OFDM on FPGA

Designed by Bo Wang

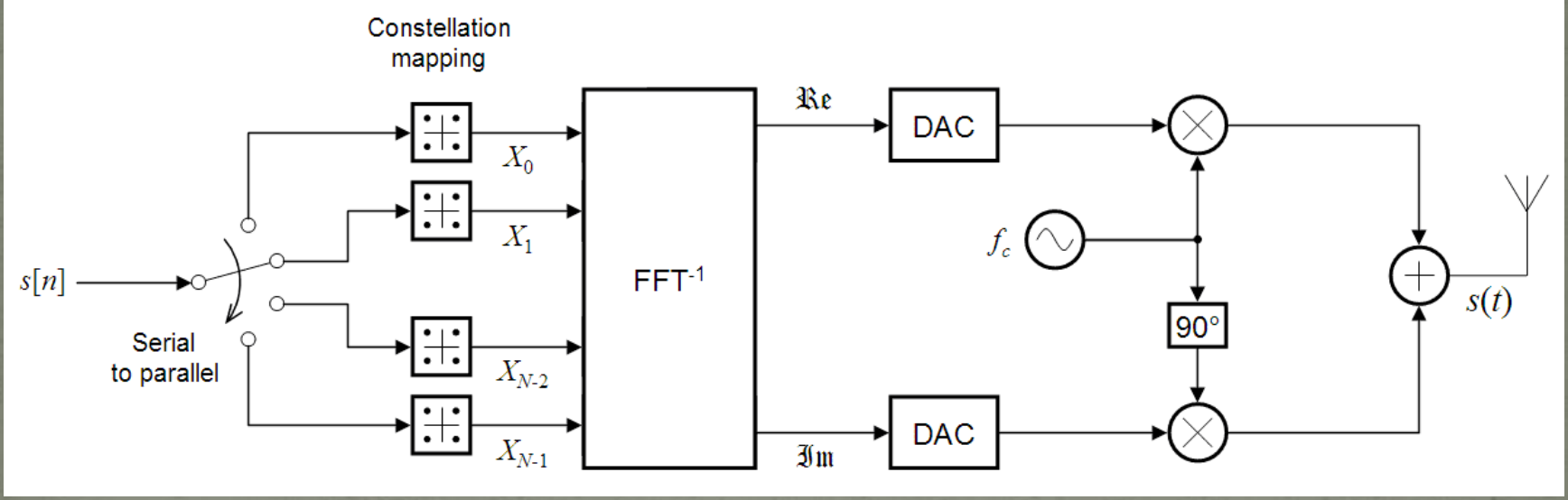
OFDM on FPGA

- Introduction of OFDM
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- Specific implementation
- DEMO on DE 2-70 board
- Reference

