



High Performance Software Defined Radio Update

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TAPR/ARRL Digital Communications
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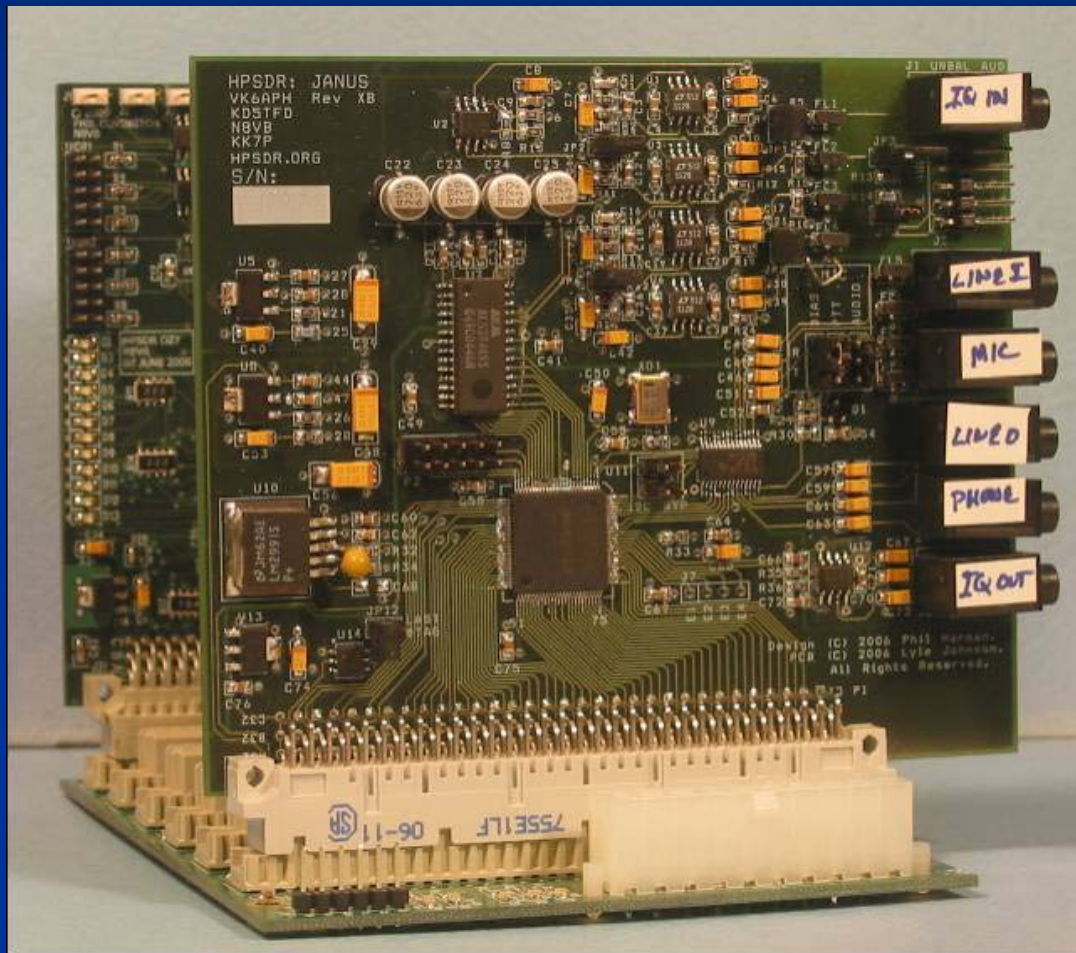
HPSDR: What Is It?

