the second hand market it is not helpful to dwell on the past and to try something new, good and bad points accepted.
- Keep in mind that I only wanted to use D-Star and not the other modes.
- MMDVM ready made devices and Pi-Star software was the easiest way to get on air.
- SharkRF OpenSpot [Read 2)] is a nice device but I wanted to try and prove the ZUM Spot first as it was a lower cost device.

b) Enter the ZUM Spot USB with built in UHF RF and no antenna.

Picture below shows the ZUM Spot USB plugged into the RPi4. Add 5.1VDC and that's it!
The UHF RF antenna is etched onto the PCB and is very sensitive. The range from the ZUM is impressive and easily suited a close range RF use in my vehicle.
WiFi directly to a cell phone in tethering mode. RPi3 and RPi4 have this built in.
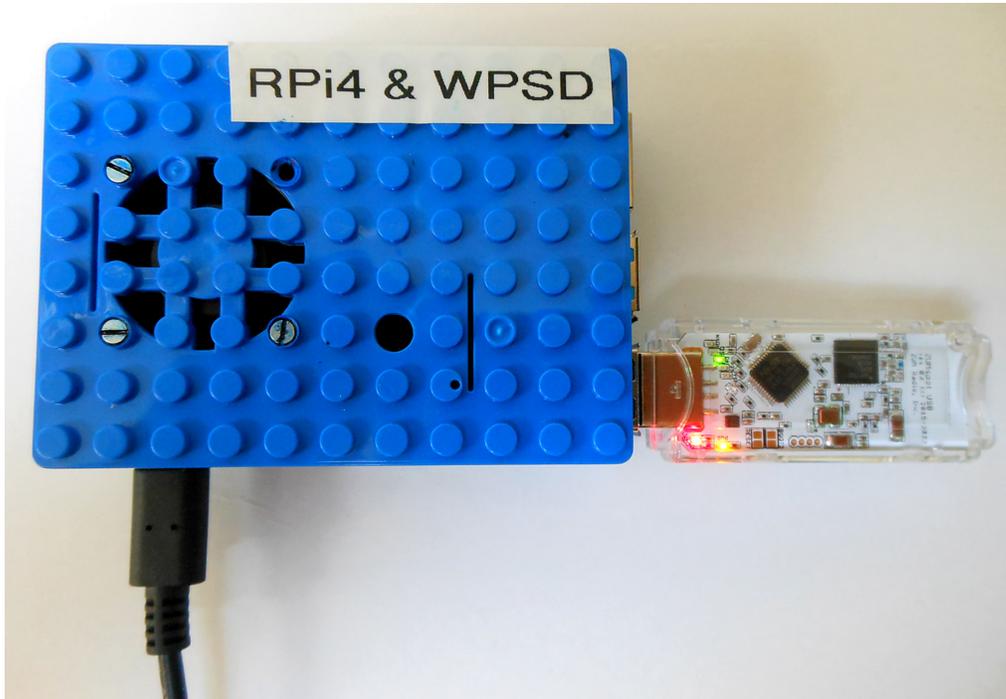
WPSD Pi-Star Image for ZUM Spot USB can be downloaded from here:
**https://cdn.w0chp.net/WPSD_Images/WPSD_ZUMspot-USB_Latest.xz**

https://zumradio.com/documents/ZUMspot USB User Guide 1.2.pdf

c) ZUM Spot USB also works perfectly with BlueDV by PA7LIM.
This picture below shows BlueDV running on a Windows 7 PC.

2) <u>SharkRF OpenSpot call signs not displayed on some dashboards.</u>

- Users of these RF dongle devices have found that on some dashboards, such as new versions of ircDDB, they can link and have a QSO but often their callsign drops off the connection list of stations. The call sign is not seen at all after re-linking.
  On US Trust G3 gateways, like ZL2VH C, OpenSpots can only listen and show as a listening remote user but not pass traffic with no user message or shown as a Module C remote user.

