



THE LOW POWER LEADER

Safe Harbor

Forward Looking Statements

We may make projections or other forward-looking statements regarding future events during our presentation today. We caution you that such statements are predictions based on information that is currently available and that actual results may differ materially. We refer you to the documents that the company has filed with the SEC, including our 10-K, 10-Qs and 8-Ks. These documents identify important risk factors that could cause actual results to differ materially from those contained in our projections or forward-looking statements.

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Solid Progress Over the Past Year

FOCUSED STRATEGY



100% Focus on FPGA

RE-ENERGIZED TEAM



New Leadership Team;
Revitalized Culture

SOLUTION INNOVATION



Application Focused
Innovation

PROFIT EXPANSION



2x Growth in Profit
5x Growth in Cash Flow

INCREASED INVESTMENT



Increasing Investment in
New Devices and Solutions

STRONGER ROADMAP



Faster Cadence;
High Fidelity Execution

Note: Net profit and cash flow expansion based on non-GAAP results from Q1 thru Q3 2019 compared to Q1 thru Q3 2018

New Products Over the Next 12 Months

sensAI 2.0



**New AI
Capabilities**

**LAUNCH DATE
MAY 20, 2019**

MachXO3D



**Robust Platform
Security**

**LAUNCH DATE
MAY 20, 2019**

CrossLinkPlus

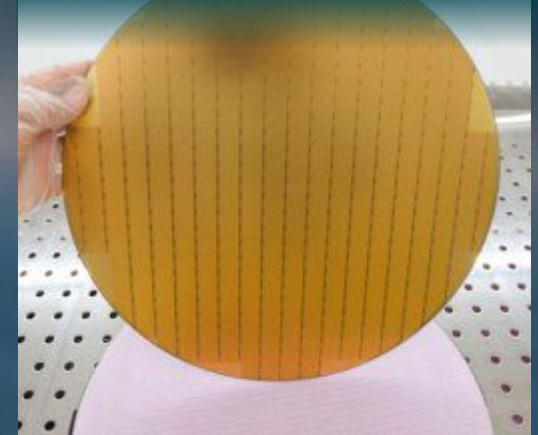


**Enhanced Video
Bridging**

~~Sampling in H2 2019~~

Q3 2019

Next Generation



**Next Generation
FPGA Platform**

~~Sampling early 2020~~

Today

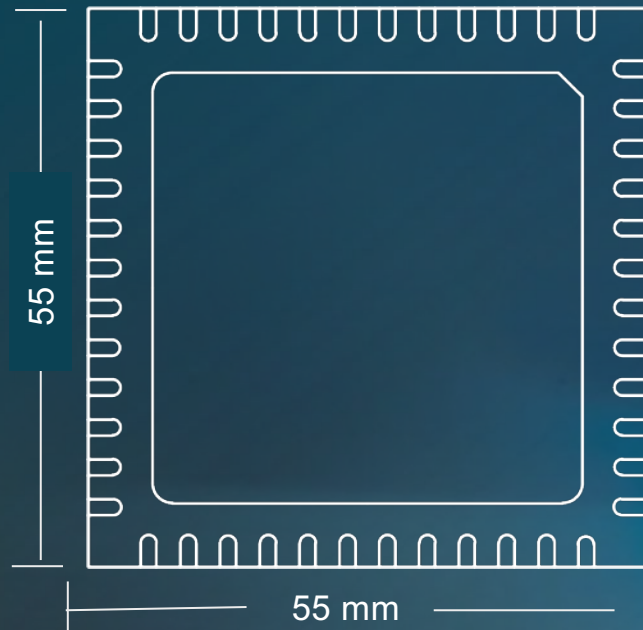
Our Mission

The Low Power Programmable Leader

Lattice's Focus: Low Power, Small Size

OTHER FPGA COMPANIES

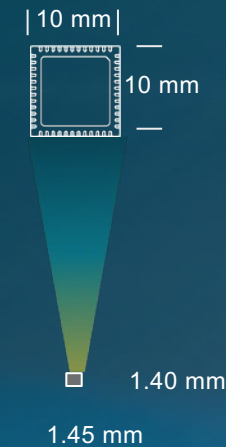
Focused on Large, High Power Devices
for Data Center Compute