- A Loose Collection of people interested in SDR
 - Bazar fashion development
 - Multiple Projects – each a Basic building block for a radio
 - Programmable hardware (FPGA, uControllers) – easy to reconfigure
 - Atlas board (backplane) is unifying factor
 - Eventually we'll build a radio or two or three....
- Open
 - TAPR OHL, GPL
- Diverse
- Fun (and at times 'Character Building')
- Advancing the state of the Radio Art

HPSDR Today: A + J + O

- Atlas
 - Backplane
- Janus – A/D, D/A – audio frequencies
 - AK5394a – best audio A/D converter on the market
- Ozy(mandias) – Controller/Communicator board
 - Cyclone II FPGA & FX2 USB2 uController, etc...
 - Control Logic for Janus, link back to PC
- Designer and Developers: Phil Covington (N8VB), Phil Harman (VK6APH), Lyle Johnson (KK7P), Bill Tracey (KD5TFD) & development support from TAPR and AMSAT

Atlas, Janus and Ozy



HPSDR Today: A + J + O

- Boards available from TAPR
 - Thanks Scotty Cowling (WA2DFI) and assembly crew
 - 500 or so out in the wild now
- PowerSDR has support for AJO
- 1 cable solution for SDR 1000
- Lots of Growth Possible with AJO
 - Great FPGA development platform
 - Lots of Custom IO possibilities
 - JTAG programmer
 - Playstation 3 – Linux and the Cell BE processor
 - New meaning to ‘Playing Radio’

HPSDR Tomorrow

- Today: Direct Conversion
 - Most Amateur Radio SDRs today are direct conversion receivers
 - 1 mixer stage to audio frequencies and into A/D or D/A
 - A/D, D/A is typically 192 khz, 16-24 bits
- Tomorrow: Direct Digital Conversion
 - Antenna to A/D or D/A (with some filtering!)
 - Holy Grail of SDR
 - Much higher speed A/D and D/A than used in Direct Conversion
 - 125 MHz, 12-16 bit

Transmitter - Penelope

- Penelope – digital upconverting transmitter
- 125 MHz, 14 bit D/A converter (AD9744)
- Cyclone II FPGA for DSP work
 - CORDIC, Digital Upconversion, FIR filters, ALC
- 1/2 watt output
- Provision for sync to external clocks
- Alpha boards built and working now
- Phil Harman (VK6APH) & Lyle Johnson (KK7P)
- More Info: <http://hpsdr.org/wiki/index.php?title=PENELOPE>