  <mark>Jeff ZL2JST found a G3 fix!</mark> Change in Connectors section a tick box "Auto set URCALL to network" so you can connect for RX and TX on G3 gateway's. If it's un-ticked you can Receive and Transmit to the RF side of the repeater. If ticked, it's Receive only. ZL2VH G3 could now be used for two way QSO's. See picture below for details.
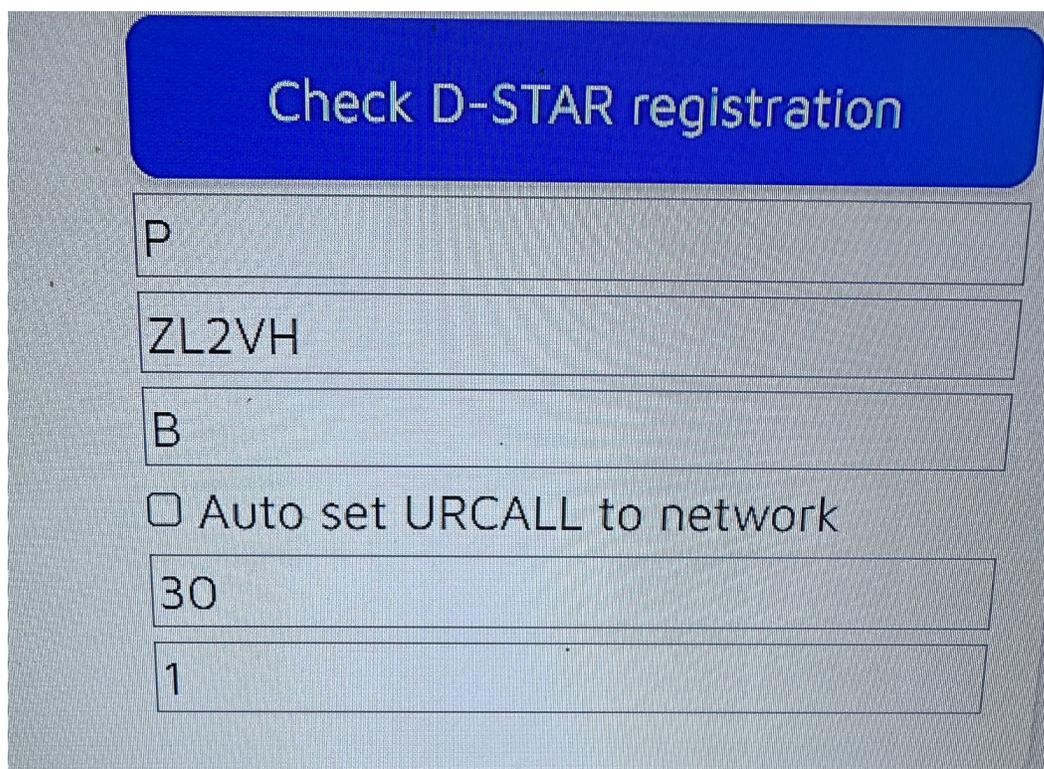
  Jeff ZL2JST contacted SharkRF, the manufacturer of the OpenSpot, and was told that the missing callsign is a known problem with some dashboards and cannot be fixed. On the SharkRF forum others have commented that if a station was using YSF and additional characters are used like ZL2xxxYSF then changing modes to D-Star must use no more than 8 characters as per the D-Star accepted protocol.

- Upon further investigation ircDDB ZL2VH-B gave us more incite and diagnostic analysis about this problem. ircDDB shows those using an OpenSpot dongle would be logged in but a long space followed the call sign along with a manufacturers code number. The number shows DV019999 after the call sign and space characters. This is what ircDDB cannot interpret and fails to display the call sign correctly.

