ZUiAM
ise
17th International Conference
Mixed Design of Integrated Circuits and Systems
DMCS
DESY

Design of Eight-Channel ADC Card for GHz Signal Conversion

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Wojciech Jałmużna
Tomasz Jeżyński

We acknowledge funding from the European Commission under the FP7 Research Infrastructures project EuCARD, grant agreement no. 227579.

Agenda

Introduction

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- Introduction
- Main requirements

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- Summary

Introduction – „Standard” LLRF System

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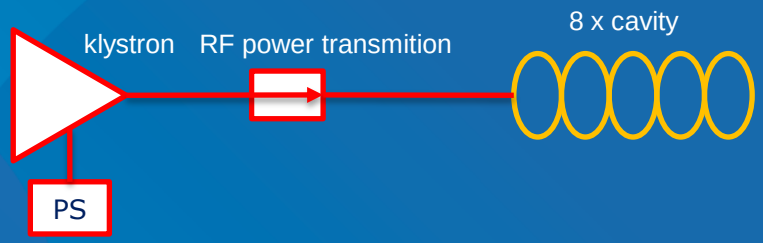
Introduction – „Standard” LLRF System



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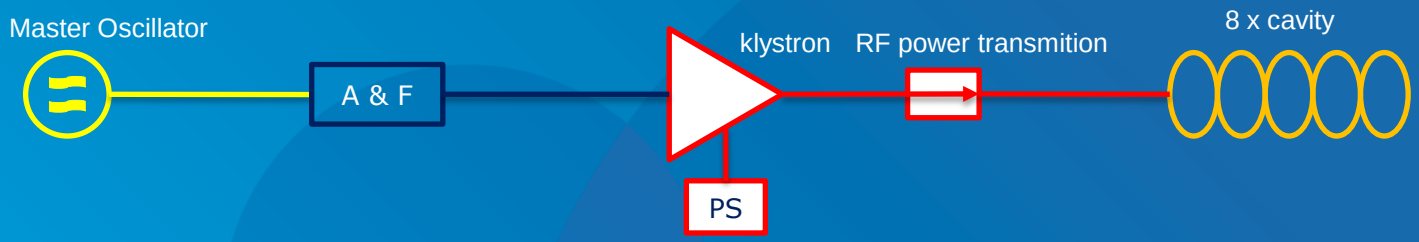
Introduction – „Standard” LLRF System



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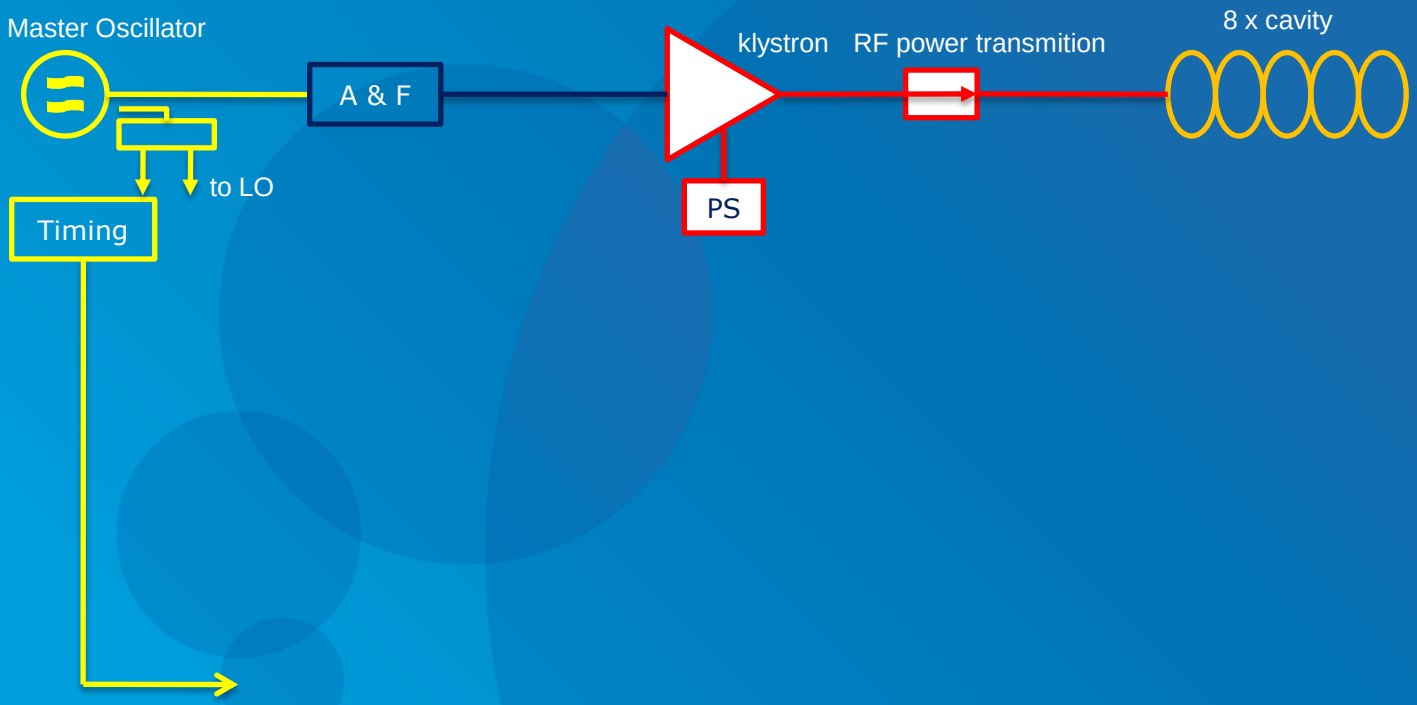