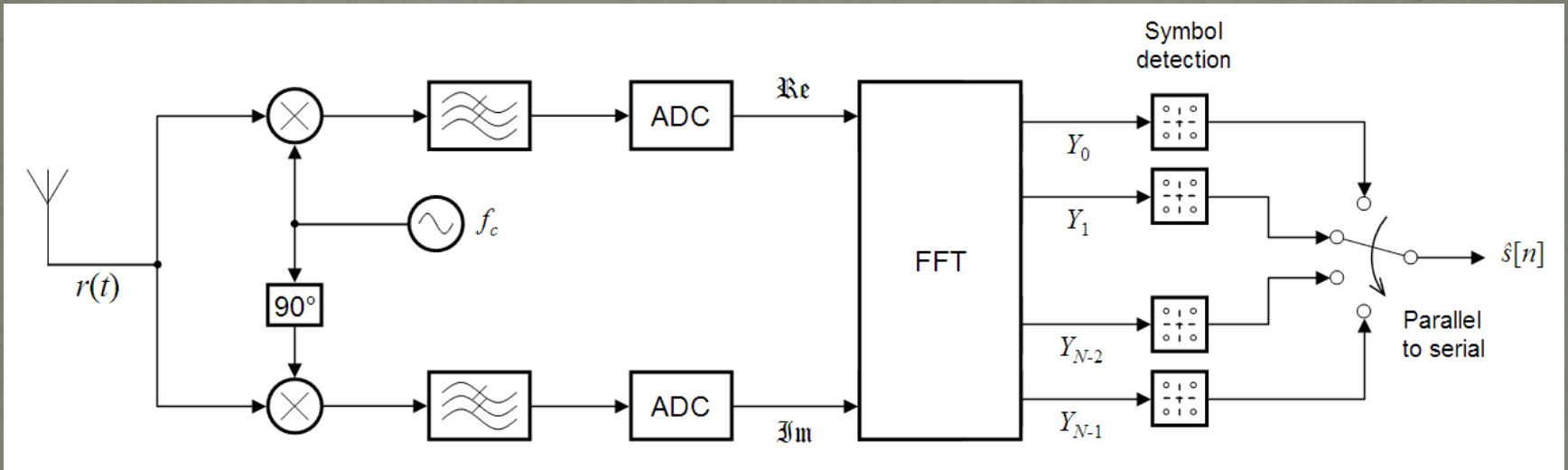
Introduction of OFDM

- **Orthogonal frequency-division multiplexing** (**OFDM**) is a method of encoding digital data on multiple carrier frequencies.
- **The main idea** : The channel is divided into several orthogonal sub channels. High-speed data signals are converted into parallel low-speed sub-data stream and modulated to be transmitted in each sub channel.

