New Approach to the ALFA Trigger Simulator

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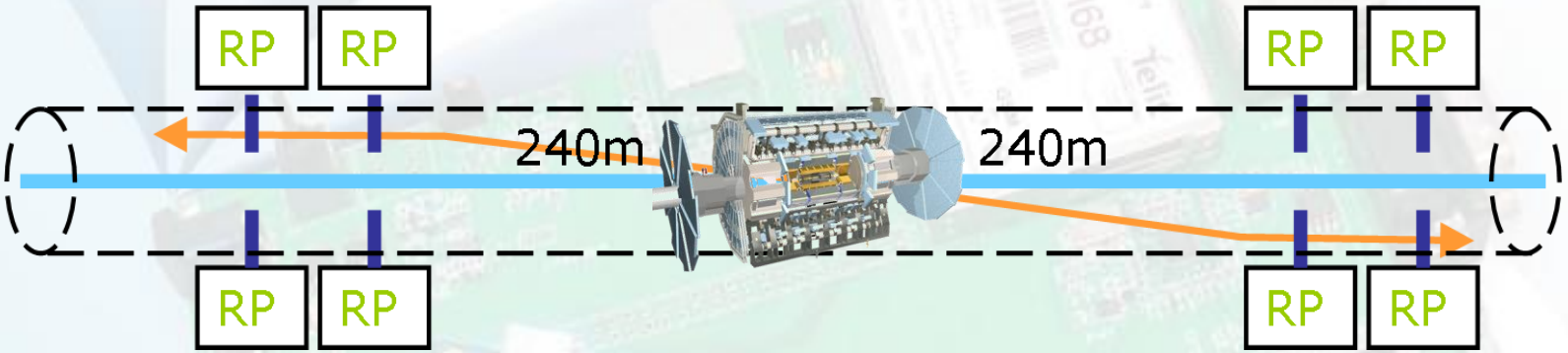
Introduction to ALFA

ALFA – **A**bsolute **L**uminosity **F**or **A**TLAS



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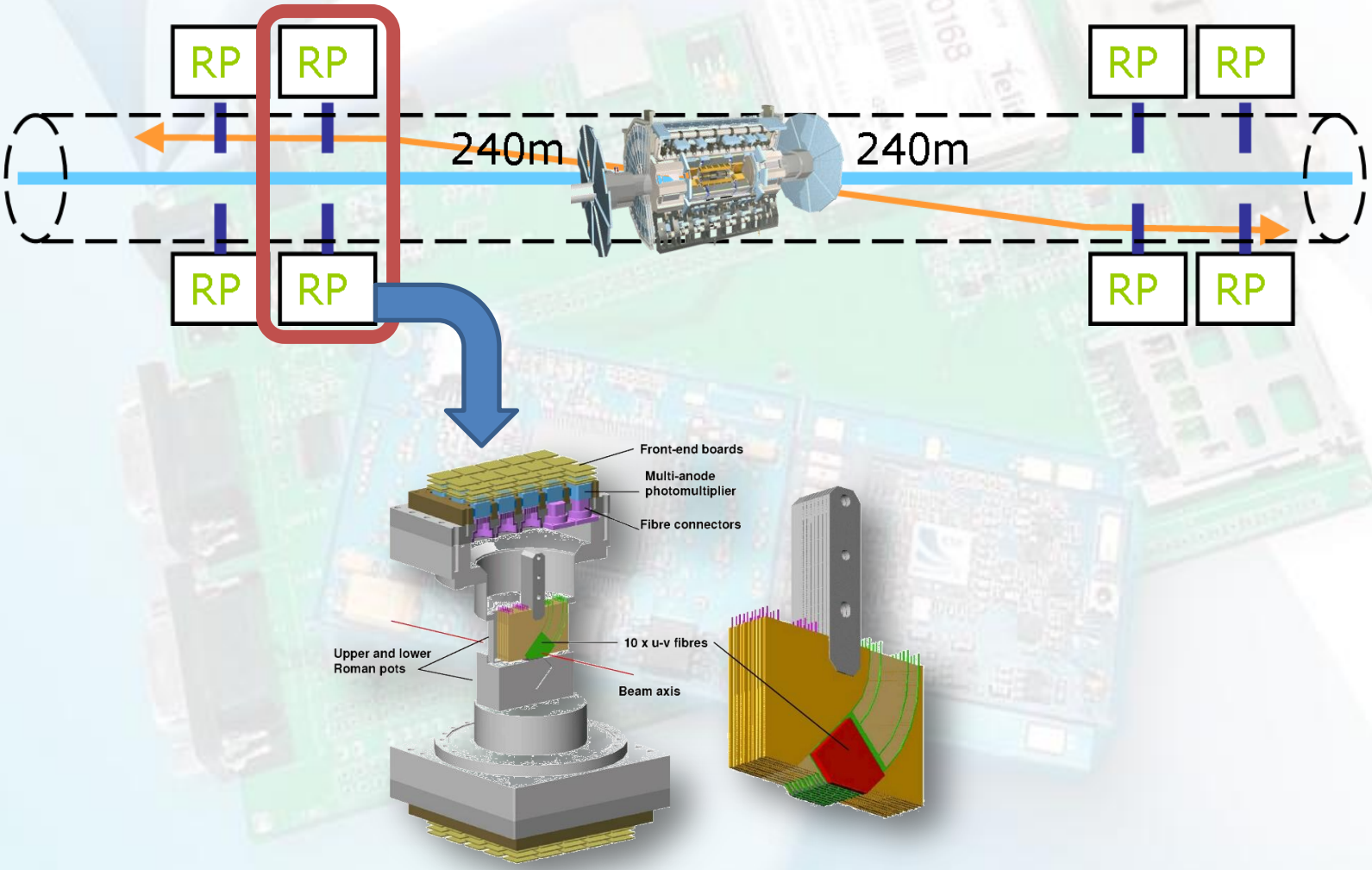