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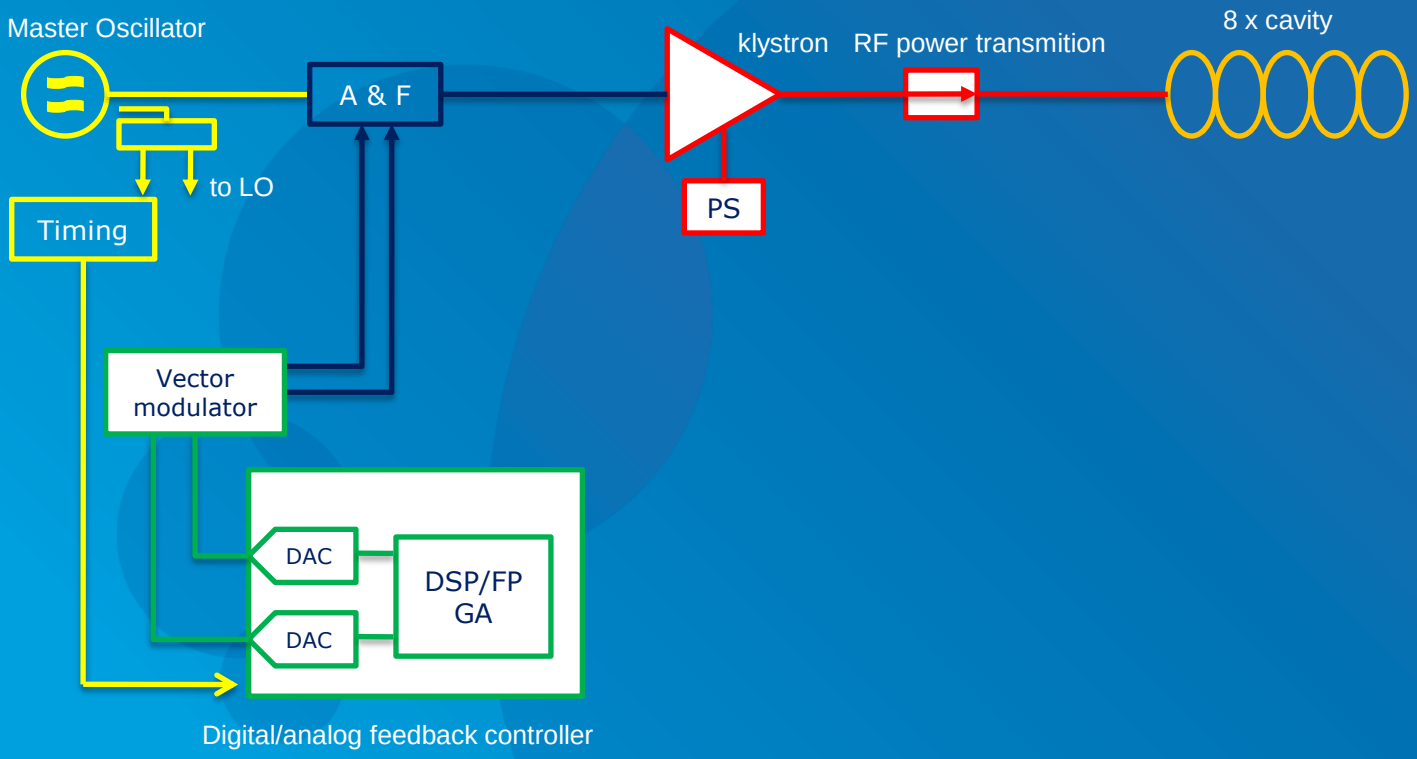

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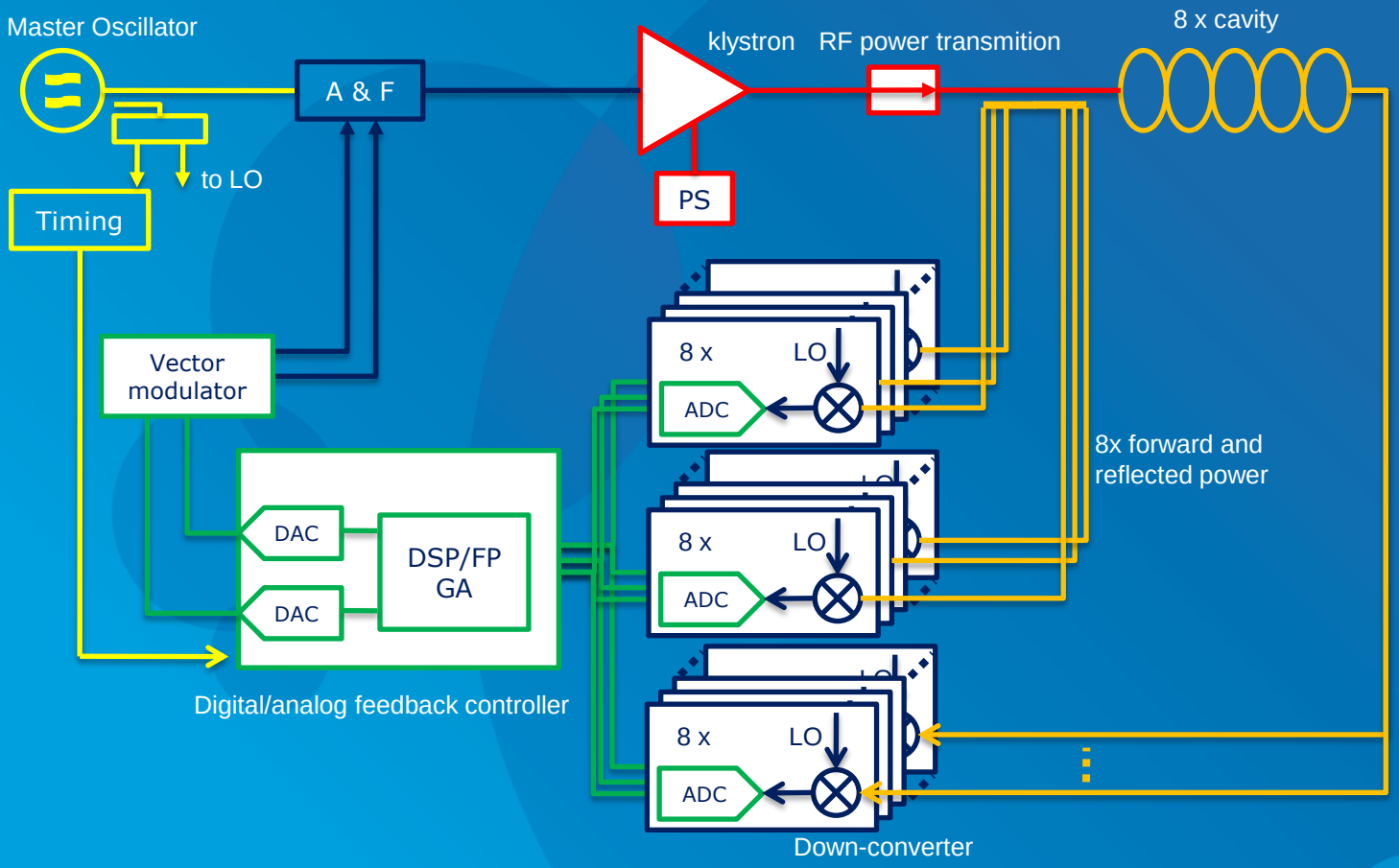

