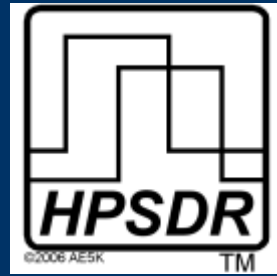




# *TAPR Digital Forum Dayton 2010*



## Putting HPSDR on the Internet

John Melton

G0ORX/N6LYT

[john.d.melton@googlemail.com](mailto:john.d.melton@googlemail.com)





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- Why?
- Hardware
- Server
- Software
- Results





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- Why?

We needed a vehicle to test multiple receivers implemented in the FPGA code of Mercury/Ozy.

FPGA code developed originally by Phil Harman VK6APH. Multiple receivers added by Kirk Weedman KD7IRS and recently developed by Bruce Walker W1BW.

It just developed into an internet application.





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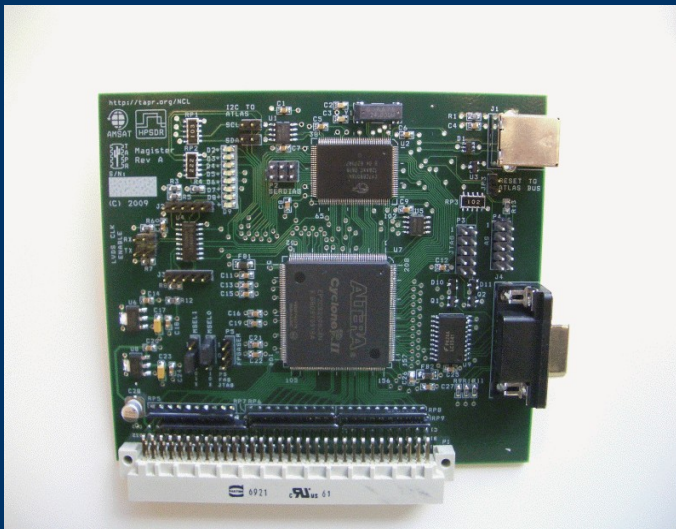
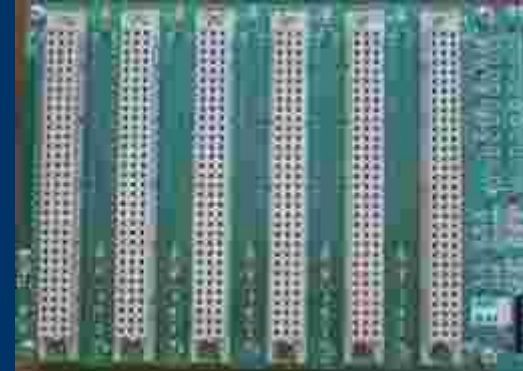


- Hardware

Atlas backplane

Ozy I/O board

Mercury receiver board





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- Hardware





# *TAPR Digital Forum Dayton 2010*



- Server

Intel Atom 330

2 GB Memory

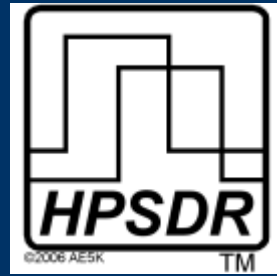
1 TB ATA hard drive

- Linux - Ubuntu 10.04 64 bit  
Apache2 Web Server





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- Software
  - HPSDR Server
  - DSP Server
  - Client Application





# TAPR Digital Forum Dayton 2010



- Software

USB I/Q Data Stream

USB data is transferred in 512 byte packets.

8 bytes of header data.



Receiver I/Q data and Mic sample.



I and Q samples are 24 bits (3 bytes).  
Microphone samples are 16 bits (2 bytes).

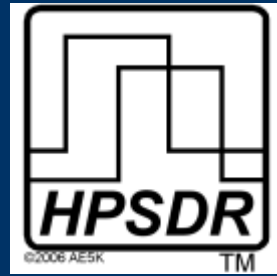
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- Software

## Bandwidth Requirements

24 bit I samples  
24 bit Q samples

48000 samples per second = **2304000** bits per second  
96000 samples per second = **4608000** bits per second  
192000 samples per second = **9216000** bits per second

For just 1 receiver!