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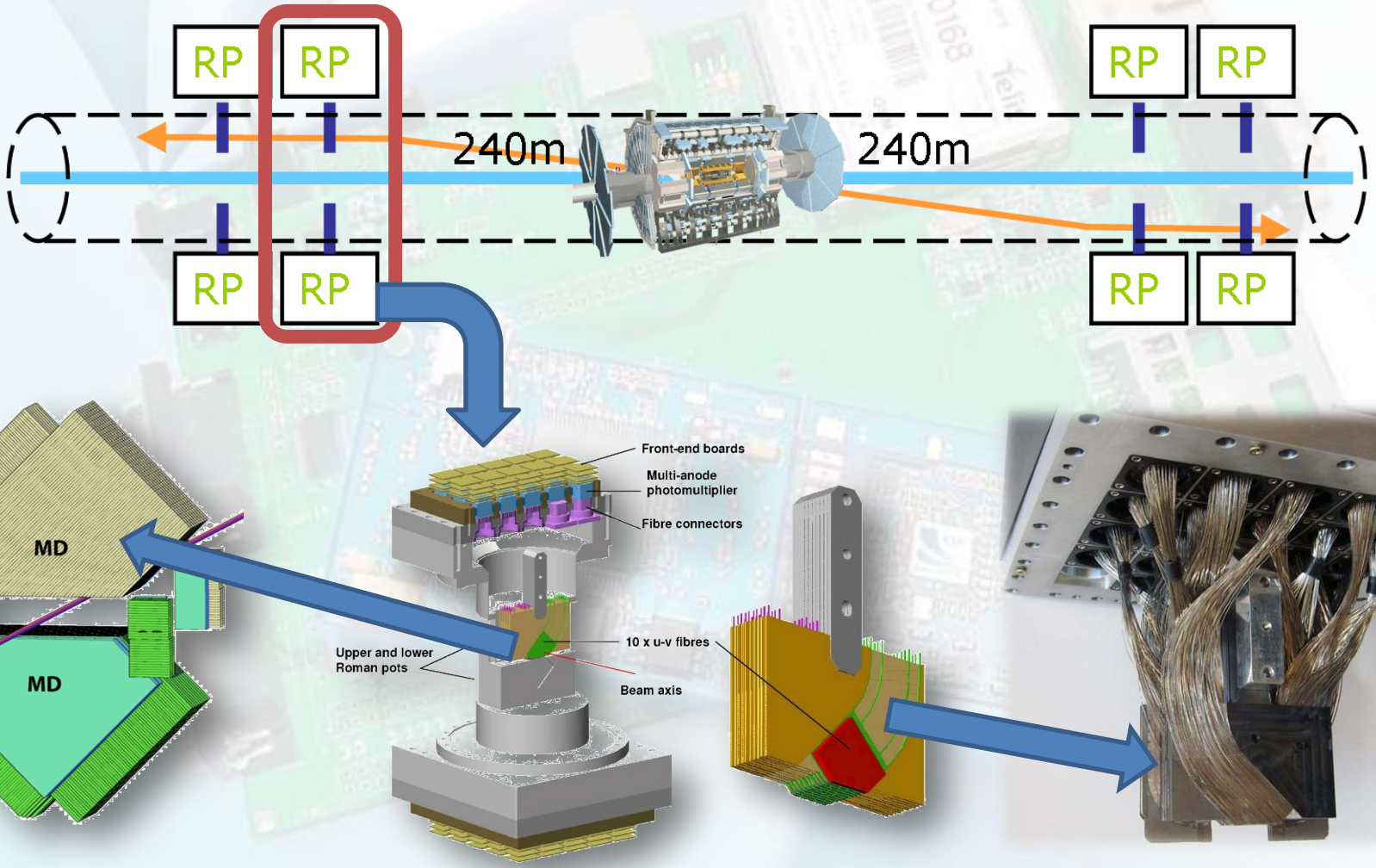
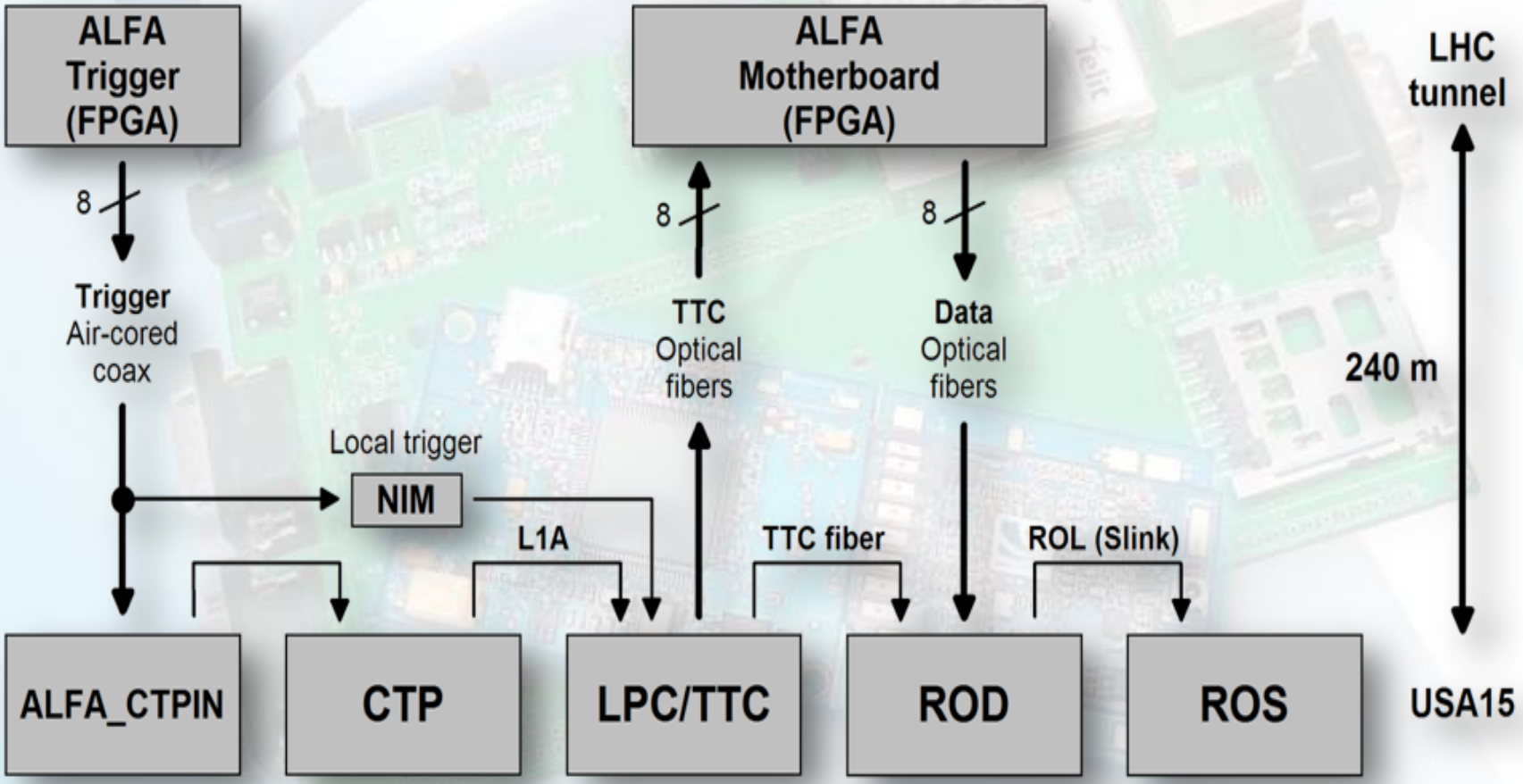


ALFA DAQ System



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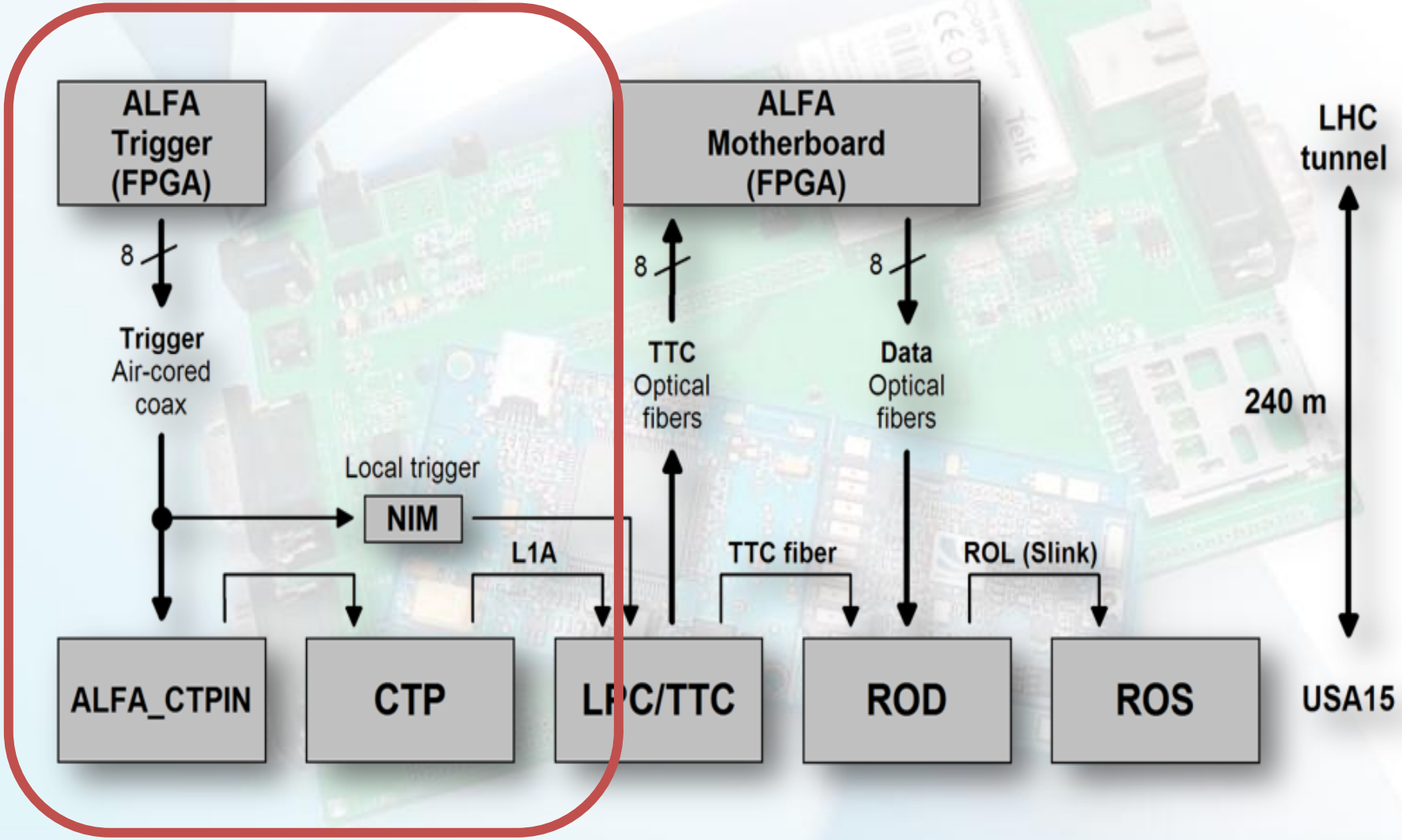
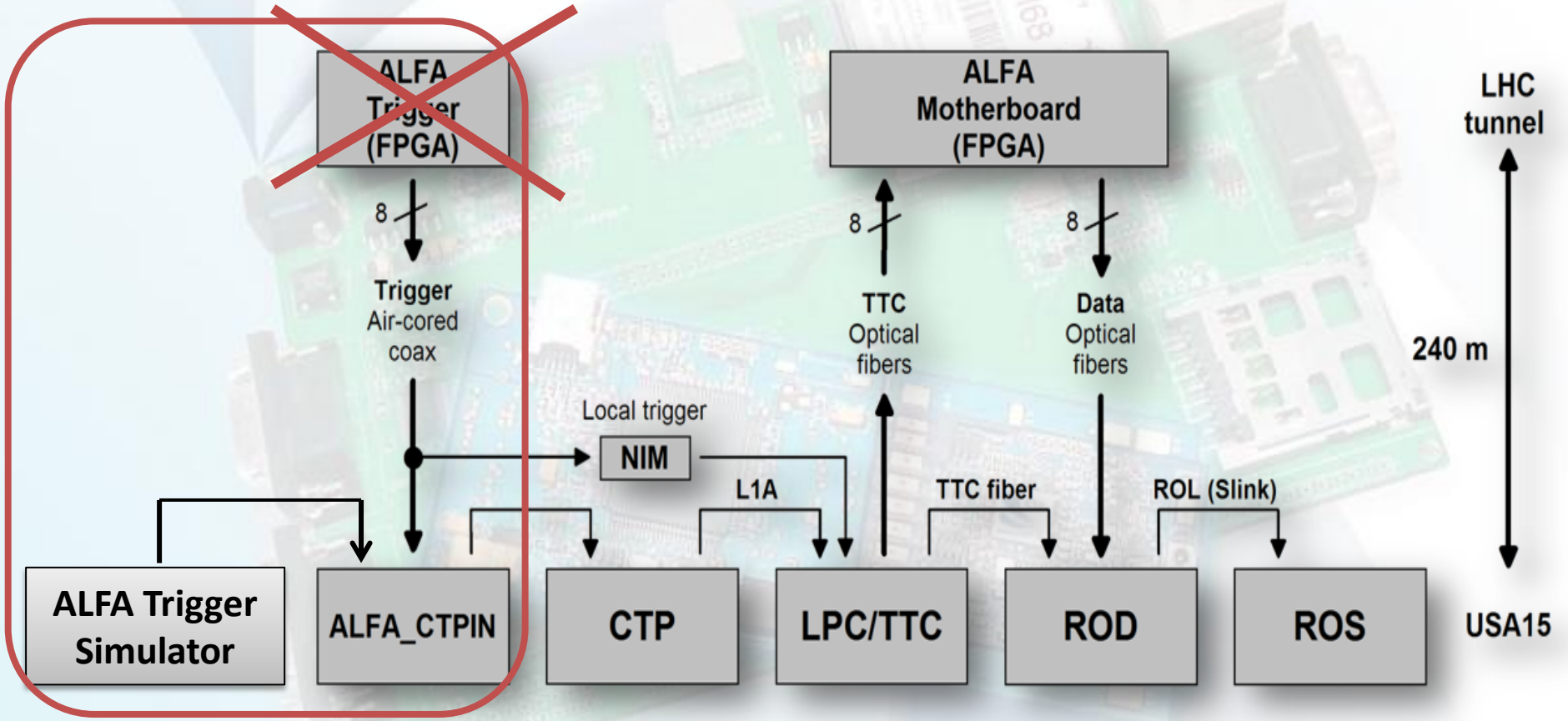