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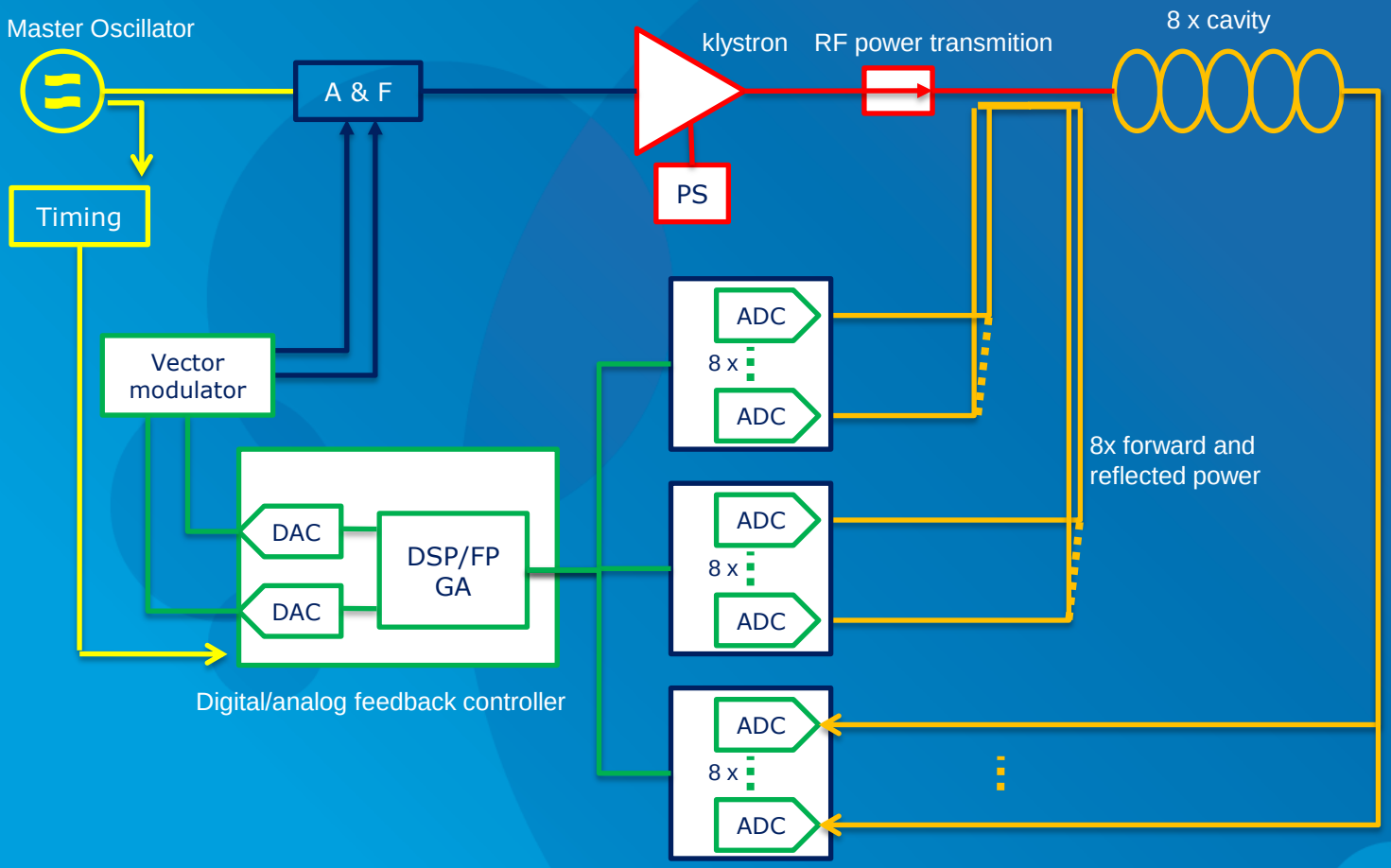
LLRF – New Concept



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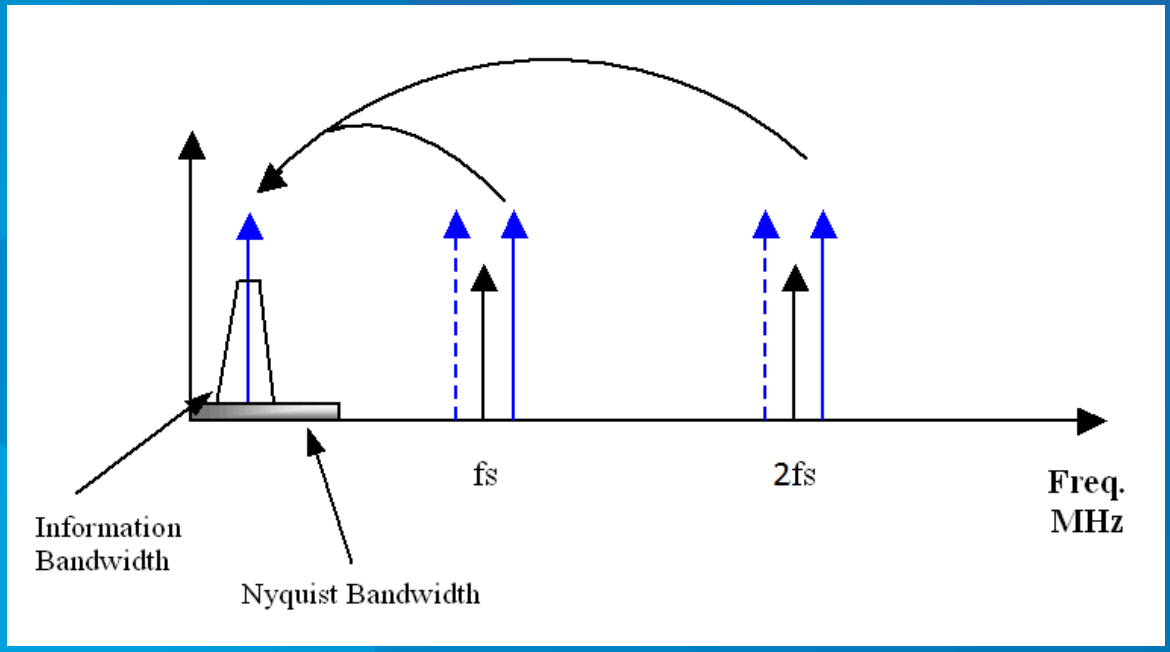
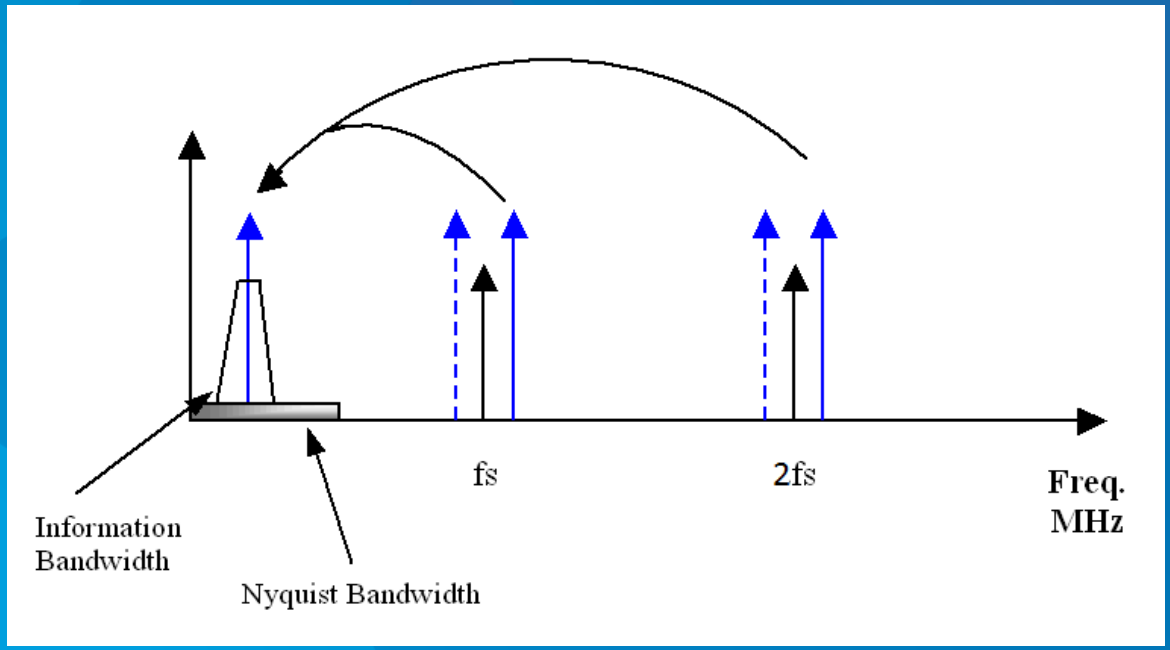
Undersampling

