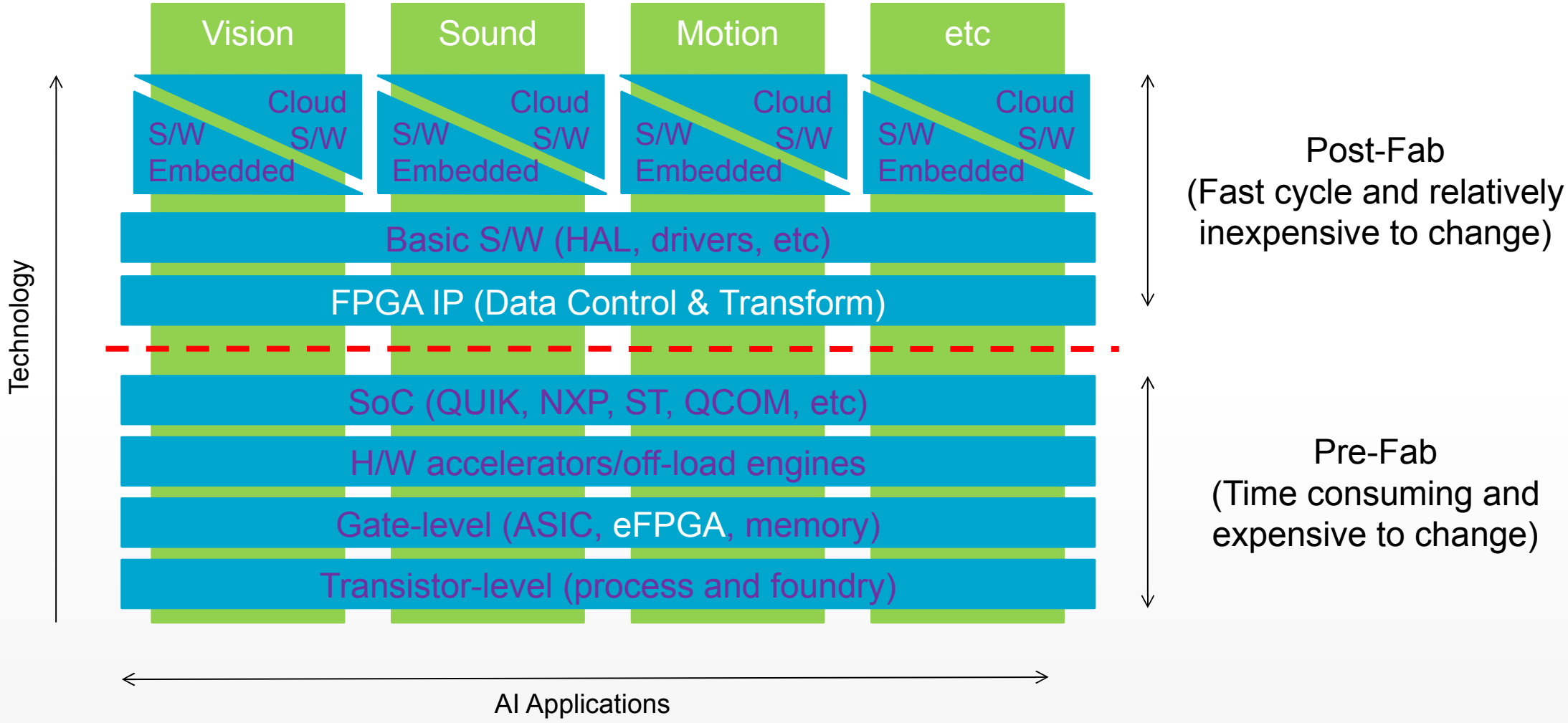
eFPGA for AI and IoT Applications

Tim Saxe

CTO

IoT Technology Stack-Up – Overview



AI is like a power tool – theoretically it can do anything

- Build a house – much easier with tool
- Put together a sofa – easier with tool

If you can connect it to the real world

- Build a house – much easier with tool
- Put together a sofa – easier with tool

If you can connect it to the real world

- Build a house – much easier with tool
- Put together a sofa – easier with tool

eFPGA

Can bridge the gap

QuickLogic®

And exactly what size problem are you trying to solve?