ALFA DAQ System



ALFA Trigger Simulator

Basic features:

- ✓Real Time machine
- ✓Must be synchronised with LHC Clock (40 MHz)
- ✓Must be synchronised with LHC Orbit Signal (11.25 kHz)
- ✓Possibility to set the delay
- ✓Possibility to set „dummy orbit”

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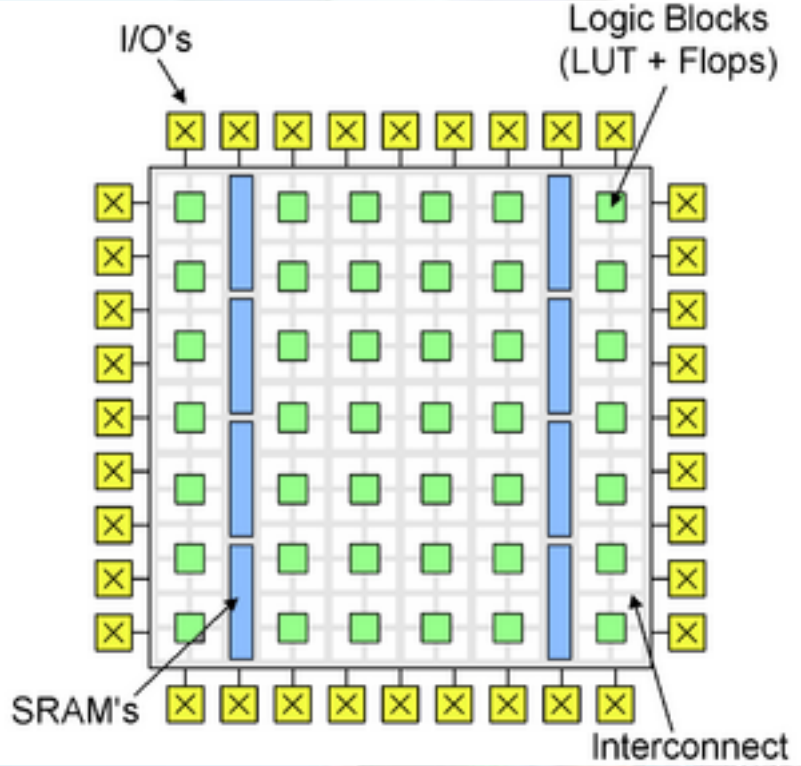
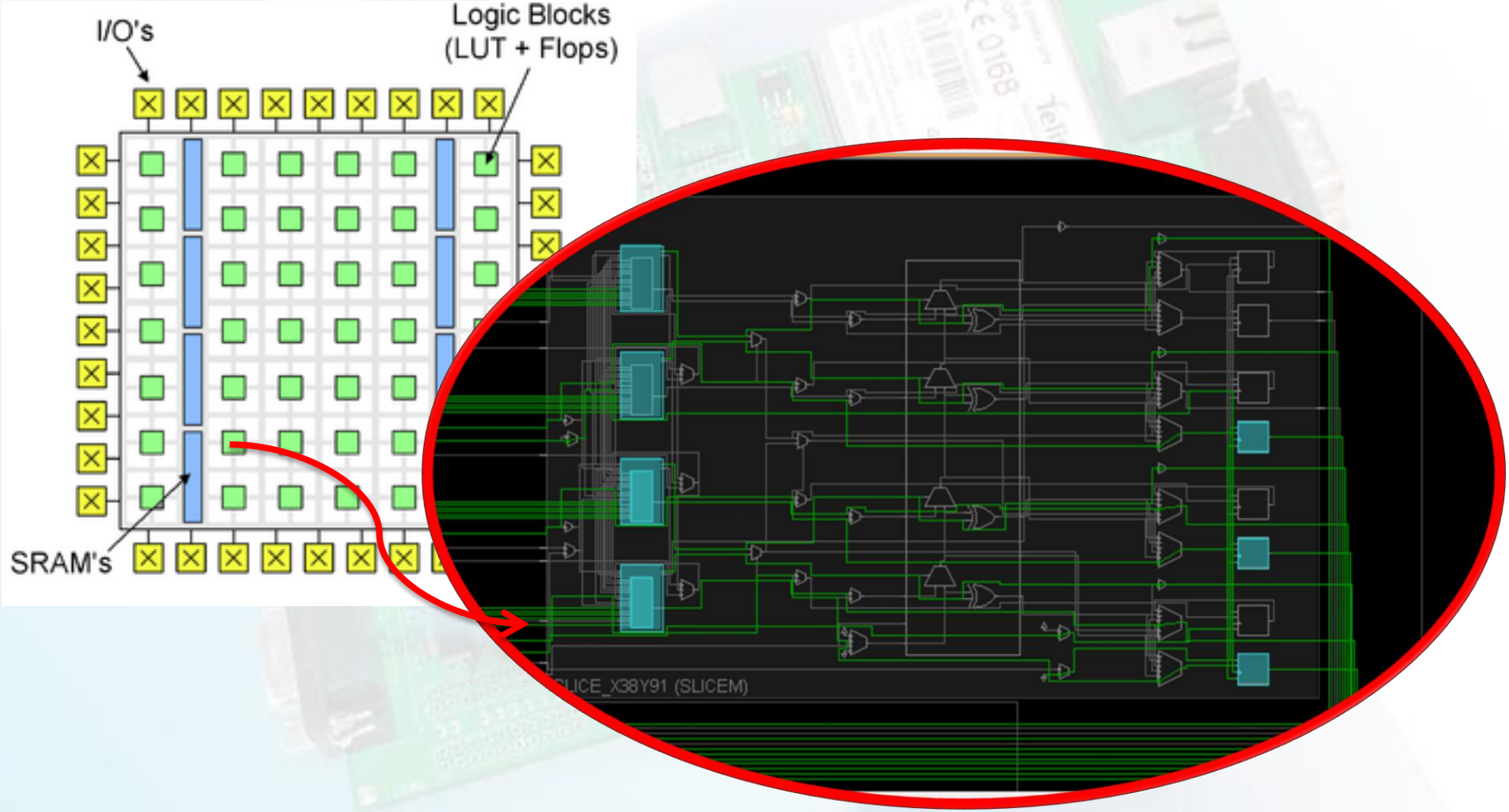
Synchronization with LHC can be obtained only using programmable logic -> FPGA