Frequency domain



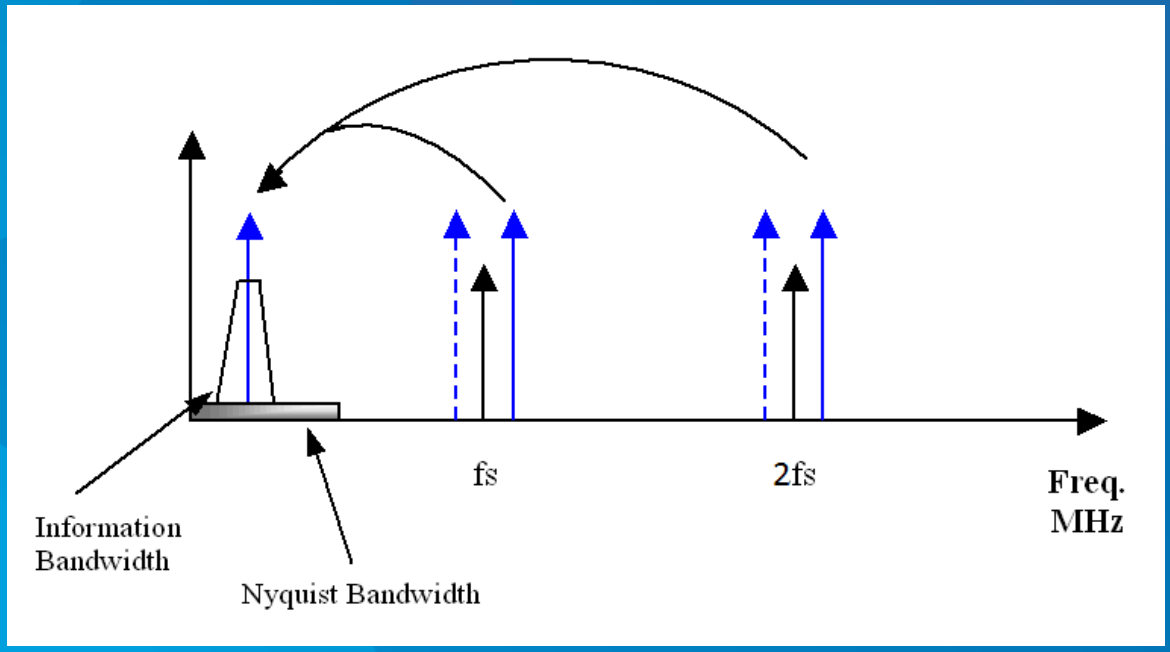
Undersampling

Sampling frequency fs>2fb



Undersampling

Input Badwidth > Signal Frequency



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System Concept

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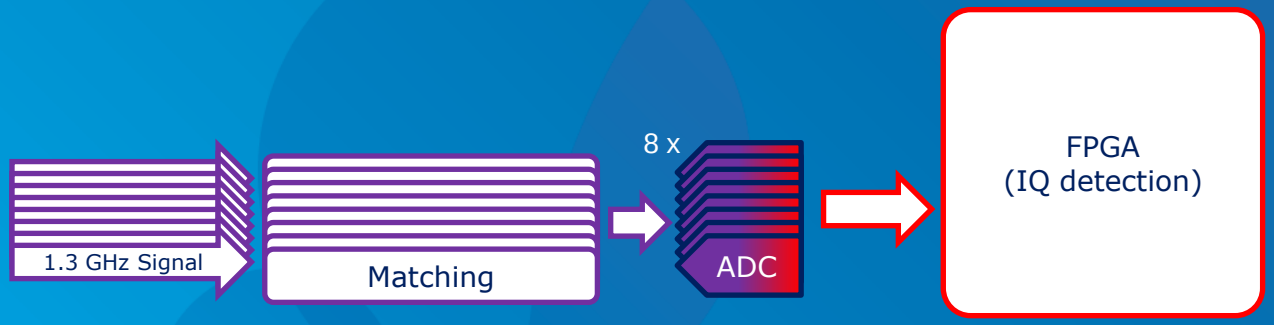

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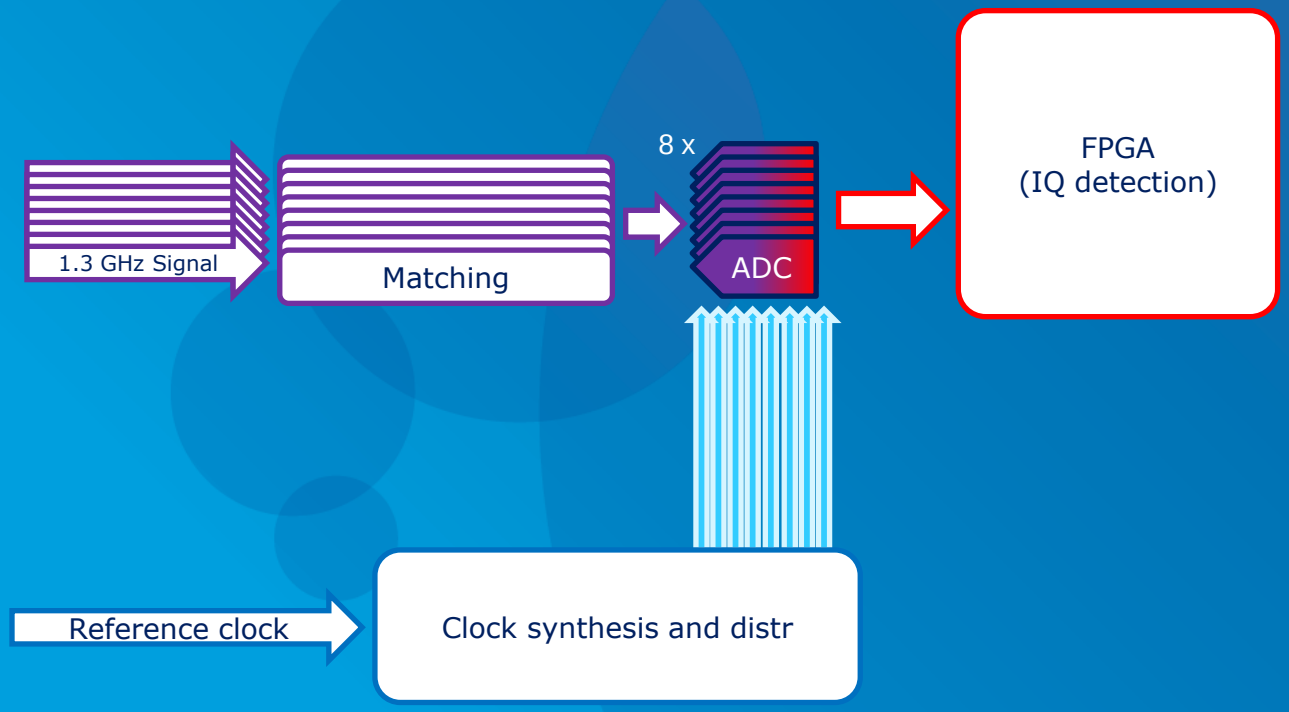