- The picture below shows the connection attempts by ZL2JST and ZL2NSA and when they do connect the call sign field is displayed. This is not seen with any other hotspot or dongle device used. It is specific to SharkRF OpenSpot dongles. The green lines show the long space and DV019999 number in the call sign field.


```
                 ZL 33 37 43 3E 2F 0D          *455.57E>/.*
7-21 20:27:53: ZL2JST  is trying to G2 route to callsign ZL2JST
7-21 20:27:54: Incoming poll from unknown D-Plus dongle
7-21 20:27:59: Incoming poll from unknown D-Plus dongle
7-21 20:28:04: Incoming poll from unknown D-Plus dongle
7-21 20:28:10: Incoming poll from unknown D-Plus dongle
7-21 20:28:15: Incoming poll from unknown D-Plus dongle
7-21 20:28:15: From RF
7-21 20:28:15: 0000:  24 24 43 52 43 36 38 45 42 2C 5A 4C 32 54 67 53   *$$CRC68EB,ZL2
7-21 20:28:15: 0010:  3E 41 50 49 35 31 30 2C 44 53 54 41 52 2A 3A 21   *>API510,DSTAR
7-21 20:28:15: 0020:  34 31 31 32 2E 35 32 53 2F 31 37 34 35 35 2E 35   *4112.52S/17455.
7-21 20:28:15: 0030:  37 45 3E 2F 0D 24 24 43 52 43 36 38 45 42 2C 5A   *7E>/.$$CRC68EI
7-21 20:28:15: 0040:  4C 32 54 57 53 3E 41 50 49 35 31 30 2C 44 53 54   *L2TWS>API510,I
7-21 20:28:15: 0050:  41 52 2A 3A 21 34 31 31 32 2E 35 32 53 2F 31 37   *AR*:!4112.52S/1
7-21 20:28:15: 0060:  34 35 35 2E 35 37 45 3E 2F 0D 3B 31 30 30 8F      *455.57E>/.;100.*
7-21 20:28:16: ZL2JST  is trying to G2 route to callsign ZL2JST
7-21 20:28:18: ZL2JST  is trying to G2 route to callsign ZL2JST
7-21 20:28:19: D-Plus dongle link to ZL2JST     DV019999 has started
```



```
-07-21 20:14:23: Registered with dns.xreflector.net using callsign ZL2VH
-07-21 20:14:23: Loaded 34 DCS reflectors from dns.xreflector.net
-07-21 20:14:23: Starting the Callsign Server thread
07-21 20:14:23: No space to add new D-Plus dongle, ignoring
-07-21 20:14:23: No space to add new D-Plus dongle, ignoring
-07-21 20:14:29: No space to add new D-Plus dongle, ignoring
-07-21 20:14:34: No space to add new D-Plus dongle, ignoring
3-07-21 20:14:39: D-Plus dongle link to ZL2NSA D   DV019999 has started
```

- Other dongles display correctly like this: "D-Plus dongle link to ZL2JST has started"
- John ZL2TWS has also found that if the ircDDBGateway is re-booted then the OpenSpot will be displayed but as soon as it un-links and re-links the callsign is missing, once again.
- The following from Paul ZL1UHX who is going deeper into the way ircDDBGateway is handling the non-standard OpenSpot DPlus linking callsign field.

"Does this mean that the Shark RF hot spot is incorrect in its handling of the message? No it does not, it is simply different. We know that much older versions of ircddbgateway handle the same message from the very same hot spot in a more robust way, i.e. it works. Where this rewrite of ircddbgateway, all be it likely thirteen + years old assumes that the parameters are null delimited. To really know which end is not following the 'standard' we need the standard, to date I have not found a definition of how these parameters are delimited. For example it could be by offset position in the message and length, null terminated or some other method." For the full dialog look at the SharkRF OpenSpot4 forum here:

https://forum.sharkrf.com/d/7456-callsign-missing-from-dashboard-using-ircddbgateway-v20200621-debug

With Paul's professional work looking at the [link2] code within ircDDBGateway, Paul was able to submit findings to SharkRF and request some solution.
Shark RF came back to Paul with a new firmware version to trial.
This was passed onto Jeff ZL2JST to upload to his OpenSpot4. This was a success!

I am pleased to announce that there is now a fix and the missing call sign issue is resolved. SharkRF have issued a new firmware release (52) and anyone with their call sign not being displayed should update their OpenSpot3 or OpenSpot4 dongle.

3) <u>The different reflector systems.</u>

REF
The first reflectors where the REF reflectors. To convey the DStar information the software used to run an REF reflector used a network protocol called DPlus to communicate with the repeaters. The DPlus protocol requires you to be registered into the US-Trust system. To connect your repeater to a REF reflector you'll issue a command REFxxxCL on your radio, replacing xxx with the wanted number and a with the wanted module. Assuming you want to link to module C.
The user generally need not do anything special to facilitate this working,
unless there is an unusual firewall configuration (sometimes seen in commercial/government networks).

XRF
The second type of reflectors that came up were the XRF reflectors. The software used to run the XRF reflector uses another network protocol called DExtra. To connect your repeater to a XRF reflector you'll issue a command XRFxxxCL on your radio, replacing xxx with the wanted number and a with the wanted module. Assuming you want to link to module C. If the basic DExtra protocol is used, then port 30001 must be open for inbound connections, which does require port forwarding be enabled in the user's router / firewall to work.