IoT problem

eFPGA

Can help here

Data center problem

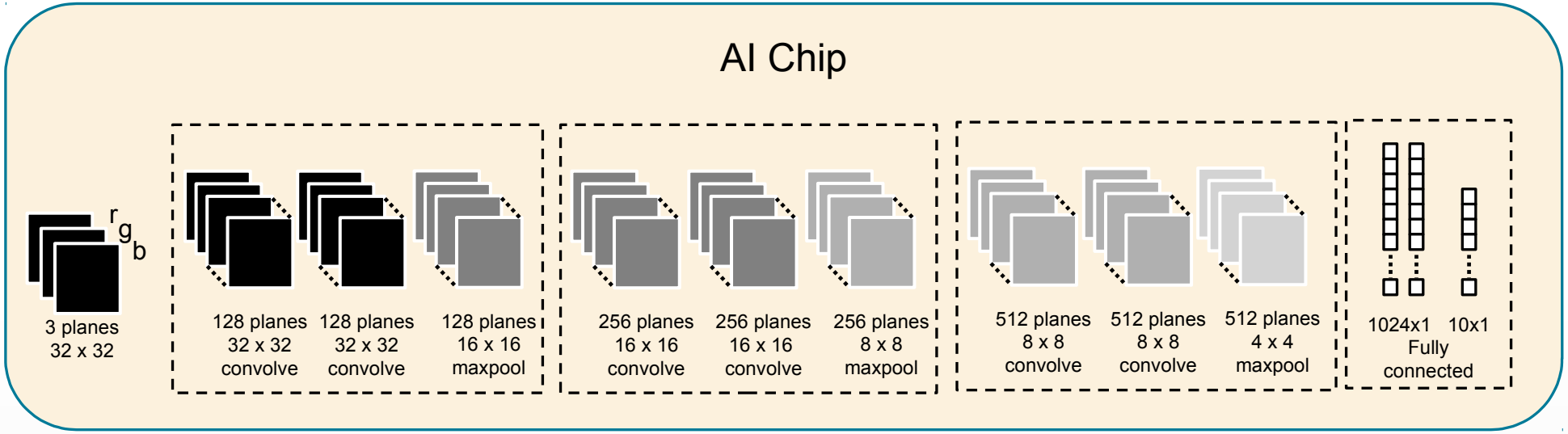
eFPGA

Can help here, too

QuickLogic®

Deep Learning Image Classification Network

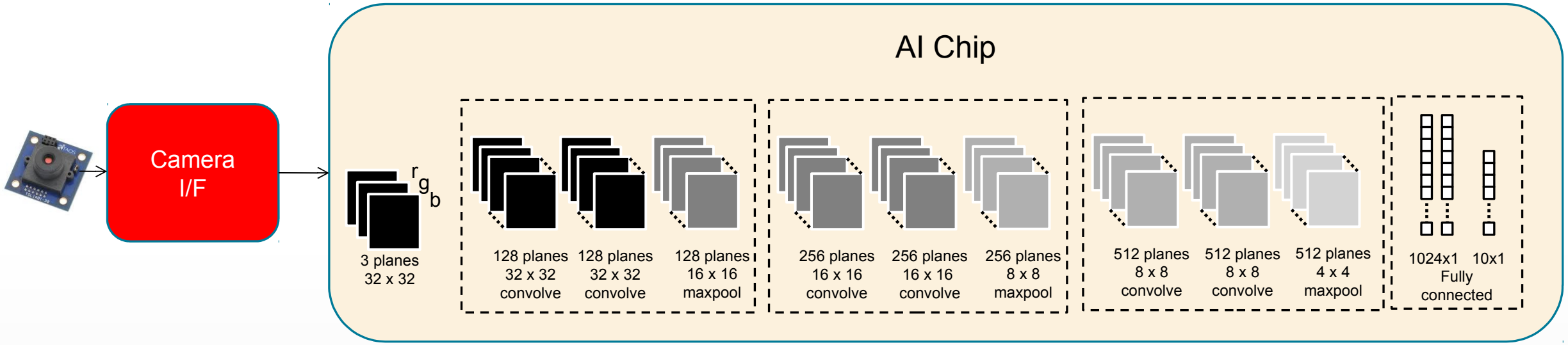
Requires 128KB scratch memory and 6MB coefficient memory