8 receivers at 192000 = **73728000** bits per second

My broadband uplink speed is 360 Kbps





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- Software
  - HPSDR Server
    - USB interface to HPSDR
    - TCP socket interface for client commands/responses
    - UDP socket for I/Q data stream

For multiple receivers the I/Q data stream is sent over the USB interface as interlaced samples. The server splits these samples out into separate I/Q data stream buffers and when full sends to client over UDP.

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- Software

- DSP Server

- TCP connection to HPSDR Server
    - UDP socket to receive I/Q data stream
    - TCP socket for client connection

One DSP server for each receiver.

Processes I/Q data stream using DttSP.

Processes commands from client to set mode, filter, etc and passes frequency commands on to the HPSDR Server.

Processes commands from client to send spectrum data and audio data to client.

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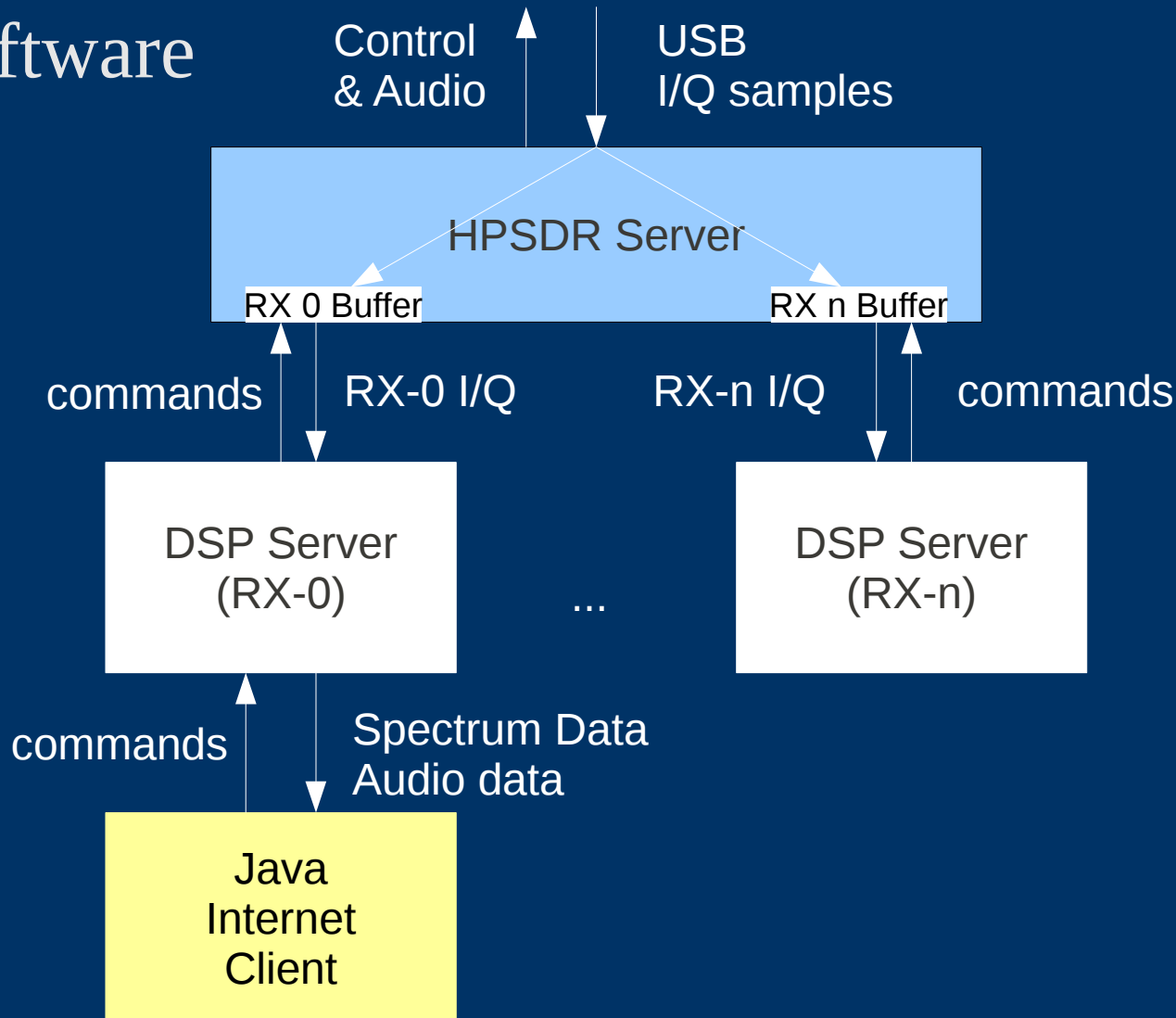
- Software
  - Bandwidth requirements per receiver
    - Spectrum data sent as 8 bit values
    - Client requests number of samples - currently 480 at 10 requests per second.
    - Audio data sent as 8-bit aLaw at 8000 samples per second.
    - Spectrum data =  $480 * 10 * 8 = 34800$  bits per second
    - Audio data =  $8000 * 8 = 64000$  bits per second
    - 98800 bits per second per receiver