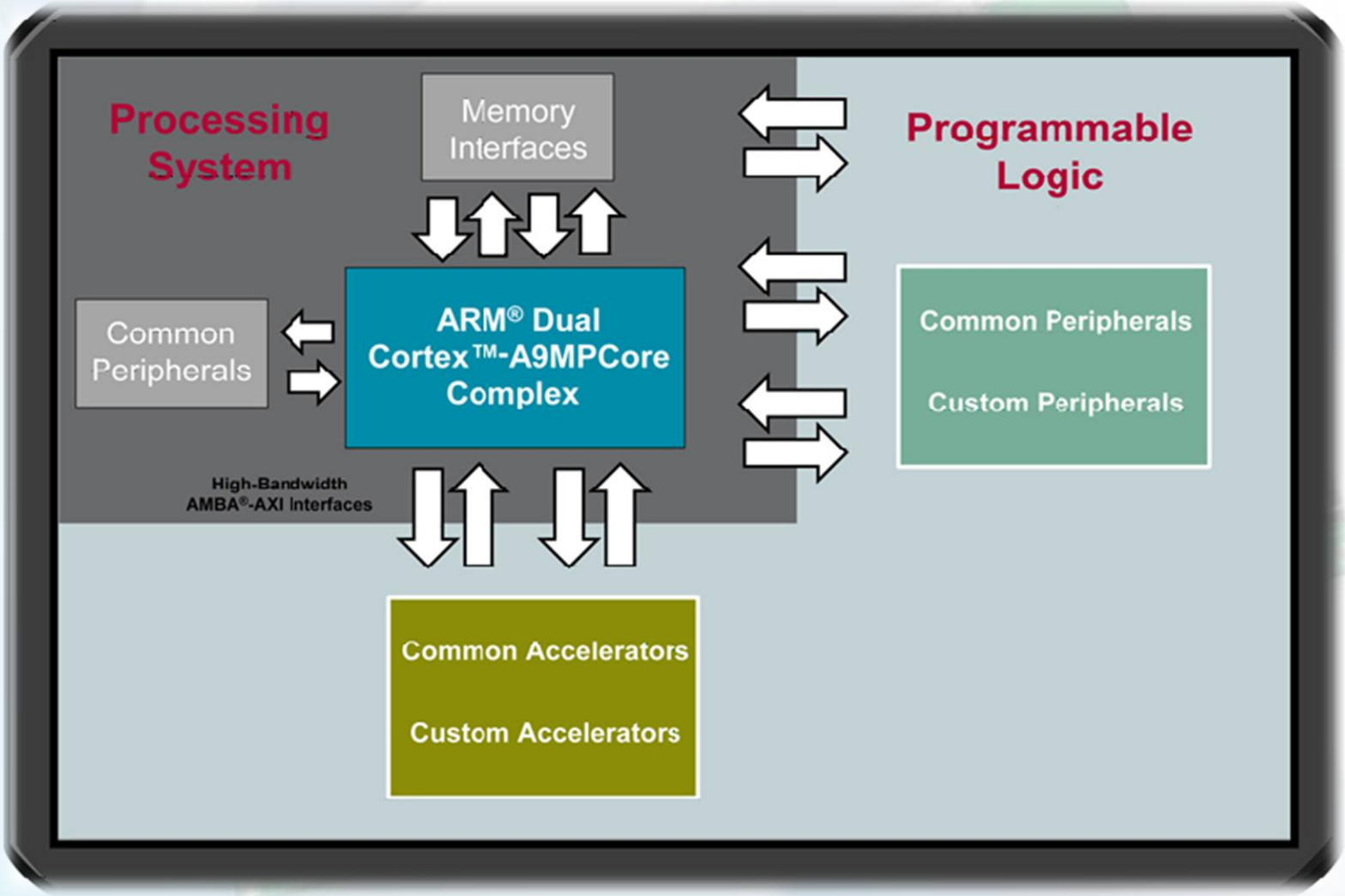
FPGA – **F**ield-**P**rogrammable **G**ate **A**rray