Deep Learning Image Classification Network

Requires 128KB scratch memory and 6MB coefficient memory

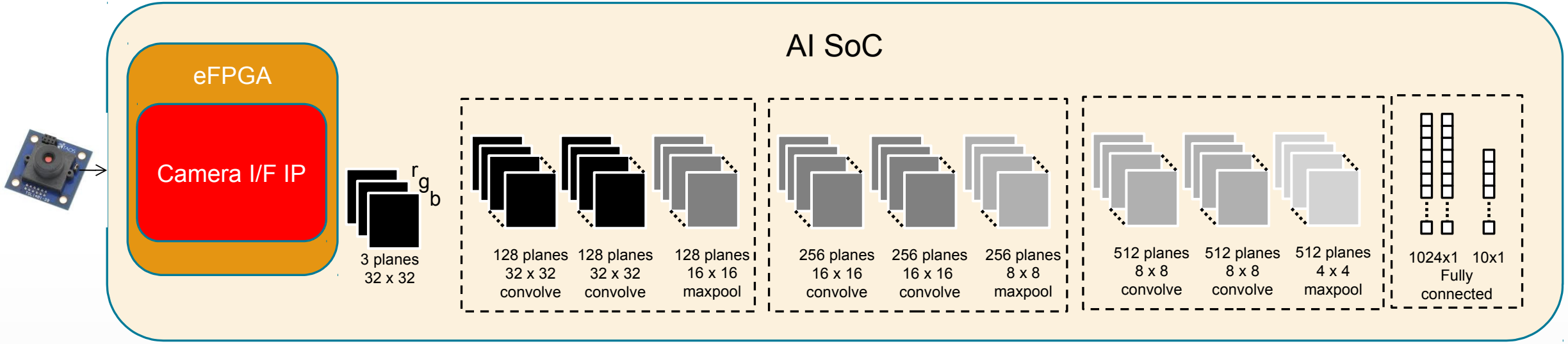
And somehow the image miraculously appears at the start



Deep Learning Image Classification Network

Requires 128KB scratch memory and 6MB coefficient memory

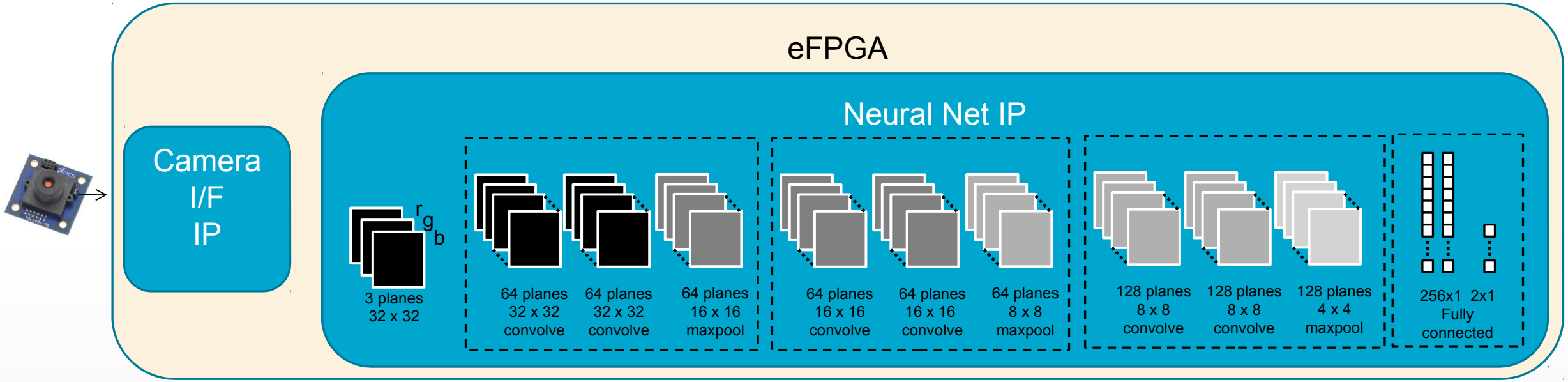
eFPGA can manage the sensor and format the image