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- Software





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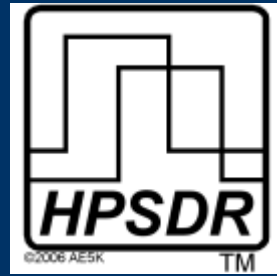


- Software
  - Java Applet Client
    - Runs in any browser window.
    - Can be run as a standalone application.





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- Software
  - iPhone client

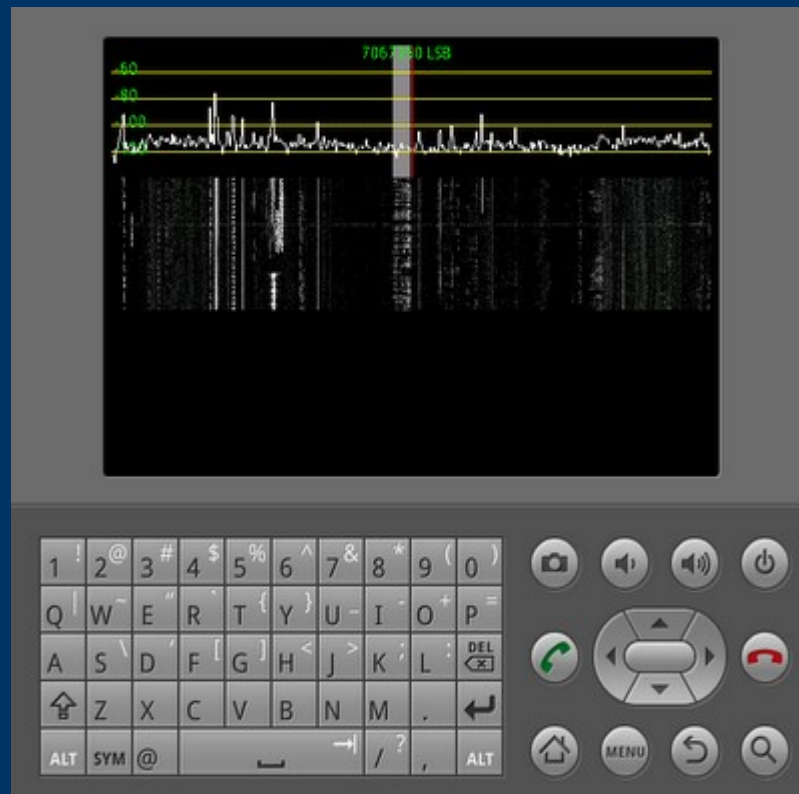




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- Software
  - Android Client







# *TAPR Digital Forum Dayton 2010*



- Software

Ongoing development to support other hardware

SDR-1000

Softrock (both fixed Xtal and Si570)