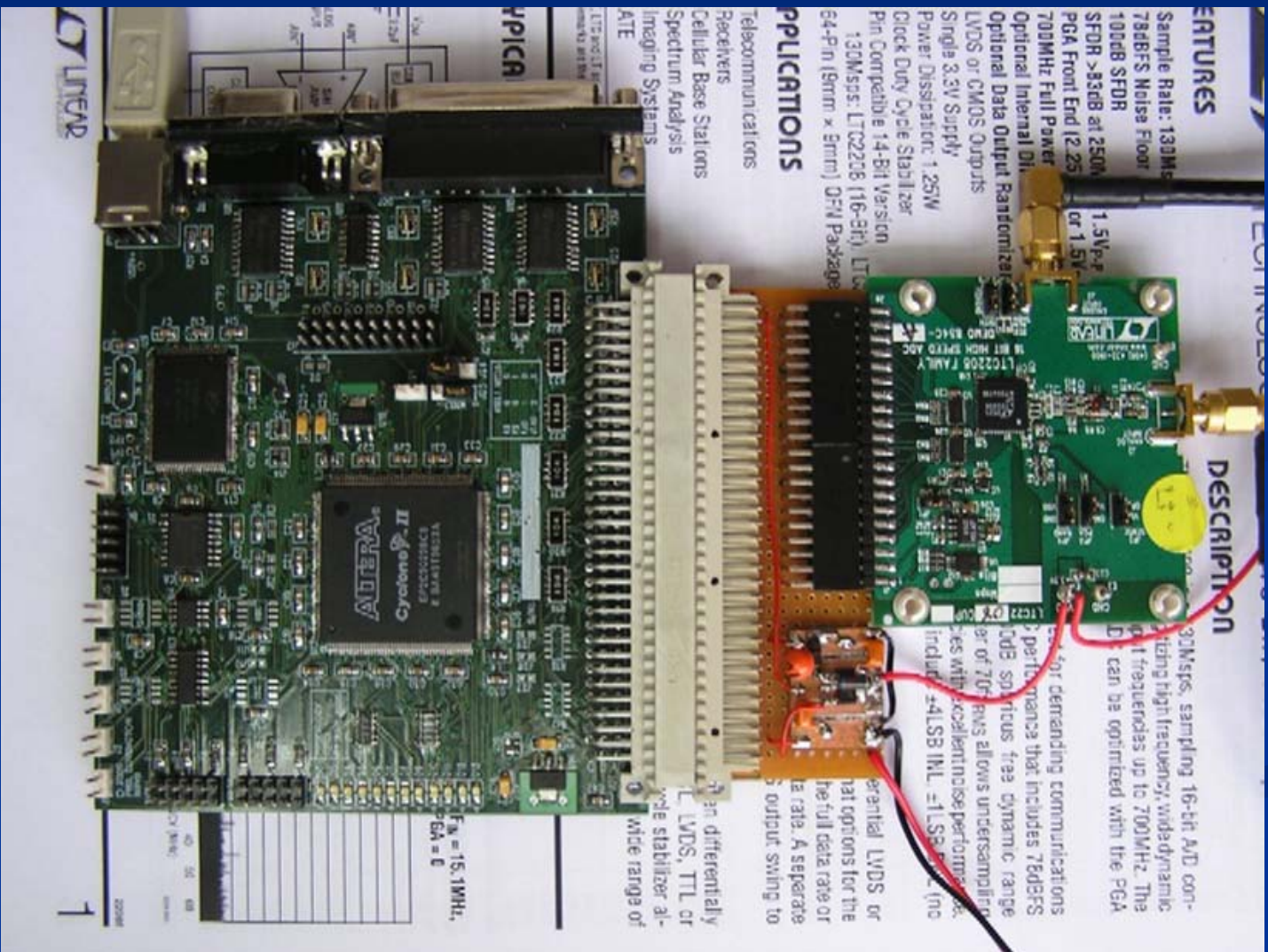
Penny



Receiver - Mercury

- Mercury – digital down converting receiver
- 125 MHz, 16 bit A/D converter – LTC 2208
- Cyclone III FPGA for DSP work
- Pre Alpha boards built and working now (VK6APH, ZL3IX, N8VB)
- Next step is board layout and then Alpha
- More Info:
<http://hpsdr.org/wiki/index.php?title=MERCURY>

Mercury Prototype



Filters - Alexiares

- Receive pre selectors, pre amp
- Transmit LPF, Fwd/Reverse Power Sensing, Antenna Selection
- Control Logic
- Next step is Alpha build and checkout
- Graham Haddock (KE9H) and Phil Harman (VK6APH)
- More Info:
<http://hpsdr.org/wiki/index.php?title=ALEXIARES>

Additional Active Projects

- Gibraltar – Frequency Reference – Rick Hambly (W2GPS) & Steve Bible (N7HPR)
- Pandora – an enclosure for this thing! – Ben Hall (KD5BYB)
- Thor – a Hi Efficiency (EER) Power Amp – Chuck Clark (AF8Z)
- Demeter – Power Supply - Jeroen PE1RGE
- Sasquatch – DSP board – Lyle Johnson (KK7P)
- Odyssey – Suitsat II - Joe Julicher (N9WXU), Steve Bible (N7HPR), Frank Brickle (AB2KT), Bob McGwier (N4HY), Lou McFadin (W5DID)
- Others ...
- More @ the Wiki: <http://hpsdr.org/wiki>

HPSDR The Future

- What are folks interested in?
- How do we get more folks involved?
- What do people need to be able to use this technology?

HPSDR

Thanks for Listening.

Questions?