Edge Friendly Deep Learning Image Classification Network

Requires 8KB scratch memory and 150KB coefficient memory

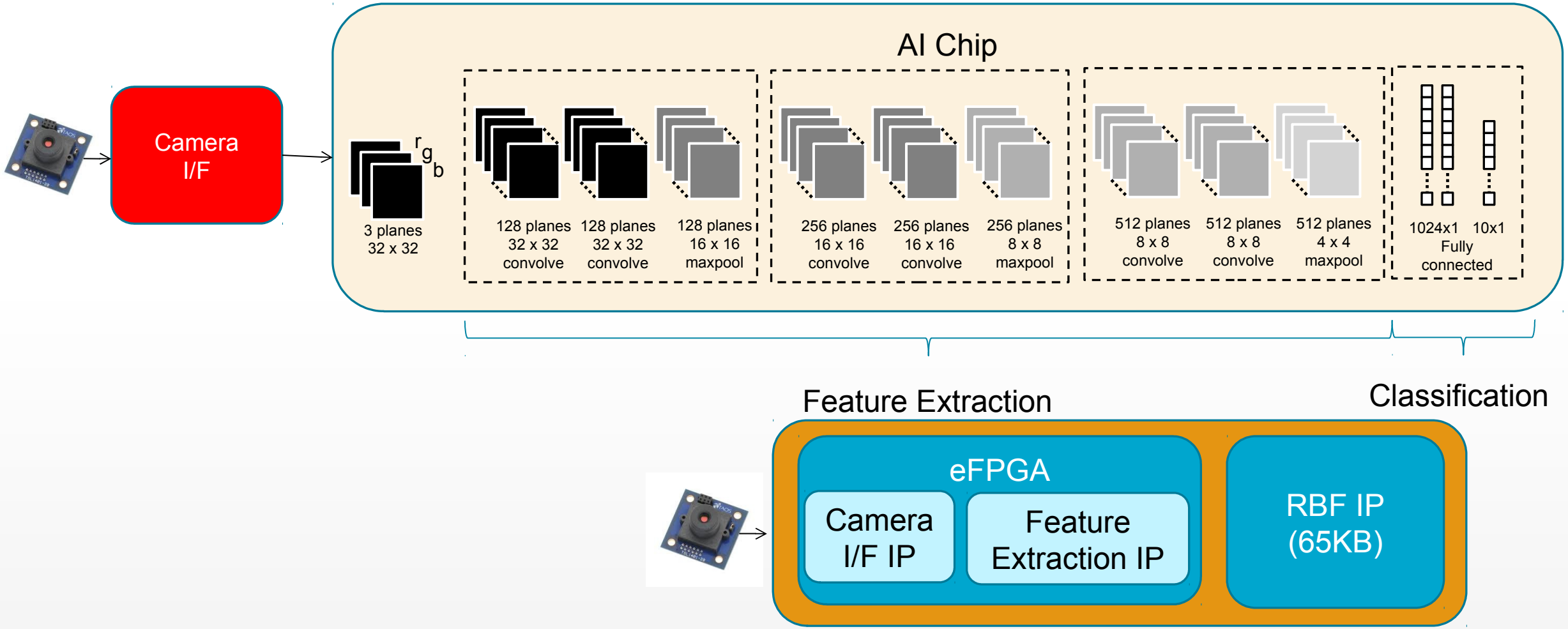
Fits a small eFPGA with scratch memory



QuickLogic®

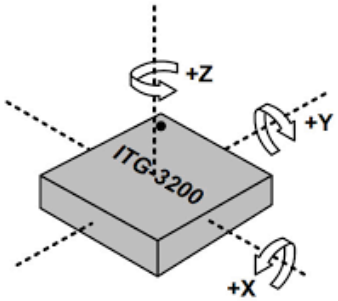
Radial Basis Function Image Classification Network