DCS
The DCS reflectors arrived later and originated in Germany. It is / was a centralised system ran by German hams. If you wanted to run a reflector you had to give admin rights to some German OMs who will install the software for you on your server. Quite awkward. OK focus back. The DCS reflectors also come with their own network protocol. The protocol here is simply called DCS. Recently the OMs in charge of the DCS decided to drop the system, but some fellow hams decided to take it over. To connect your repeater to a DCS reflector you'll issue a command DCSxxxCL on your radio, replacing xxx with the wanted number and a with the wanted module. Assuming you want to link to module C. No special firewall configuration is needed to allow DCS connections.

XLX
Now we went through all three historical reflectors and you are probably thinking "OK no need to continue reading, he'll tell us XLX is a reflector that speaks XLX protocol"… Nope! You are wrong! Continue reading!
The software used to run the XLX reflectors actually speaks all three previous protocols REF, XRF, DCS and additionally its own protocol which is only used to interconnect reflectors

together. As a side note, XLX reflectors are very versatile and can also be accessed through DMR and Fusion with full audio transcoding. For the sake of clarity this aspect will not be covered here.

Back to DStar. The 3 protocols (REF, XRF, DCS) capability brought lots of confusion and still confuses DStar newbies : some reflector sysops did not do their homework and just hijacked reflector numbers that were used in the legacy XRF and DCS systems. This caused names collision and sometime you did not know if you were really connected to where you wanted to connect.

Let's assume you want to connect to XLX299B. According to the previous examples with REF, XRF and DCS you would expect to have to issue the command XLX299BL from your radio. This used to lead you nowhere until the release of ircDDBGateway-DEBUG V20200621. Before that DEBUG version you needed to issue either XRF299JL or DCS299JL. Both commands will connect your repeater to XLX299 J.

On Module J, the first one using the DExtra protocol, the other using the DCS protocol. If two repeaters connect to the same reflector module using different protocols the reflector software will convert protocols back and forth i.e. a repeater connected using DExtra will be get the transmissions from the one connected through DCS and vice versa.

It's worth mentioning all those different protocols are network protocols, once the transmission reaches the radio side it is just sent out as plain D-Star.

4) MMDVM and ZUM updates via SSH by www.rozenek.com

Firmware release notes on GitHub: **ZUMspot/MMDVM_HS**
==***Only use those below if you know the board you have installed***==
From Pi-Star SSH enter this to find board details:
sudo pistar-findmodem
SSH Updating hotspot firmware via Pi-Star (V4.1.6)
ZUMspot board connected to GPIO: **sudo pistar-zumspotflash rpi**
MMDVM_HS_Hat board with 14.7456 MHz TCXO1 connected to GPIO:
sudo pistar-mmdvmhshatflash hs_hat
MMDVM_HS_Hat board with 12.288 MHz TCXO connected to GPIO:
sudo pistar-mmdvmhshatflash hs_hat-12mhz
MMDVM_HS_DUAL_Hat board with 14.7456 MHz TCXO connected to GPIO:
sudo pistar-mmdvmhshatflash hs_dual_hat
MMDVM_HS_DUAL_Hat board with 12.288 MHz TCXO connected to GPIO:
sudo pistar-mmdvmhshatflash hs_dual_hat-12mhz
Nano Hat board connected to GPIO: **sudo pistar-vyehsflash nano_hs**
HS_DUAL_HAT (VR2VYE) connected to GPIO: **sudo pistar-vyehsflash hs_dual_hat** (m0ppr)
NanoDV NPi board: **sudo pistar-nanodvflash pi**
NanoDV USB board: **sudo pistar-nanodvflash usb**
BD7KLE/BG3MDO devices: **sudo pistar-mdoflash**
ZUMspot duplex board connected to GPIO: **sudo pistar-zumspotflash rpi_duplex**
ZUMspot USB key: **sudo pistar-zumspotflash usb**
USB-connected Libre Modem: **sudo pistar-zumspotflash libre**
Be patient, this step takes a bit of time during which it doesn't look like anything is happening.
NOTE: ZUM Radio V0.9 / V1.0 HAT is not listed below.
Instructions included in next months newsletter.

5) Hotspot and Gateway Repeater active watch Updates - Dashboard hosting.

This is a listing of High Power Hotspots and Gateway Repeaters you can connect to.
See this link:
https://zl2vh.org.nz/assets/pdf/other/new-zealand-d-star-gateways-hotspots.pdf

6) ZL2VH-B KiwiDstar Update.