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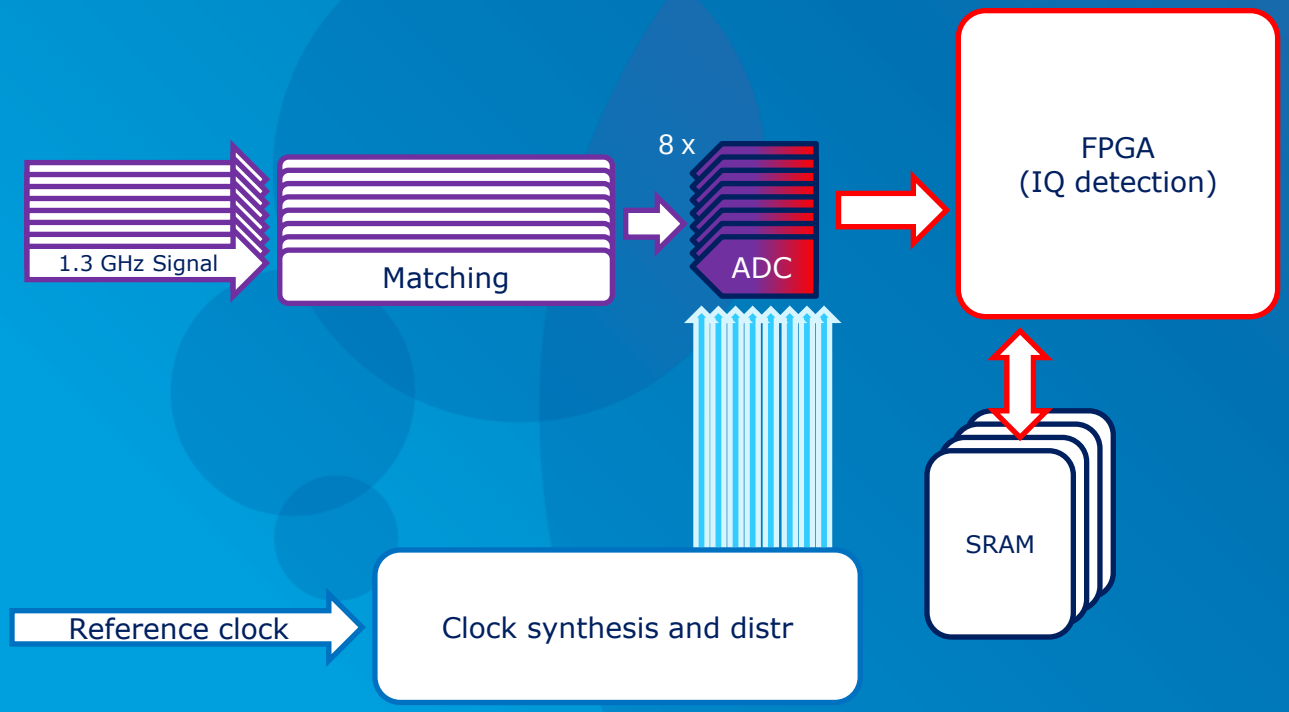

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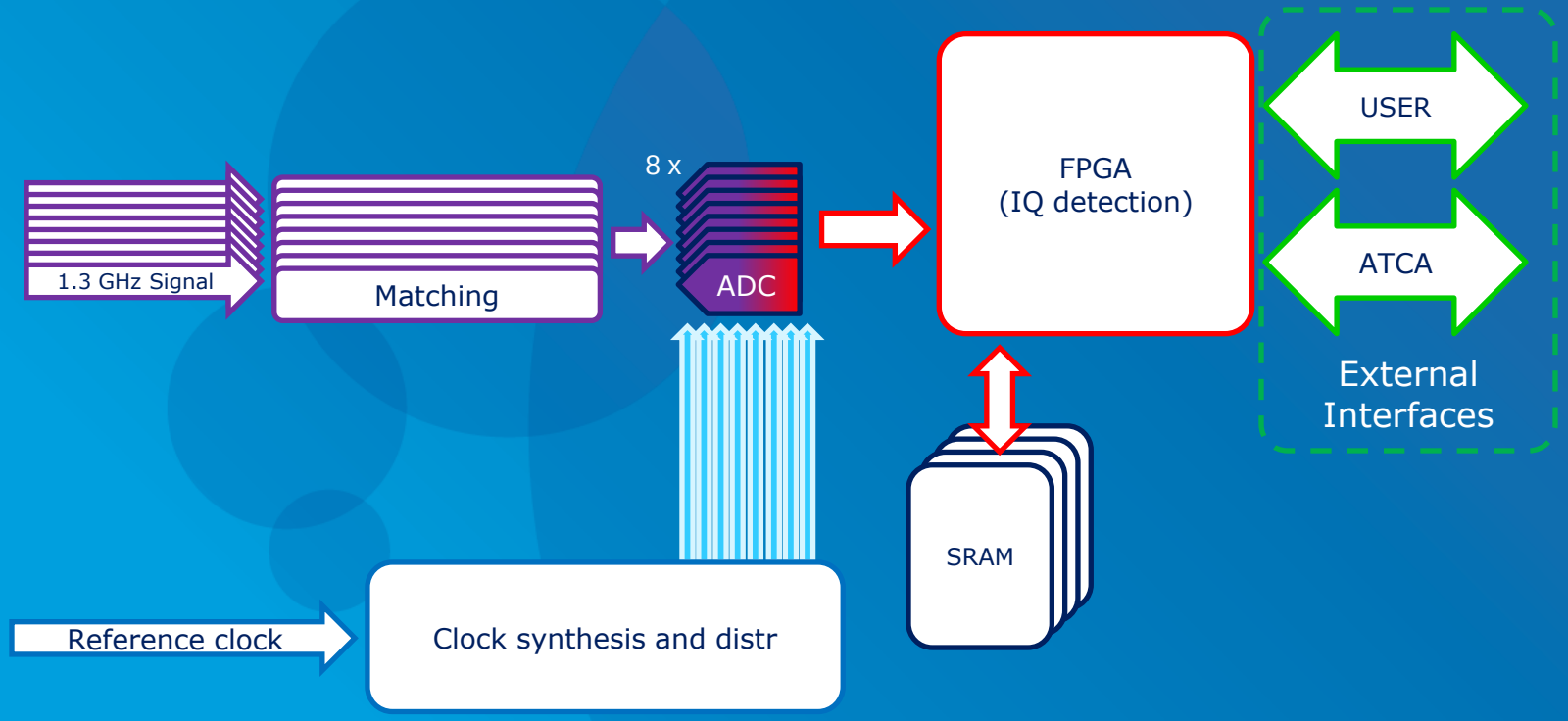