Design diagram

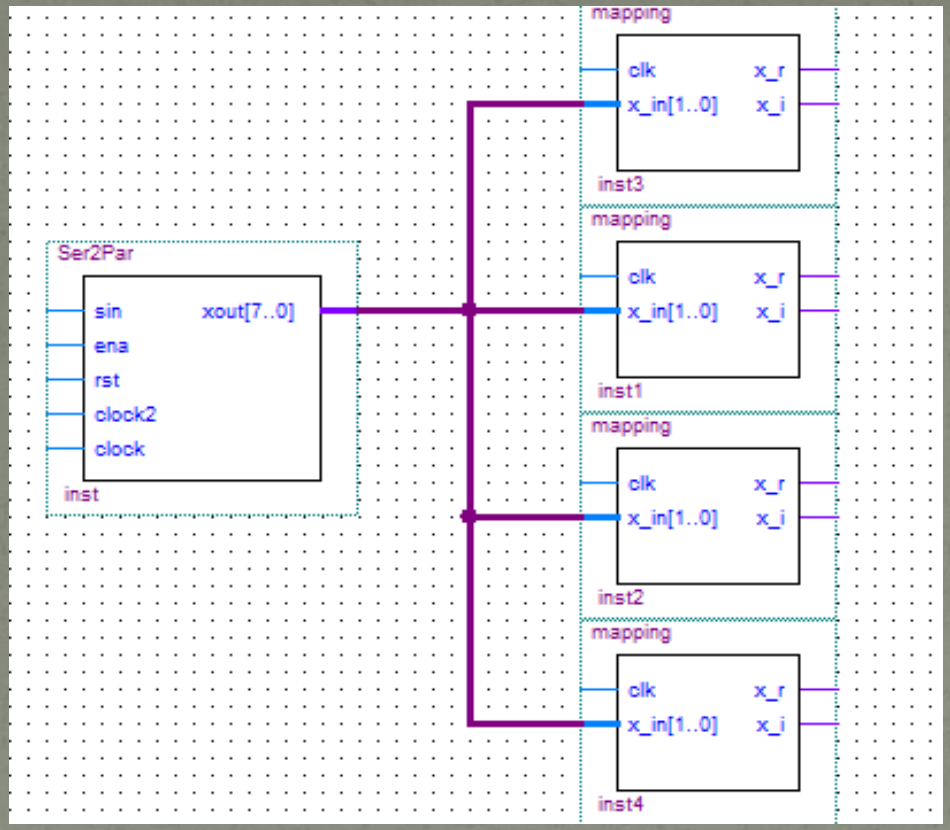


Design diagram



Specific implementation

- Serial to parallel
- Constellation mapping
- IFFT
- DAC
- Modulate



Specific implementation

Serial to parallel

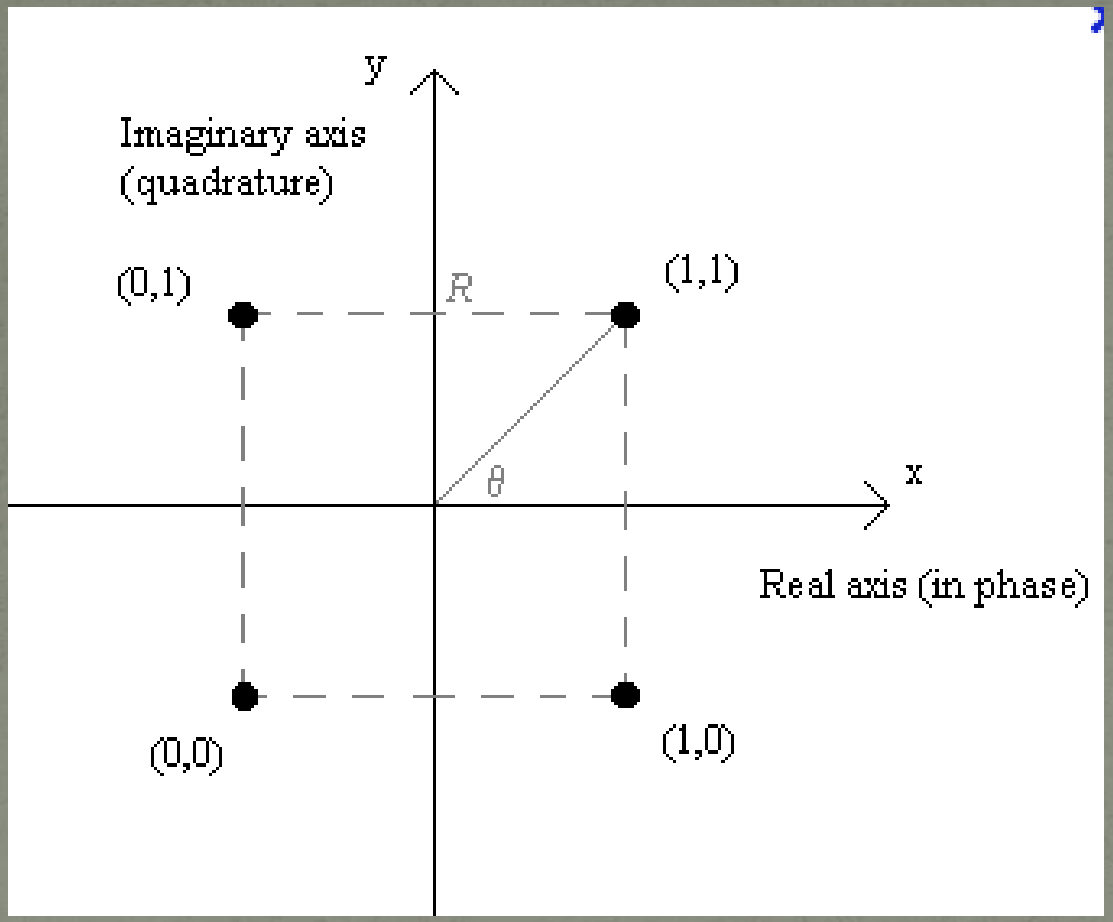
Constellation mapping

IFFT

DAC

Modulate

```
,xout(7 downto 6)=>map4,xout(5 downto 4)=>map3 xout(3 downto 2)=>map2,xout(1 downto 0)=>map1);
```