~200 W With Heat Sink



Focused on Low Power,
Smaller Form Factors

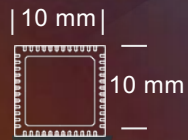


~1 W
(Small)

~1 mW
(Smallest)

Addressing Applications Where
Power Efficiency & Small Size are Important

Solving Problems at the Edge



~1 W
(Small)

~1 mW
(Smallest)



AI & IoT

AI Inferencing at the Edge



VIDEO

Embedded Vision



SECURITY

Hardware Platform Security



5G INFRASTRUCTURE

Control & Management



AUTOMATION

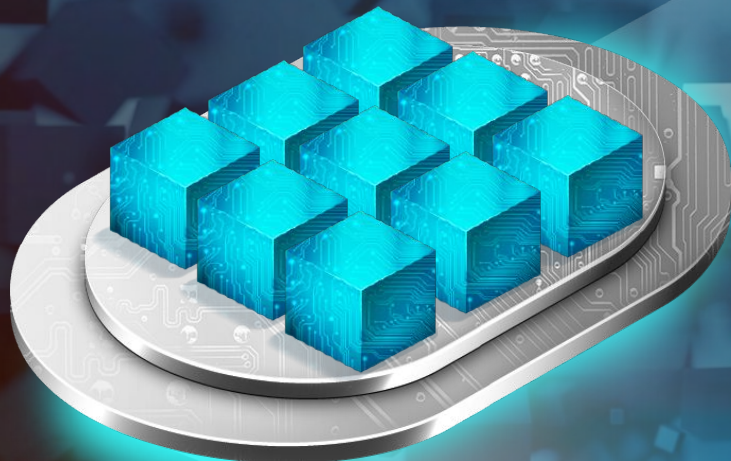
Precision Robotic Motor Control

Introducing Our New Low Power FPGA Platform



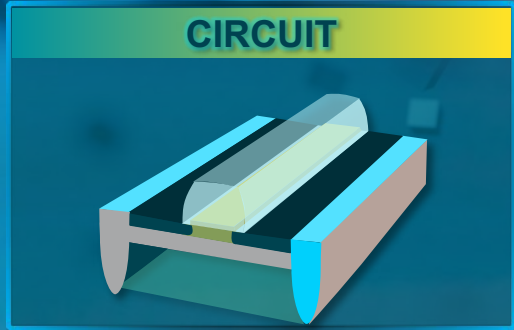
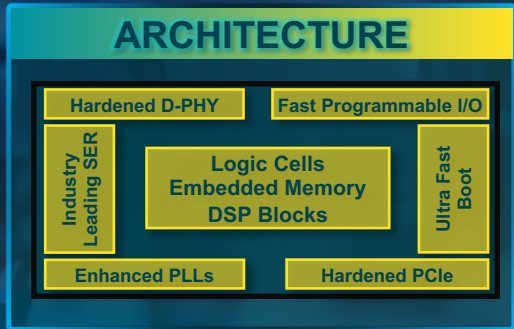
LATTICE NEXUS