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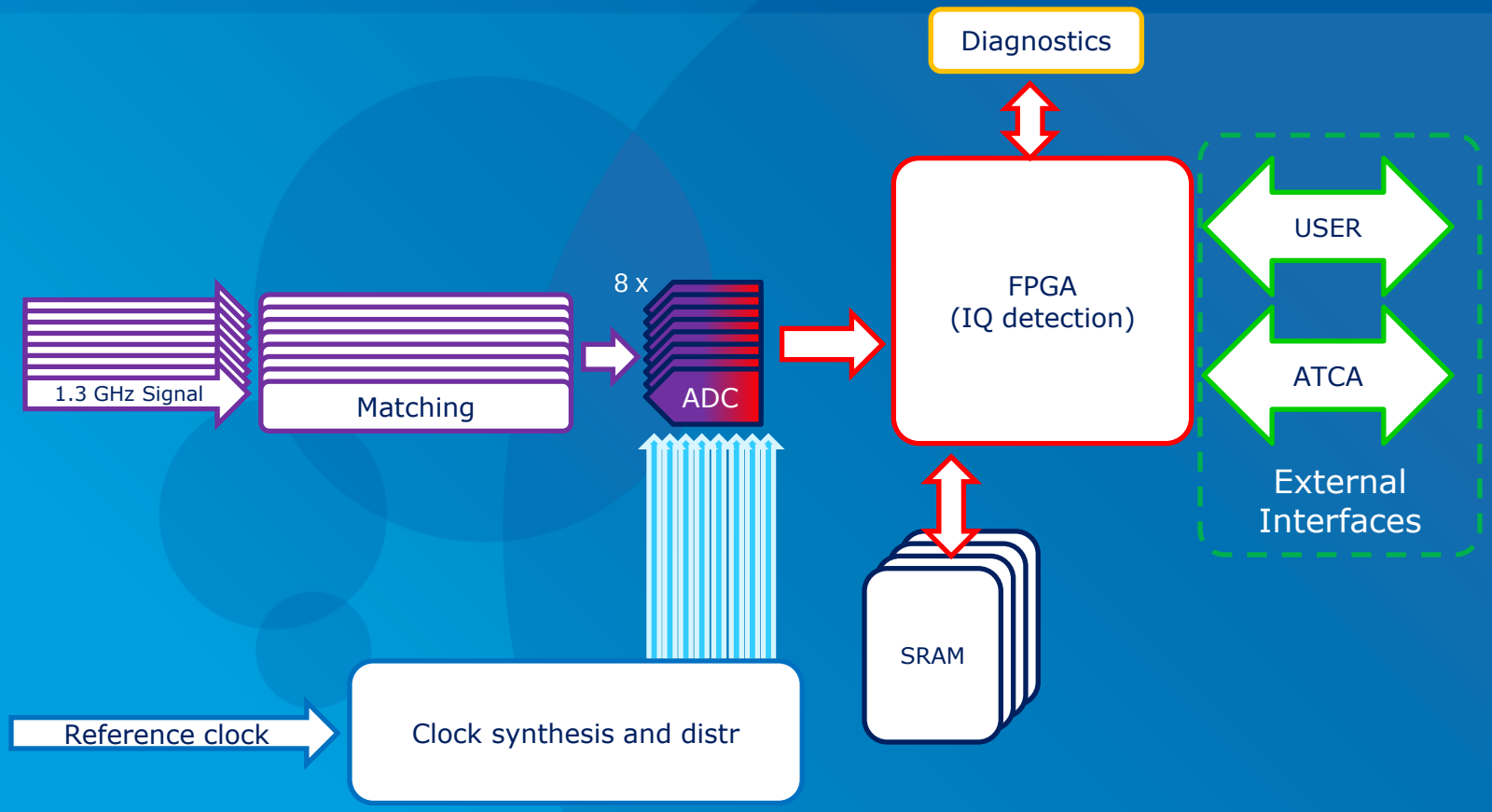

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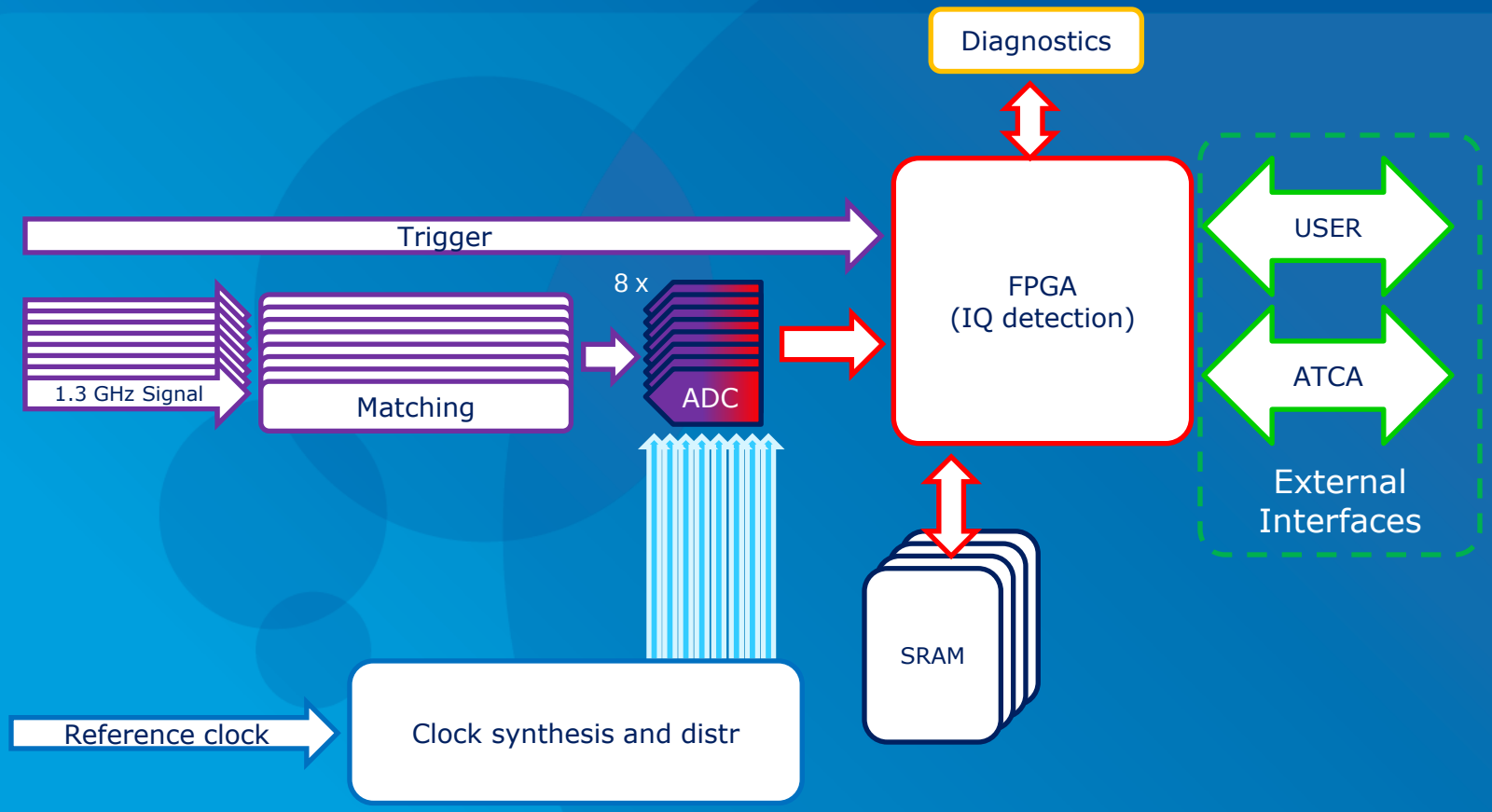