FPGA – **F**ield-**P**rogrammable **G**ate **A**rray



Zedboard and Zynq



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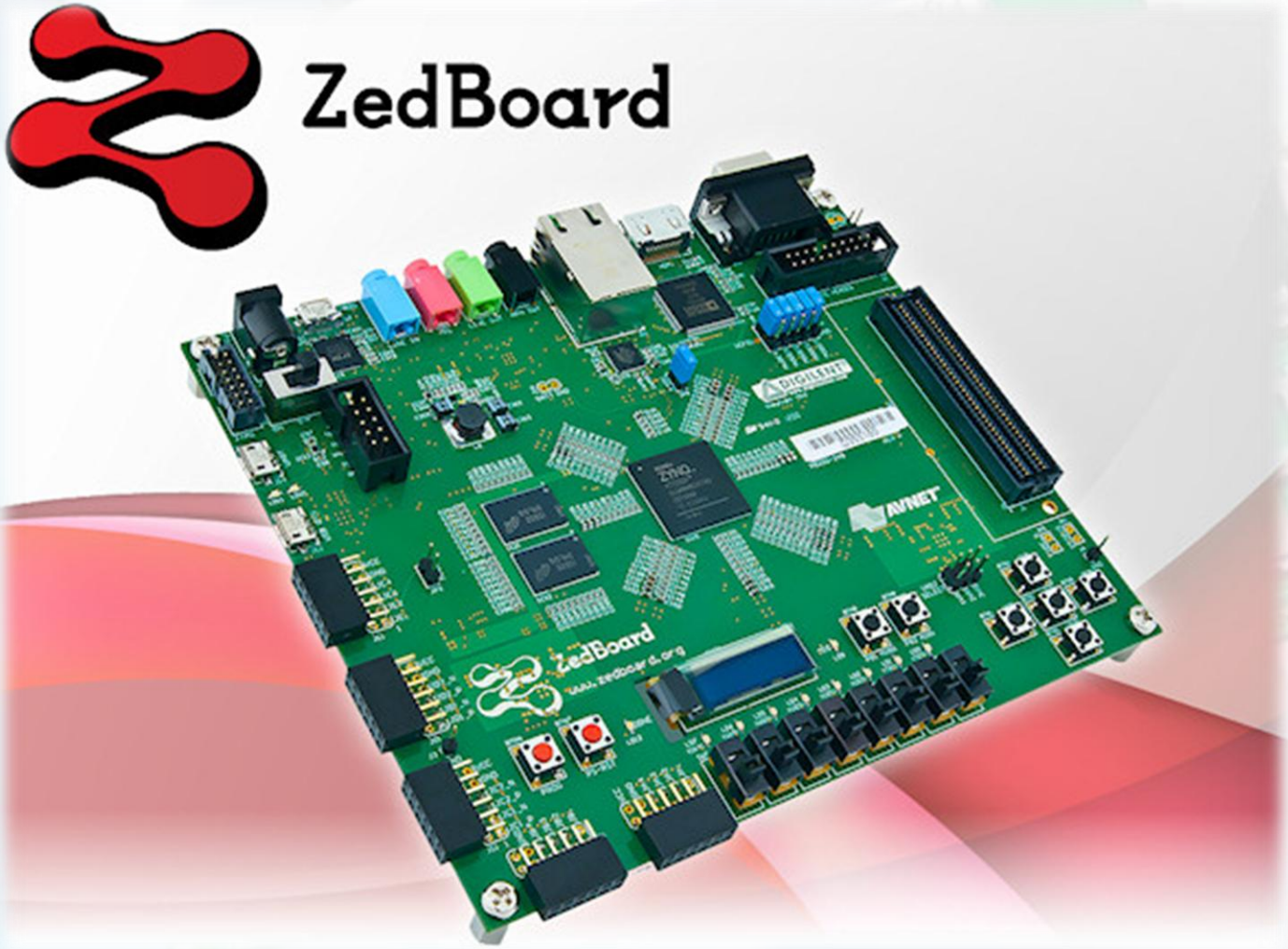
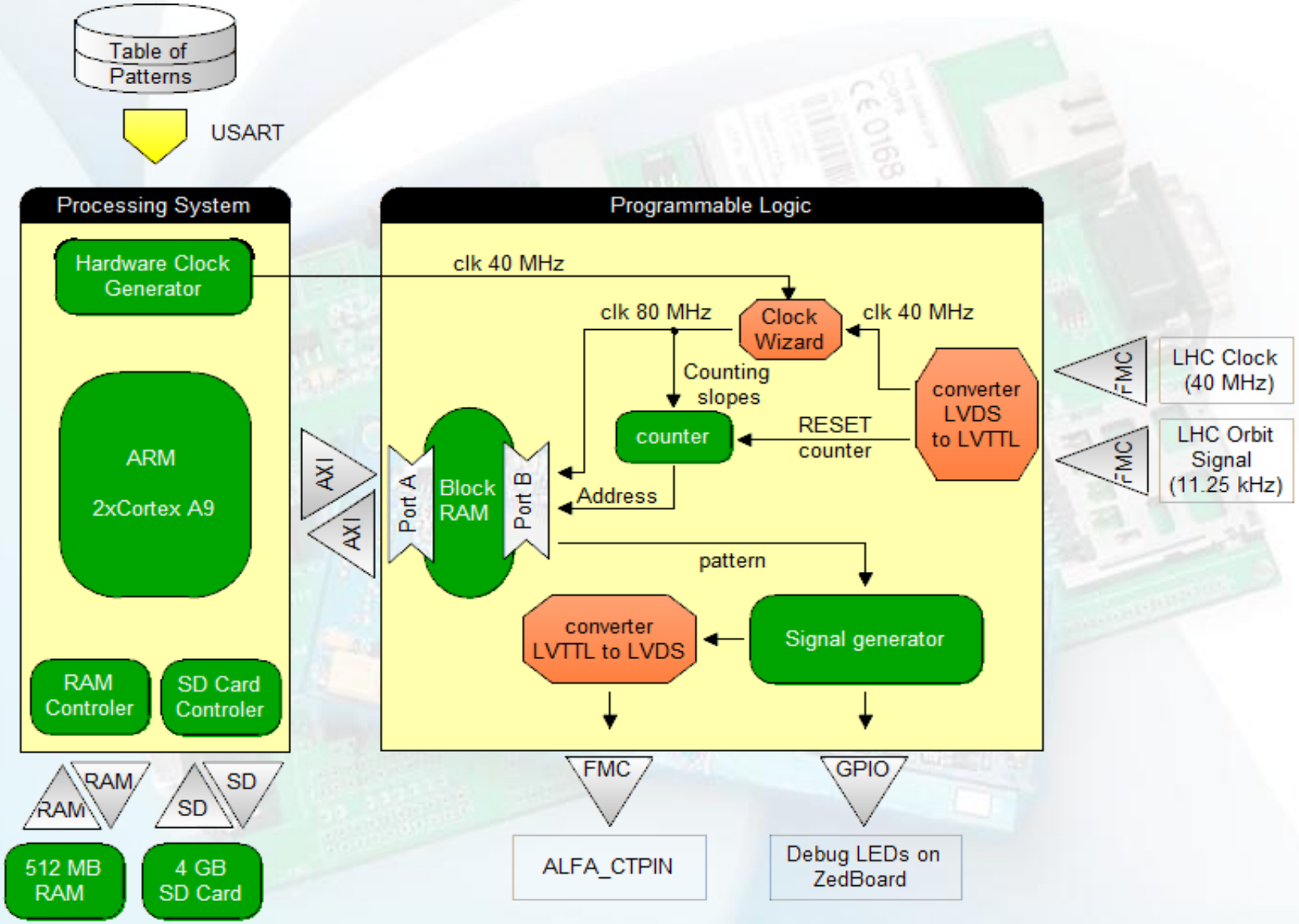


ALFA Trigger Simulator



Approach I - problems

Disadvantages:

- Pattern modification requires additional computer to send commands to board
- Program update requires physical access to board
- Logic update requires physical access to board
- Any update takes a lot of time
- No possibility to create advanced application

Approach I - problems

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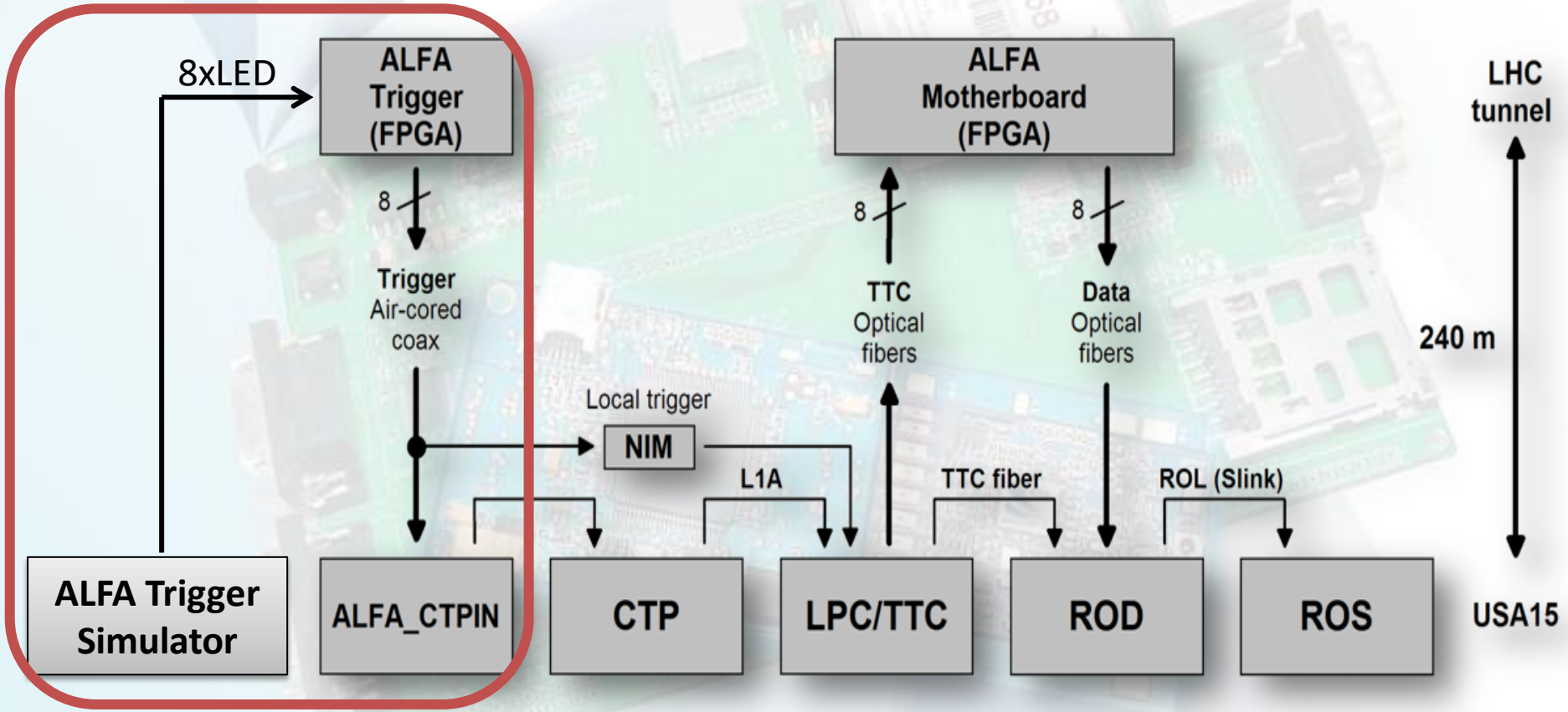
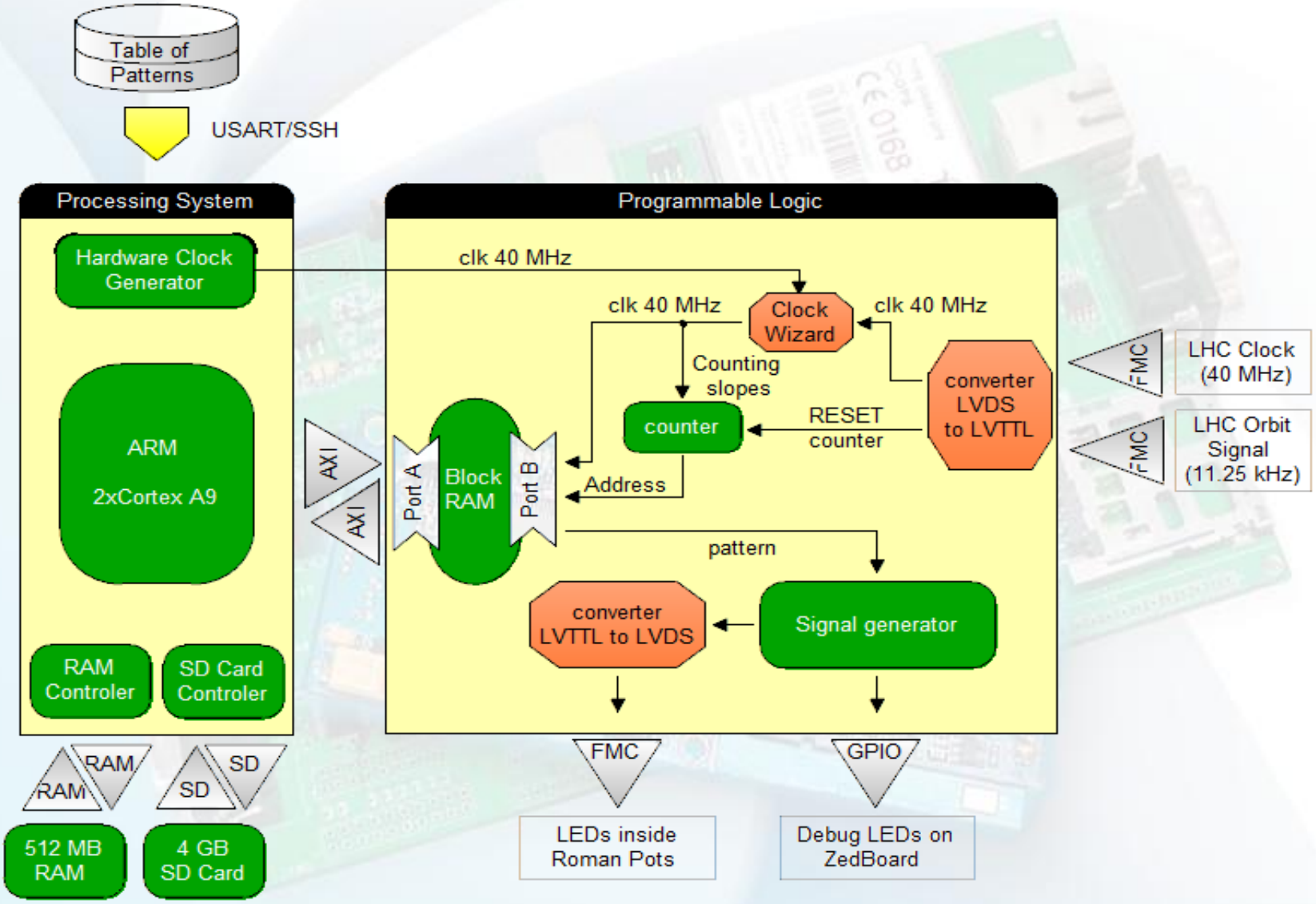
Solution:

Approach II – new one:



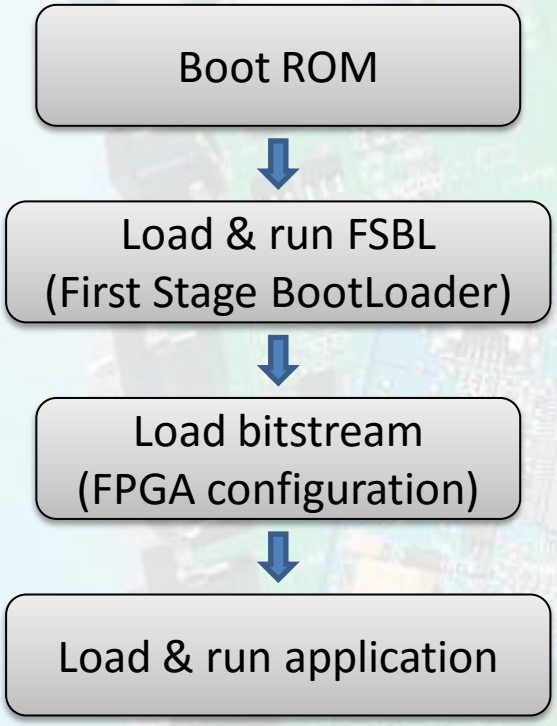
Approach II – new one:



Approach II – Boot

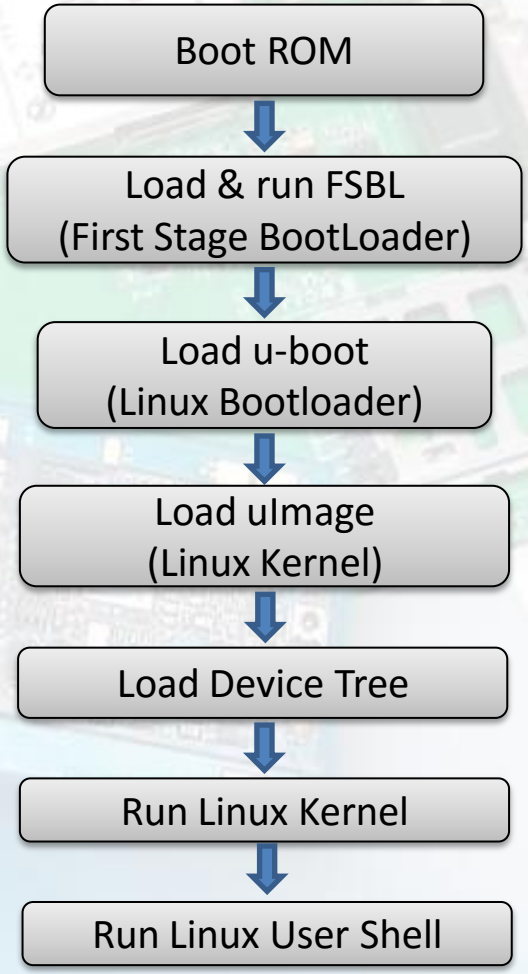
Standalone application

(Approach I)

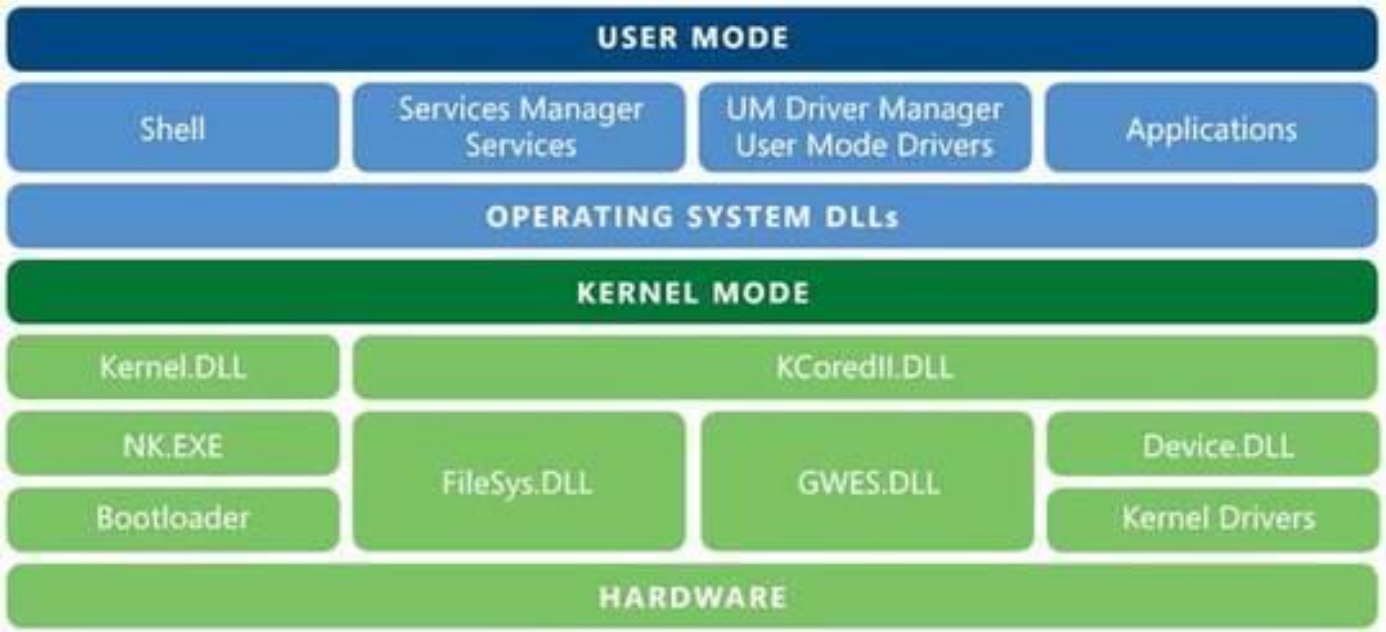


Linux application

(Approach II)