Specific implementation

Serial to parallel

Constellation mapping

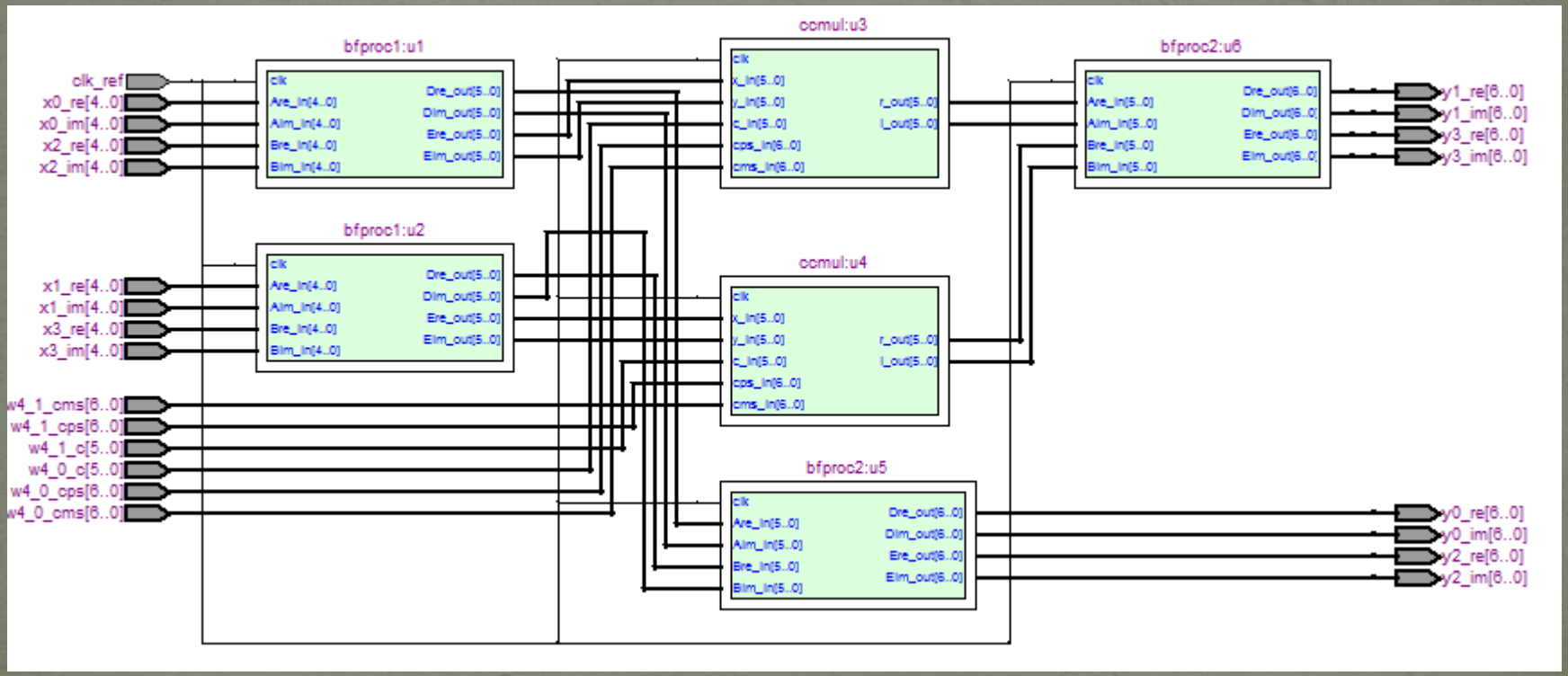
IFFT

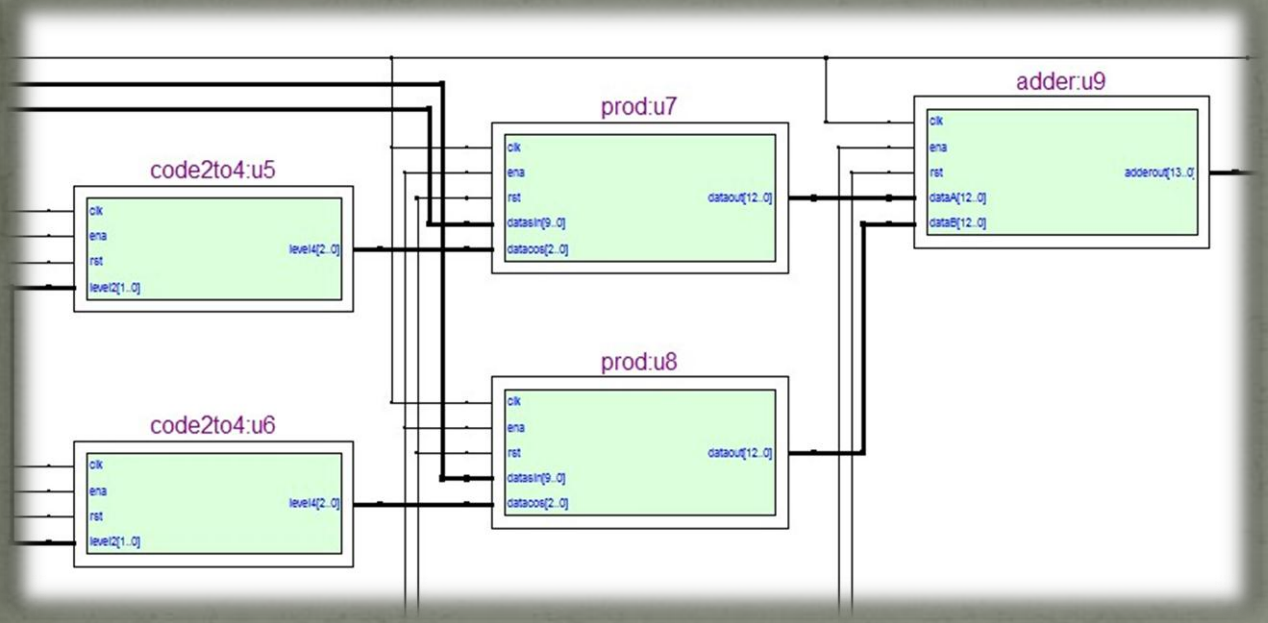
DAC

Modulate

Serial to parallel Constellation mapping

Specific implementation **IFFT** DAC Modulate





Specific implementation

Serial to parallel

Constellation mapping