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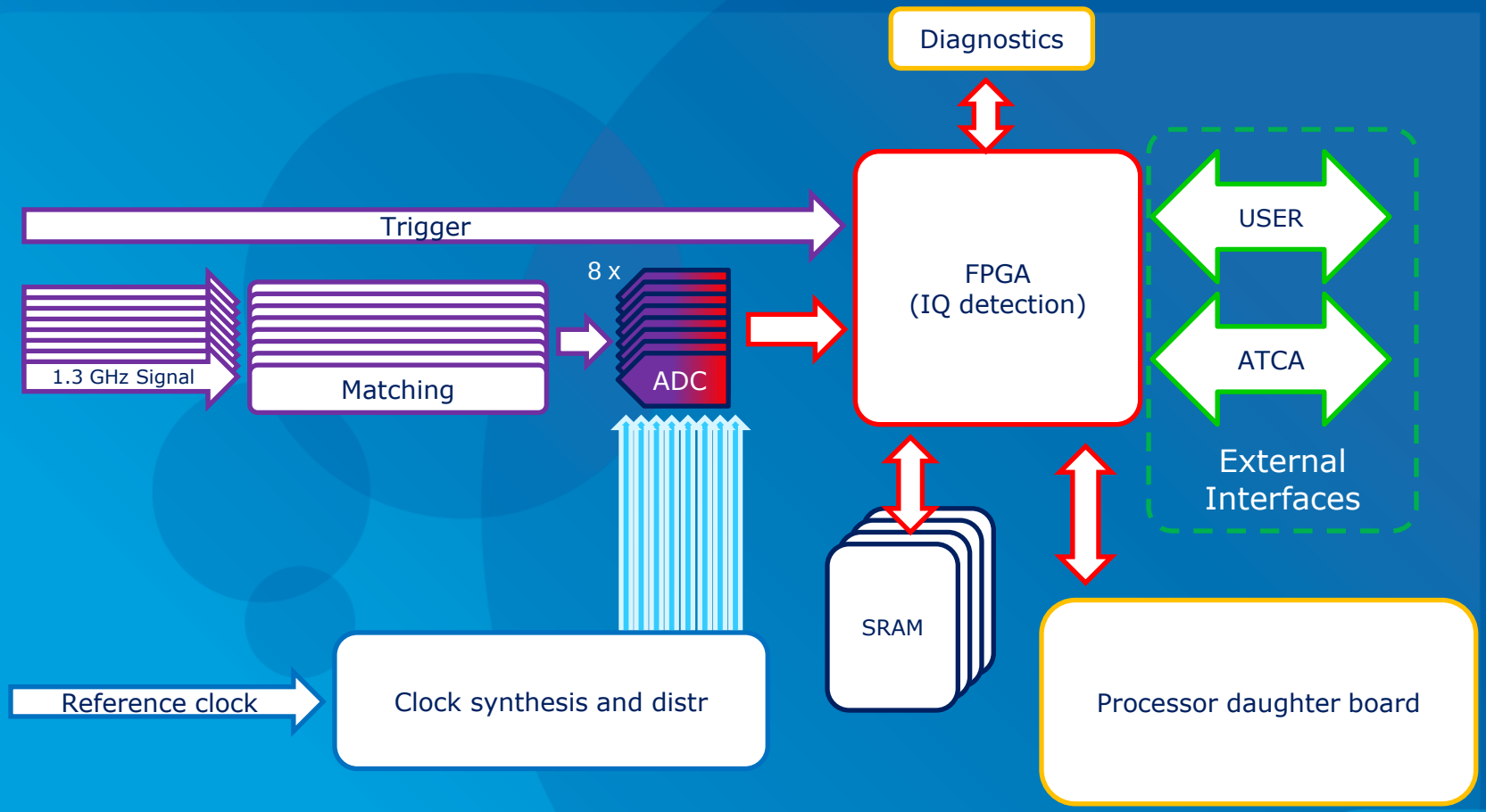

Analog circuit

14-bit/ 400MSPS and 12-bit 500MSPS

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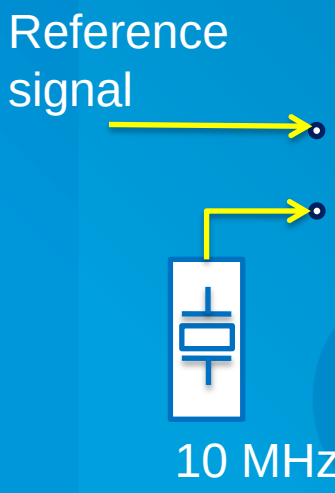
- Add-on matching board

Clocking circuits



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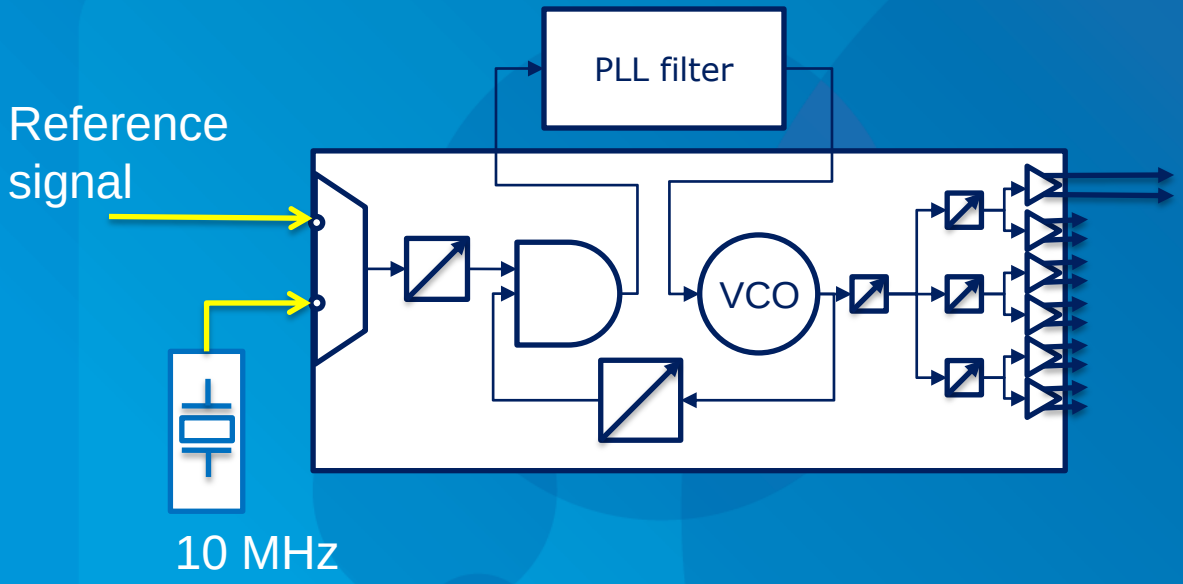
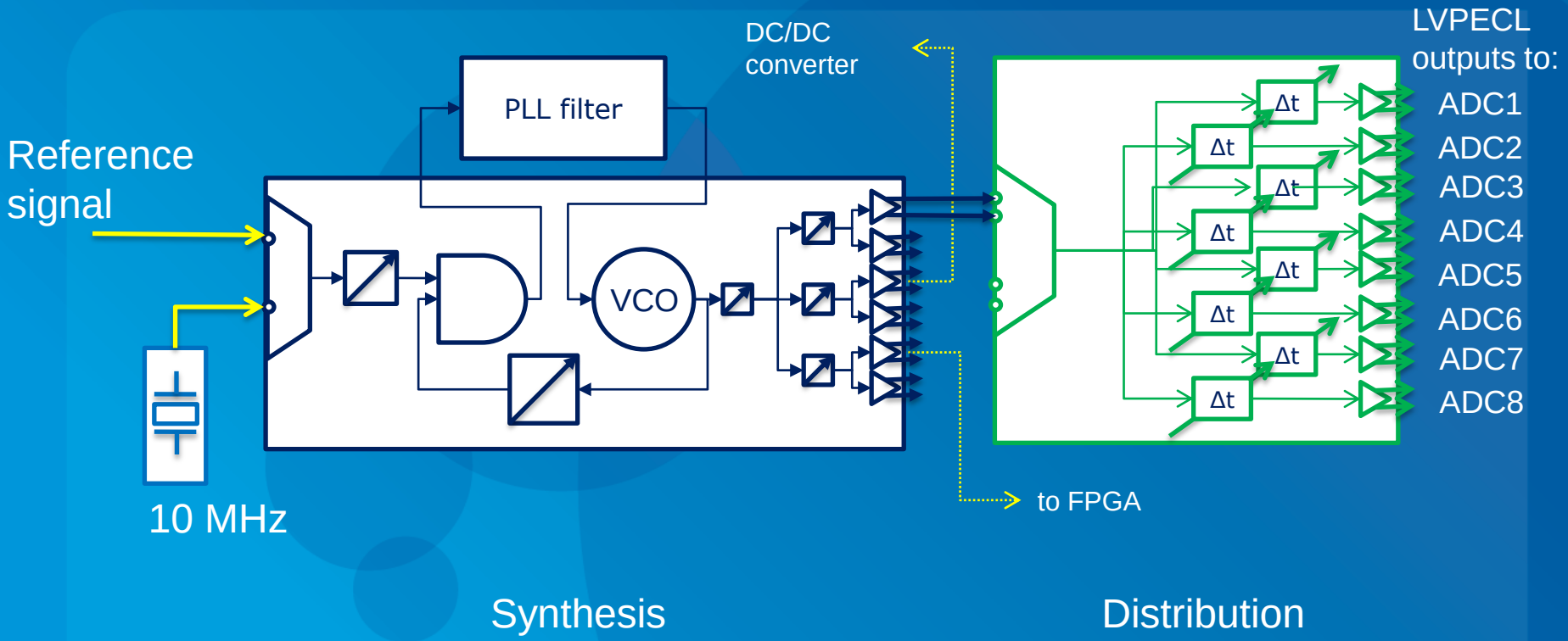