No remote link radio has been found yet however it seems sure that the only reliable remote link is going to be via traditional GMSK modems such as the DVRPTR-V1 and a high speed 9k6 compatible radio. We found this month that the WPSD MMDVM ZUM Radio HAT did not work reliably receiving from 860. Kiwi D-Star DG9VH Lubuntu 14 is most reliable but needs some software updating.
Paul ZL1UHX has done a lot of work improving the performance with the following fixes:

- Odroid cooling fan persistent settings so that changes made are reloaded at boot time.
- Apache2 web server shutdown and lighttpd web server moved to port 80.
- ddns.net auto update so that when the IP address changes, zl2vh-b.ddns.net is updated.
- Investigate kernel update to Lubuntu 14 in preparation to enable Odroid watchdog.
- Odroid watchdog can take care of the hotspot automatically to restart if needed.

Discussions continue with others involved with the project. More next edition.

G3 Gateways, US Trust DSync monitor and ircDDBGateways.

G3 Gateways and G3 with ircDDB addon - Repeaters: (crossed out means currently down)
~~**Auckland Klondyke ZL1VLD.** https://zl1vhd.dstar.org.nz/ (DPlus) ZL1VHD B [438.175-RPTR]~~
~~**Auckland Klondyke ZL1VLD.** https://zl1vhd.dstar.org.nz/ (Dplus) ZL1VHD C [145.650-RPTR]~~
Auckland ZL1ZLD. https://spamnz.zapto.org/ (Dplus) ZL1ZLD A [1293.625-RPTR]
Auckland ZL1ZLD. https://spamnz.zapto.org/ (Dplus G3 with ircDDB addon) [439.575-RPTR]
Auckland ZL1ZLD. https://spamnz.zapto.org/ (Digital Data) [1294.625-RPTR]
Te Puke. http://202.36.75.248:40001 (DPlus G3 with ircDDB addon) [145.725-RPTR]
Hamilton ZL1HND. http://zl1hnd.d-star.nz (Dplus) ZL1HND B [439.450-RPTR]
Wellington ZL2VH. https://123.255.47.67 (Dplus) ZL2VH C [145.425 RPTR]

US Trust DSync monitor:
https://dsync.dstarusers.org/

ircDDBGateway - Repeaters:
Hamilton. http://zl1cct.d-star.nz (DPlus, DExtra & DCS) **CCS7 8530100** [145.350-RPTR]
~~**Kapiti ZL2KB.** http://zl2kb.ddns.net:8080.~~ ZL2KB C (DPlus, DExtra & DCS) [145.300 RPTR]
Wellington ZL2VH-B. http://zl2vh-b.ddns.net:82 **CCS7 8530304** [DPlus, DExtra & DCS] [860-RPTR]

New Zealand XLX Multimode Reflector www.XLX299.nz
ircDDB Status for ZL: https://status.ircddb.net/cgi-bin/ircddb-gw?NZL

Examples of hotspots with dashboards that you can view and connect to this month:
    ZL1TOB (http://zl1tob.ddns.net:83)
    ZL1AMK (http://zl1amk.ddns.net:82)
    ~~ZL3TJH (http://zl3tjh.ddns.net:83)~~

Other Gateway Repeater Hotspots of interest:
ZL2AUS is running the WPSD Pi-Star variant for MMDVM
   http://www.zl2aus.co.nz

Dashboard - DDNS naming convention.
    PiStar: http://callsign.ddns.net
    Note: PiStar uses port 80 by default and not required to be added to the end of the address
    line.

KiwiDstar Hotspots: http://callsign.ddns.net:82
    UDRC Compass Hotspots: http://callsign.ddns.net:82
    Hotspots that cannot use port 80 or 82 use port 83 (example is http://zl3tjh.ddns.net:83) and
    http://zl1tob.ddns.net:83)

Host files that include ZL gateways and hotspots can be downloaded from here:
    http://zl2vh.org.nz/assets/d-star-hosts/
D-Star Nets to join
    http://www.dstarinfo.com/nets.aspx

Kiwi-D-Star Net on XLX299 J (D-Star only channel)

Sites Reference information:

    ZL2VH Web site. http://zl2vh.org.nz/d-star/

For US Trust G2 Registration go here: http://zl2vh.org.nz/d-star/gateway/

Previous D-Star newsletters FREE to download:
    http://zl2vh.org.nz/d-star/newsletter/2015/
    http://zl2vh.org.nz/d-star/newsletter/2016/
    http://zl2vh.org.nz/d-star/newsletter/2017/

73 and good DV. John ZL2TWS for Branch 63 NZART.