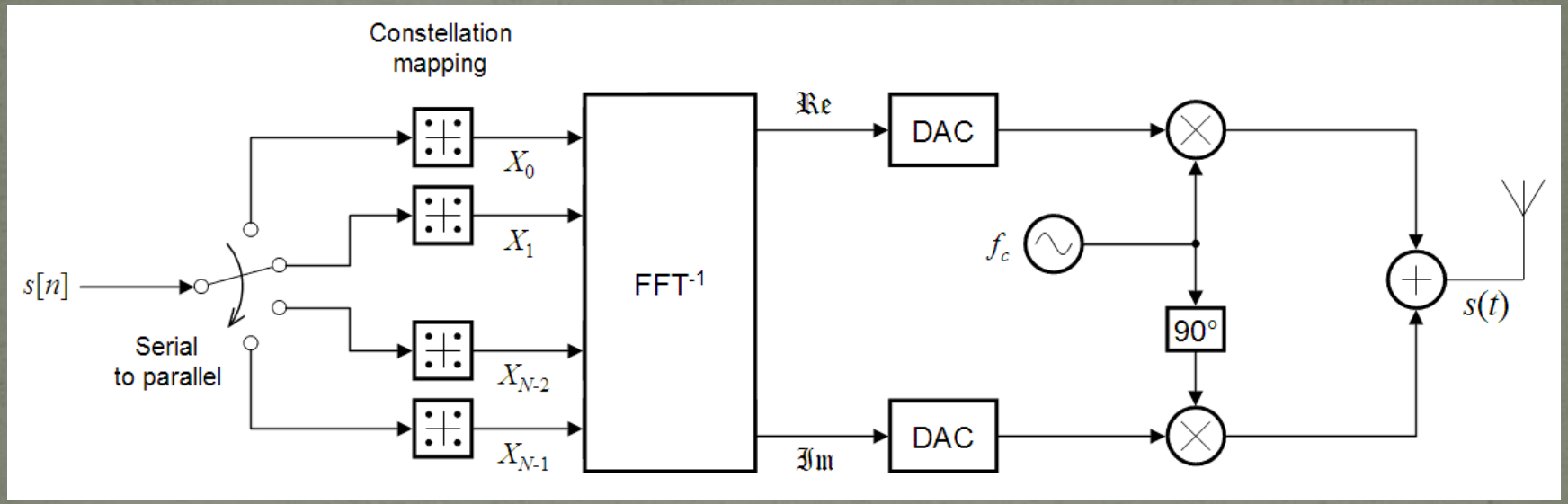
IFFT

DAC

Modulate

DEMO on DE 2-70 board

DEMO on DE 2-70 board



Reference

[1] Tong Xuejian, LuoTao. Principle and Application of OFDM mobile communication technology. Posts and Telecom Press. 2003.6
[2] http://en.wikipedia.org/wiki/Orthogonal_frequency-division_multiplexing
[3] Mérouane Debbah. Short introduction to OFDM