Synthesis

Clocking circuits



Digital circuits

FPGA Virtex5 SX50T

- 500 MSPS data
- Memory blocks
- DSP blocks

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SRAM Blocks

- 400 MHz
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Communication Interfaces

- ATCA *backplane*
- Fiber-optics
- *Ethernet*

CPU Daughter board

Virtex 5 with embedded PPC440

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CPU Daughter board

- Virtex 5 with embedded PPC440
- Configuration

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CPU Daughter board

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- Additional computations

PCB

20-layer board

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PCB

- 20-layer board
- ATCA standard

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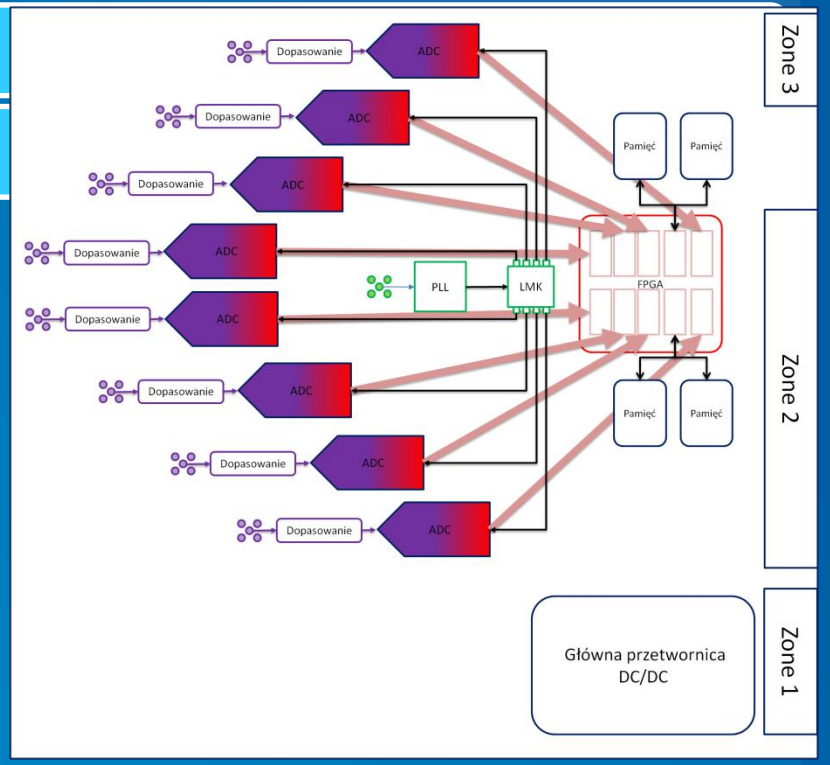
PCB

- 20-layer board
- ATCA standard
- Precise part distribution



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PCB

- 20-layer board
- ATCA standard
- Precise part distribution
- Over 170 differential pairs of 440 signals connected to FPGA

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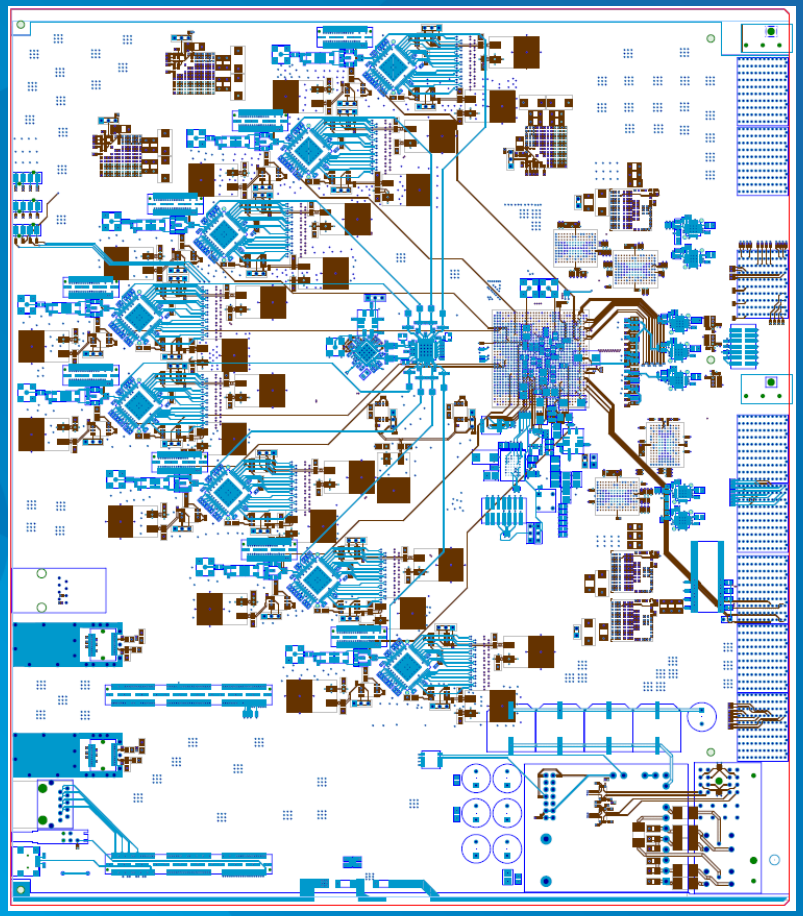
- *Power supply and grounding*

PCB



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Summary

Eight channel Fast ADC board

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- Eight channel Fast ADC board
- CPU daughter board

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- Eight channel Fast ADC board
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- Study of direct sampling performance

Summary

- Eight channel Fast ADC board
- CPU daughter board
- Study of direct sampling performance
- „Revolutionize” LLRF systems

Thank you for your Attention

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