UHFSDR





# *TAPR Digital Forum Dayton 2010*



- Results

5 Mercury receivers currently active on internet

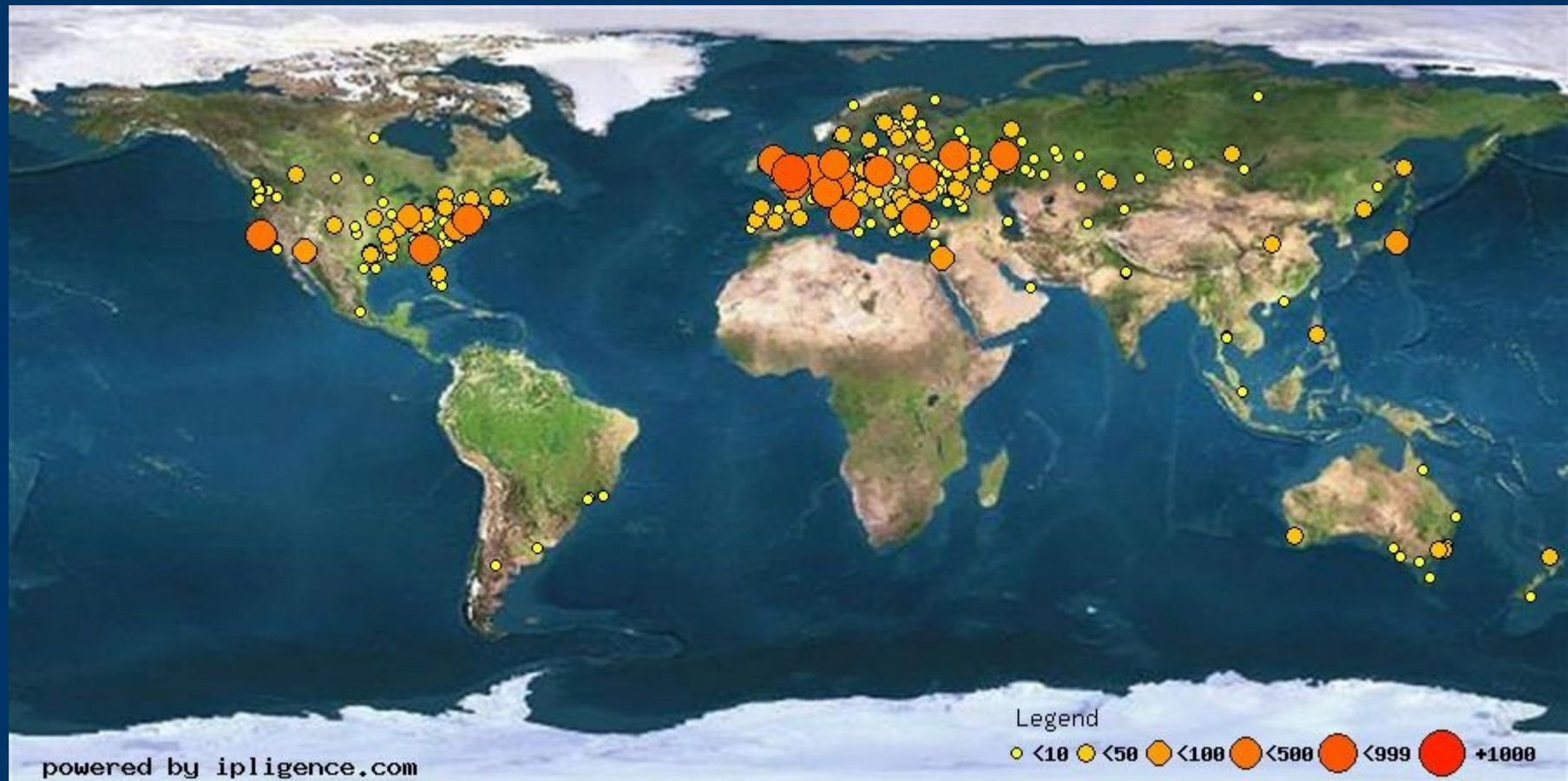
- Ken N9VV, Chicago, IL  
<http://24.192.100.58/jmonitor.html>
  - Bruce W1BW, Concorde, MA  
<http://home.w1bw.us/receiver/>
  - Jeff KT2K, Sea Girt, NJ  
<http://kt2k.ham-radio-op.net/jmonitor.html>
  - Chris 4X1RF, Haifa Israel  
<http://4x1rf.no-ip.org/jmonitor.html>
  - John G0ORX, Copthorne, West Sussex, England  
<http://g0orx.homelinux.net/jmonitor.html>
- 
-



# TAPR Digital Forum Dayton 2010



- Results  
Many accesses from around the world to my web page





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Thanks

- HPSDR Group
  - TAPR Group
  - Phil Harman VK6APH
  - Bob McGwier N4HY
  - Frank Brickle AB2KT
  - Ken Hopper N9VV
  - Kirk Weedman KD7IRS
  - Bruce Walker W1BW
- 
-



# *TAPR Digital Forum Dayton 2010*



- References

- Source code in HPSDR svn repository:

`svn://64.245.179.219/svn/repos_sdr_hpsdr/trunk/N6LYT`

- Document by Ken, N9VV

[http://www.n9vv.com/N6LYT Online Mercury Receiver.pdf](http://www.n9vv.com/N6LYT%20Online%20Mercury%20Receiver.pdf)