DNN requires 128KB scratch memory and 6MB coefficient memory



QuickLogic®

eFPGA provides sensor flexibility

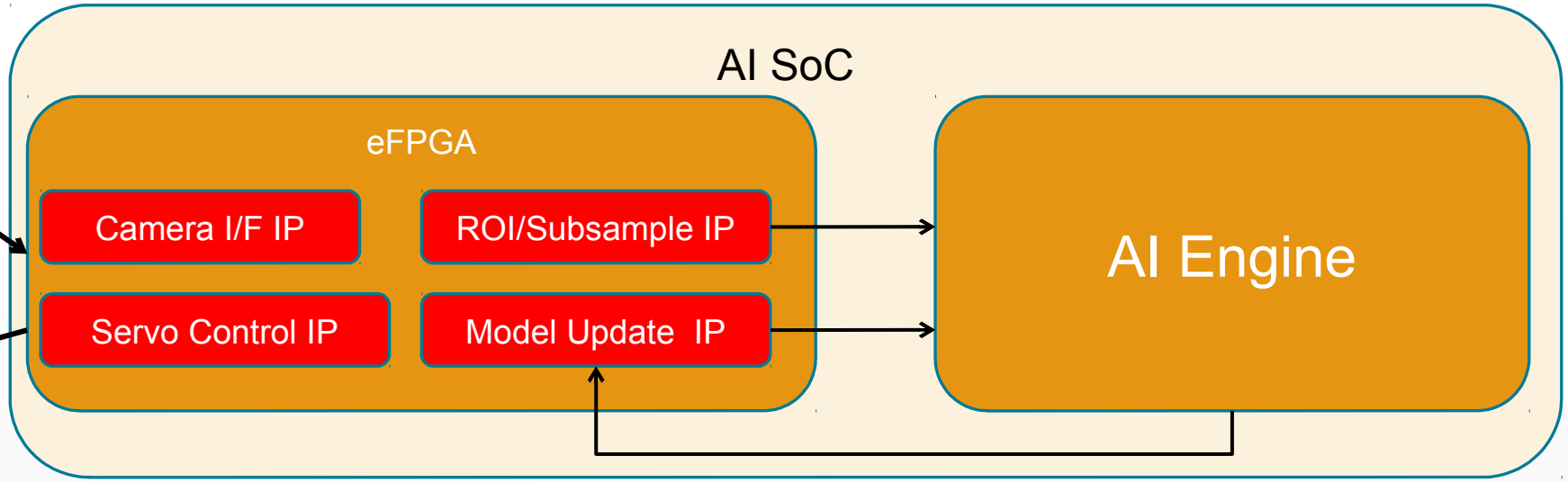


AI SoC
eFPGA
Camera I/F IP
ROI/Subsample IP
AI Engine

AI SoC
eFPGA
Sensor I/F IP
Scale & Segmet IP
AI Engine

AI SoC
eFPGA
Microphone I/F IP
MFCC IP
AI Engine

eFPGA provides real-time control



Conclusions

- Big Iron AI uses powerful eFPGAs to further accelerate powerful data center CPUs
- IoT AI uses eFPGAs as part of an SoC to bring the benefits of hardware:
  - Real-time operation
  - Low-power operation

  into the post-fab environment
- IoT AI uses eFPGAs as part of an SoC to:
  - Manage sensors
  - Preprocess and format data
  - Provide real-time control based on AI outputs