Bharti School of Telecom Technology and Management: IIT Delhi

02 May 2014

NIQ for Software Defined Radio (SDR)

Sealed quotations are invited for Software Defined Radio (SDR) as per the details given below :

S N	Description	Qty
1	Software Defined Radio (SDR)	02

I.   Technical Details :

1. The system should consist of a Transceiver with separate Host Controllers along with Open source software and independent of any Proprietary software.

2. The user should be able to work and write their own algorithm on a language of their choice like Python or C++ to augment the existing capabilities of the SDR.

3. The system should not be dependent on any proprietary software like MATLAB or LABVIEW, but should be compatible with them.

4. The Technical Specs should be as:

   a. Transceiver Frequency Range: 0.4-4GHz ,

   b. Baseband Bandwidth: 1-15MHz, Frequency Resolution: 3Hz,

   c. Maximum RF Output power: 5dBm, Receiver Sensitivity: -120 dBm,

   d. Transmit Gain Control Range: 40dB, Transmit Gain Control Step 1dB,

   e. Rx Gain Control Range: 30dB, Rx Gain Control Step 1dB,

   f. ADC Sample Rate: upto 40 MS/s, ADC Resolution: 12 bits, ADC Wideband Spur
      FDR: 60 dBc,

   g. DAC Sample Rate:upto 40 MS/s, DAC Resolution:12 bits, DAC Wideband Spur FDR:
       60 dBc,

   h. Output Amplitude: 250mV p/p differential,

   i. Host Sample Rate: 50/25 MS/s, Frequency Accuracy: 2.5 ppm,

   j. w/ GPSDO Reference :0.01 ppm, SSB/LO Suppression:>40 dBc,

   k. FPGA Integrated Transceiver

   l. Logic Elements: 40,000, M9K Memory Blocks: >400

   m. Embedded Memory: >2000 Kbits, 18 bit x 18bit Multipliers: >100, PLL: 4,

n. Maximum User I/Os: >500, Maximum Channels: >200 Differential,

o. DC Input: 6 V, Current Consumption: <500mA,

5. The whole system should be USB driven.

6. Host Controller : Dual Core 64 bit 1.66GHz, Onboard Graphics, 4GB RAM ,
HDD: 500 GB 64 bit MSATA, USB 2.0x 4, Parallel, HDMI,

7. The Accessories should consist of :
a. RG316 SMA-SMA Cables- 4 Nos., Planar Directional Antennas : 0.4-6 GHz-2 Nos.,
b. Omni Directional 0.4-6 GHz-2 Nos., USB 3.0 Cables, Connectors, Adaptors, speaker,
   microphone, 20dB Attenuator (2 Nos) and the full documentation.

8. The open source software should include the fully programmable GUI Modules like Channel Models, Coding, Control Port, Debug Tools, Equalizers, Error Control Coding, File Operators, Filters, Fourier Analysis, Instrumentation, Level Controllers, Math Operators, Measurement Tools, Modulators, Networking Tools, OFDM, Packet Operators, Peak Detectors, Synchronizers, Trellis Coding, Type Converters, Waveform Generators etc.

9. The basic Experiments included in the system should be :

Introduction to SDR-LAB Hardware and Software environment ,On air transmission & reception using Analog modulation & demodulation techniques like AM,DSBSC, SSB, Narrowband FM, Wideband FM, Stereo FM, On air transmission & reception using Digital Modulation & Demodulation techniques like ASK, FSK, BPSK, DBPSK, MSK, GMSK, DQPSK, QPSK, OQPSK, MQPSK, MQAM, GFSK, and other variants, Spread spectrum techniques like DSSS, FHSS, THSS etc.

10. Multiplexing techniques :

   a) TDM, FDM/WDM,SDM, Polarization, Spatial, Packet Switching, MC-SS, OFDM etc
   b)   Analog Channel Models like Noise (Uniform, Linear, Laplacian, Gaussian, Phase noise),Interference (Cross talk, Co-channel, Inter symbol), Distortion (Inter modulation),Frequency response (Attenuation & phase shift), Group delay, Propagation Doppler shift, Fading modeling slow, fast, selective/dispersive, Multipath, Rayleigh, Rician),
   c) Channel Coding and decoding-Convolutional, Viterbi, Trellis,
   d) Channel performance measurements (spectral bandwidth, Symbol Rate, Bit Rate, Signal to noise ratio, Bit Error Rate BER, Latency, Jitter, Eye Diagram, Constellation diagram.
   e) Line Coding & Decoding Digital Baseband.
   f) Filters-IIR, FIR, Pulse Shaping-RRC root raised cosine, High pass, Low pass, Band pass, Band stop, FFT, frequency translating filter.
   g) Adaptive Equalizers - CMA, LMS.
   h) Synchronizers-Costas Loop, Clock Recovery, Frequency locked loop, phase locked loop, correlate and sync, carrier acquisition.
   i) On air link for Voice, Data, Video,
   j) OFDM complete on air implementation
   k) GSM on air decoding from live signals,

11. Should have in-built mechanism for display of signal in time domain, frequency domain and Waterfall display

12. The equipment should have the warranty of three years.

13. The manufacturer should conduct workshops so that the technology is well understood by our students.

II. Terms & Conditions:

1. Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as "Technical Bid" and "Financial Bid". Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as "Quotation for SDR"

2. Please quote prices at F.O.R/F.O.B New Delhi, Quotation must indicate the applicable taxes and duties, if any, inclusive of installation charges.

3. Quote should be valid for at least three months.

4. Attach all the technical literature of the above item.

5. A minimum of three years comprehensive onsite warranty should be quoted.

6. Mention if you can provide any technical support like training of IIT Delhi personnel at IIT Delhi/ in your factory for the complete warranty period of 3 years. Kindly mention about this in the technical bid.

7. If the quote is being submitted by the representative of the Principals/manufactures themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.

8. The Institute reserves the rights to accept/reject any/all quotations without assigning any reasons thereof.

9. Delivery period within 04 weeks on receipt of PO.

10. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating "certified that _____ is a proprietary item of M/s. -- _____ and no other manufacture make these items".

11. Please produce compliance certificate for the specification.

12. In case of foreign supplier please ensure that the Indian agent has been enlisted with the Department of Expenditure, evidence may please be attached.

13. Incomplete or quotation received later than 4.00 PM on due date are liable to be rejected.

14. Payment will be made after satisfactory installation as per IIT norms.

15. Vendor should get NEFT Registration for processing the payment as no payment will be made via physical cheque.

The quote should reach the following address on or before **16/05/2014** up to 4.00 P.M.

Mr. M.K. Kaushik,
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Indian Institute of Technology Delhi, Hauz Khas,
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