

Abstract

- Software Defined Radio (SDR) refers to radio systems in which aspects of functionality are defined in software.
- SDR enables very flexible radio architectures which can adapt to support different standards and protocols, signal bandwidths, modulation frequencies, and so on.
- With the move towards 5G, and against a backdrop of increasing pressure on available RF spectrum resources, interest in SDR is growing.
- Our work combines two recent Xilinx innovations: the RFSoc device, and the PYNQ framework. These are shown to be a compelling combination for SDR!
- Our demonstration system shows QPSK transmission and reception with real-time control and visualization in PYNQ.

RFSoc + PYNQ

The PYNQ software framework (www.pynq.io) was installed onto the RFSoc device on the ZCU111 development board.

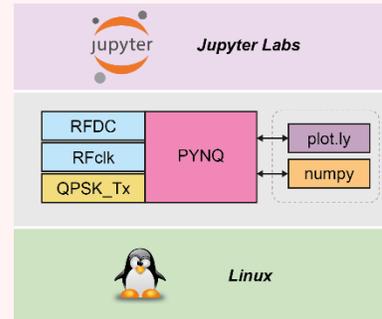
This enables Python code to be run in a Jupyter notebook on the PS, interfaced to a hardware overlay in the PL.



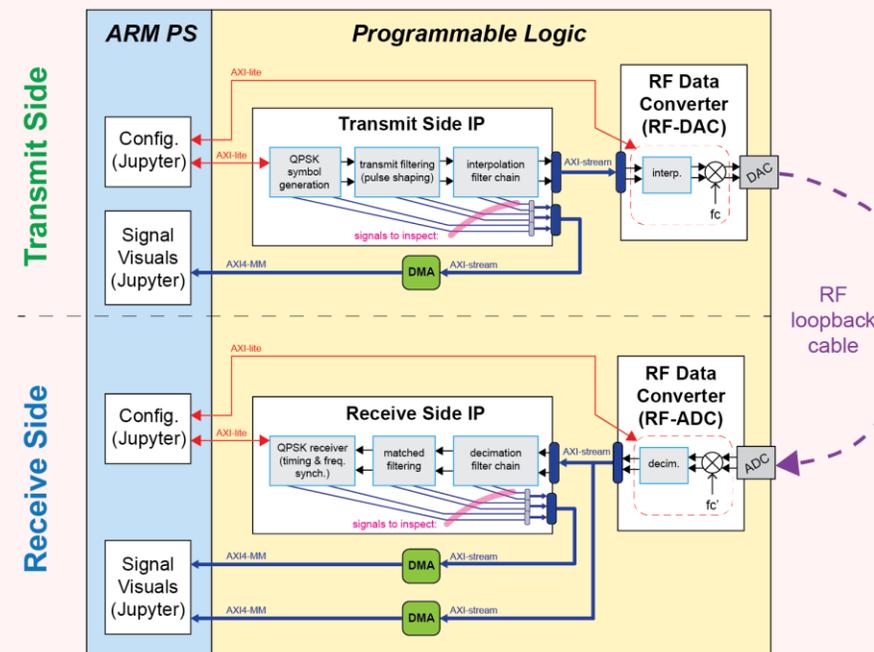
Why use PYNQ?

“PYNQ is an open-source project from Xilinx® that makes it easy to design embedded systems with Xilinx Zynq® Systems on Chips (SoCs).”

PYNQ is used to help simplify SDR systems design and interaction. This includes direct control of RF data converters and dynamic visualisation.

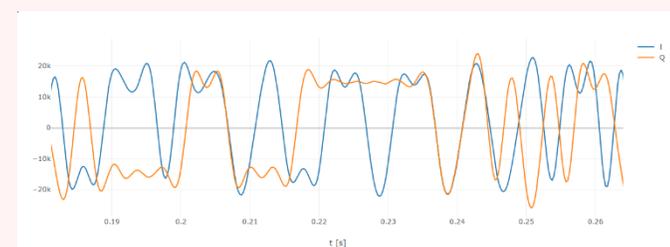


Tx / Rx Demonstrator System



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Results and Conclusions



- PYNQ and RFSoc were combined successfully and a fully functioning Tx / Rx demonstration system was produced.
- Real-time visualization of data captured from the chip is a powerful tool for both demonstration and debugging.
- RFSoc + PYNQ is an excellent combination for SDR systems!

Related Work

- Our research group has a focus on SDR development and applications. Other related work includes:
- **5G RuralFirst** (www.5GRuralFirst.org) a collaborative, UK-govt funded testbed & trial for 5G in rural locations.
- **Dynamic Spectrum Access for 5G** – funded by MathWorks.

Acknowledgements/References

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