Approach II – application Boot



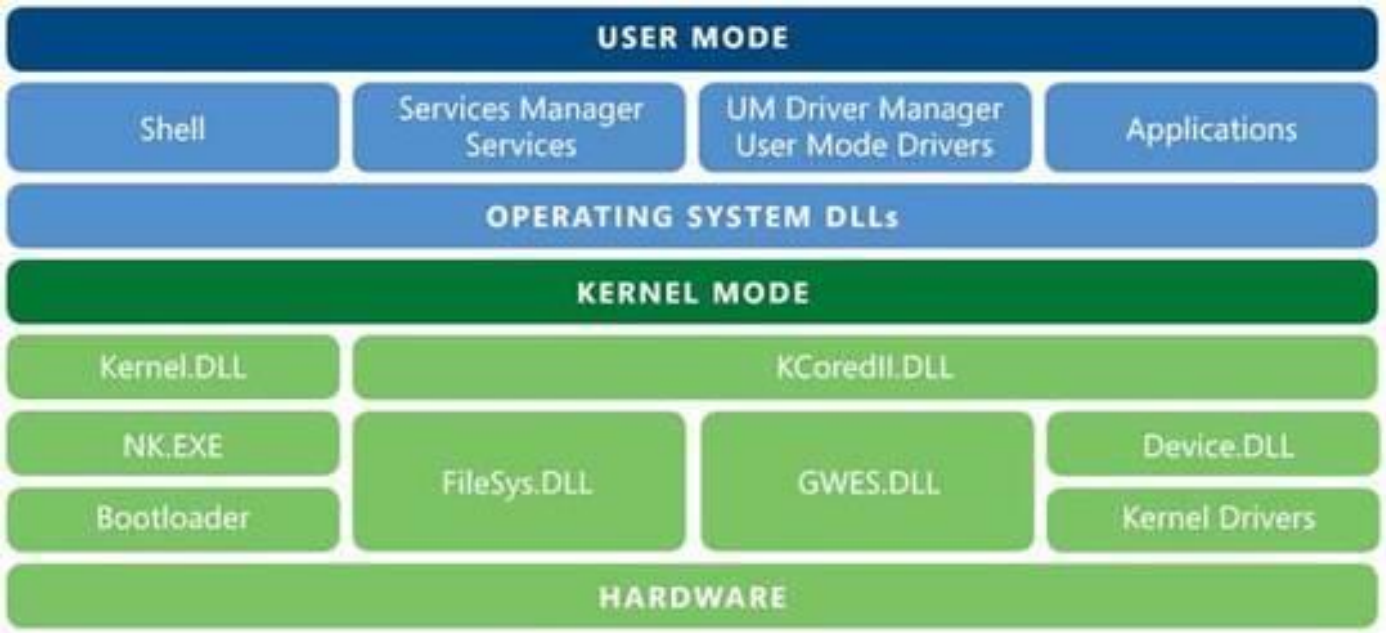
Application

bitstream
(FPGA configuration)

Download
trough SSH

SD CARD Storage

Approach II – application Boot



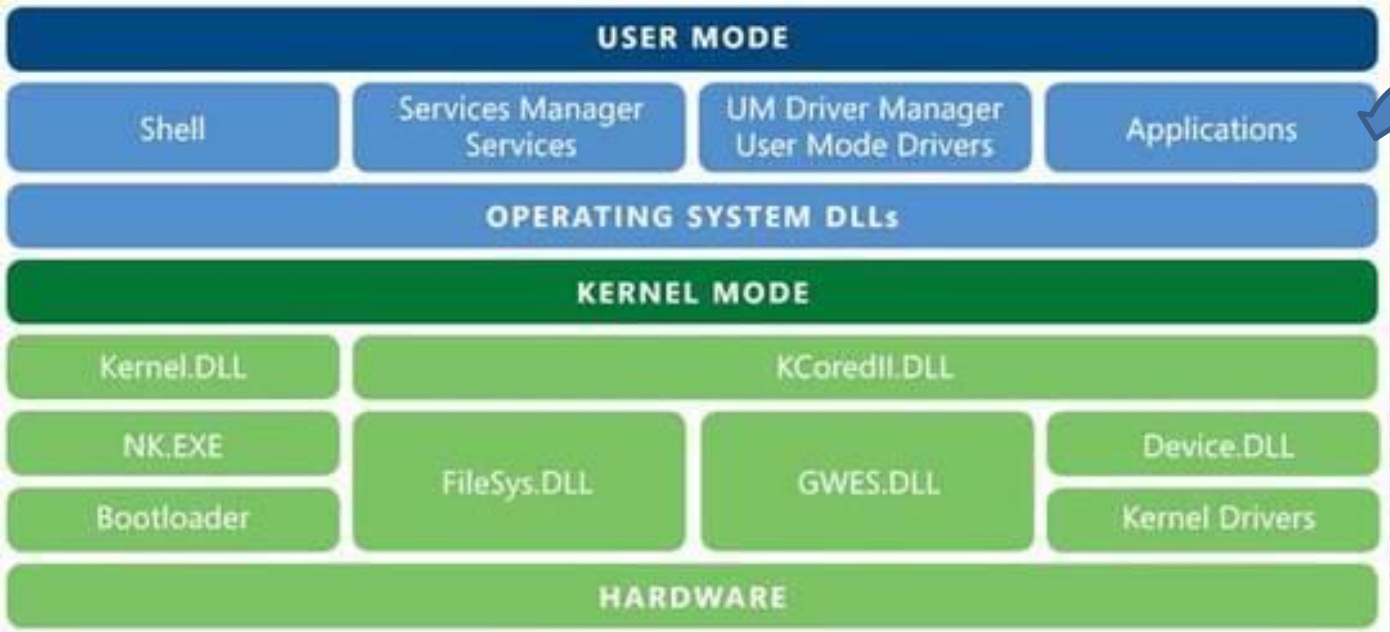
SD CARD Storage:

Application

bitstream
(FPGA configuration)

Load
bitstream

Approach II – application Boot



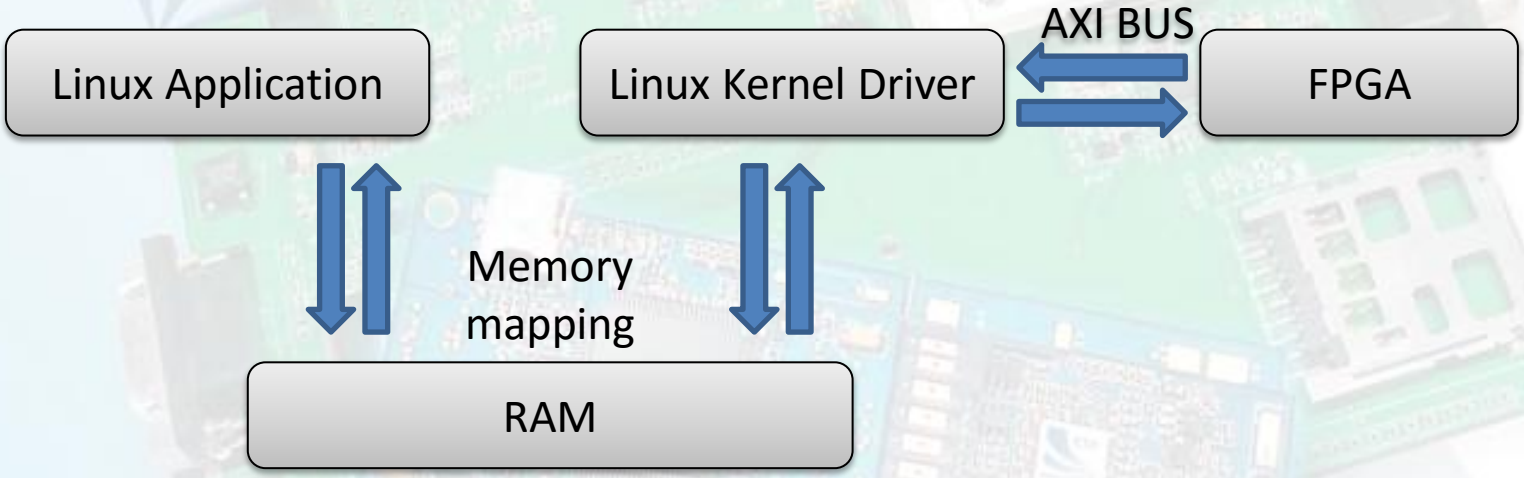
SD CARD Storage:

Load and run application

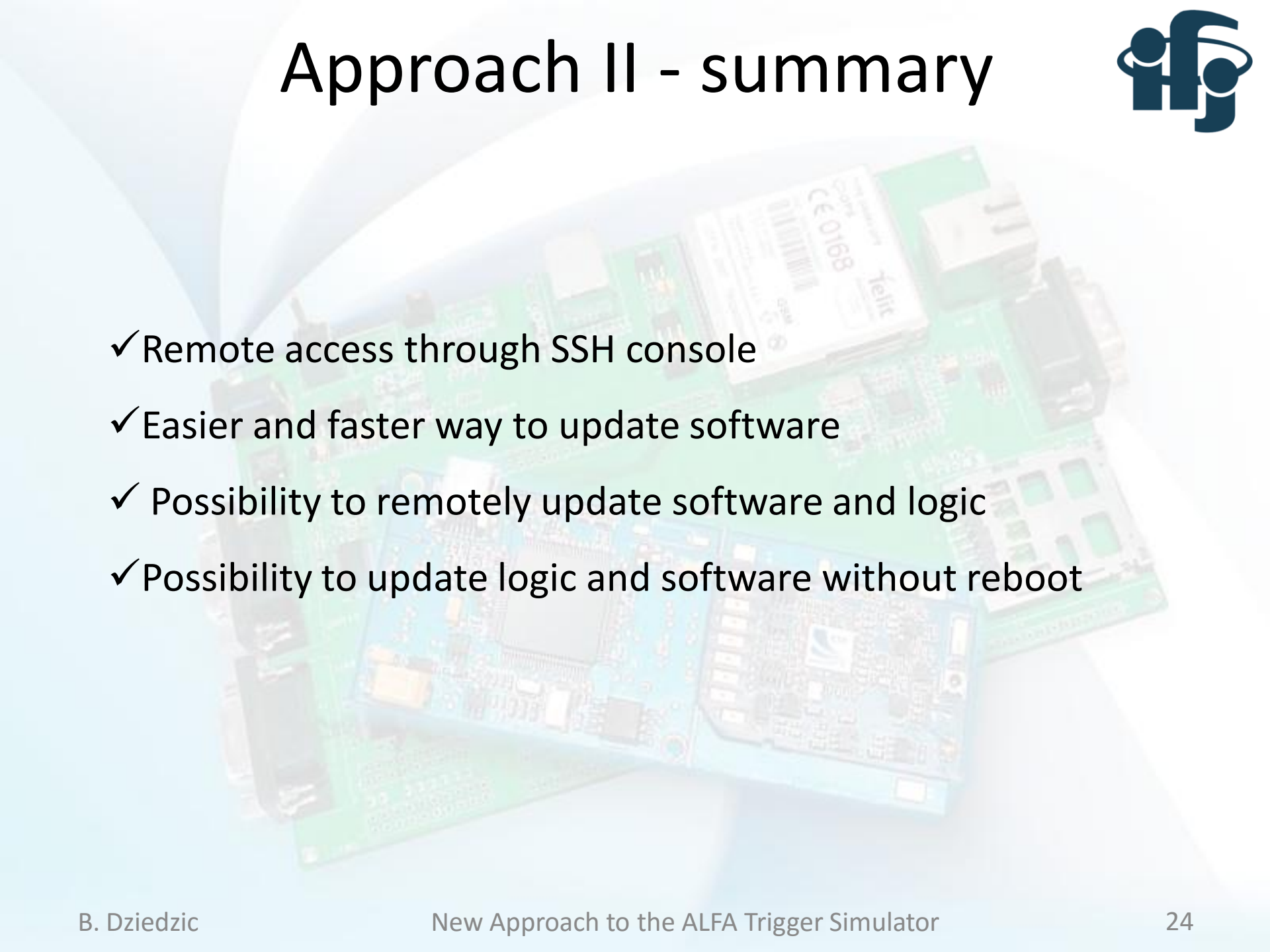
Application

bitstream
(FPGA configuration)

Approach II – application

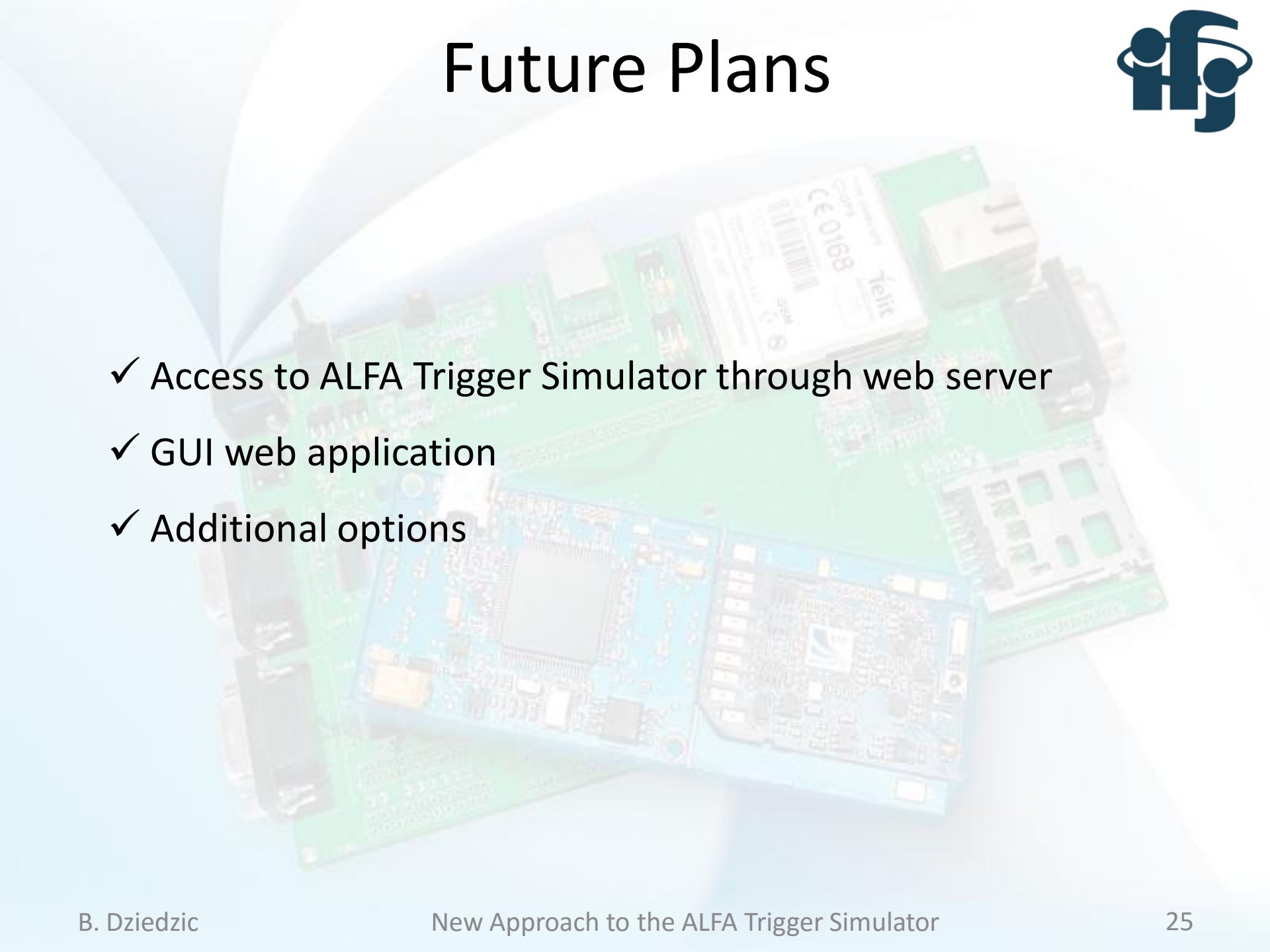


Approach II - summary



- ✓Remote access through SSH console
- ✓Easier and faster way to update software
- ✓ Possibility to remotely update software and logic
- ✓Possibility to update logic and software without reboot

Future Plans



- ✓ Access to ALFA Trigger Simulator through web server
- ✓ GUI web application
- ✓ Additional options