Introducing Our New Low Power FPGA Platform



LATTICE **NEXUS**

LATTICE INNOVATION

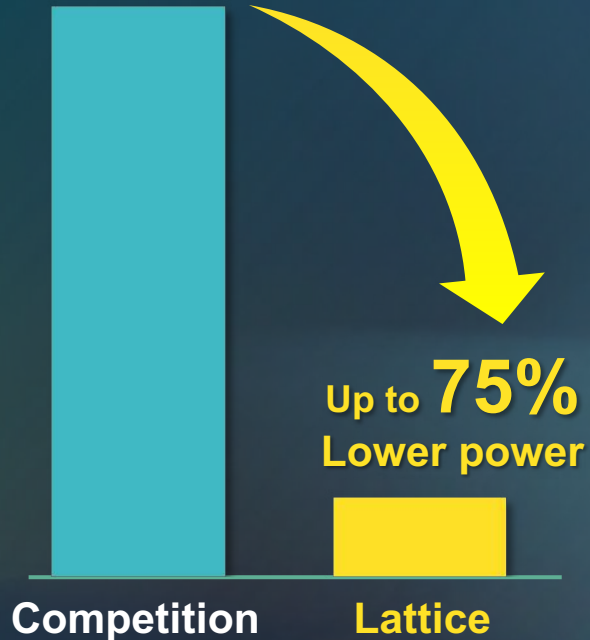


Lattice Nexus is Changing the Landscape



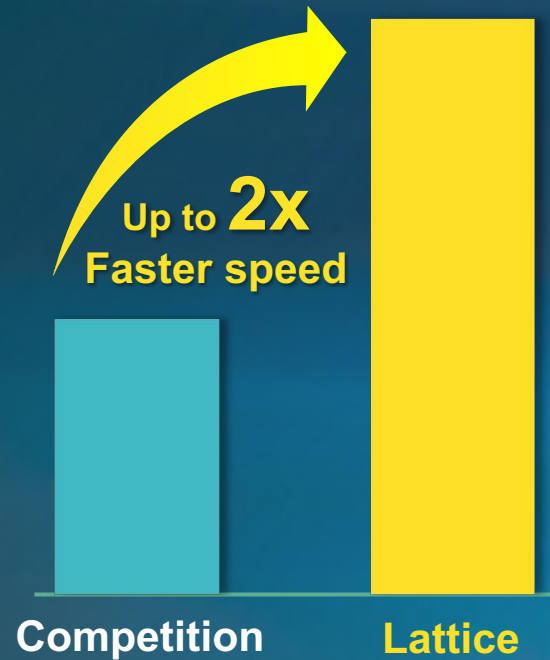
POWER

Operating Power Consumption



PERFORMANCE

Video Connectivity



RELIABILITY

Soft Error Rates



Bringing Lattice Nexus Across All our Key End Markets

COMMUNICATIONS



5G Wireless

Switches/Routers

COMPUTE



Servers

Client

INDUSTRIAL



Industrial IoT

Factory Automation

AUTOMOTIVE



ADAS

Infotainment

CONSUMER



Smart Home

Wearables

\$3B Lattice Market Opportunity

LATTICE NEXUS

- Low power leadership
- Edge computing ready
- Robust and reliable
- Smallest form factor
- Faster innovation cadence

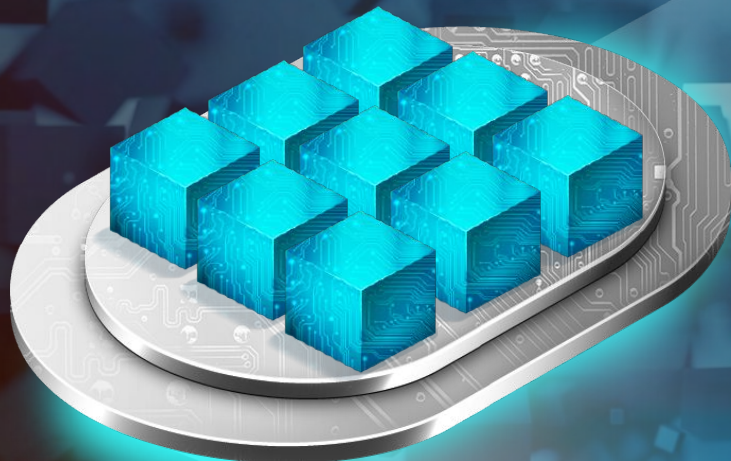




Steve Douglass

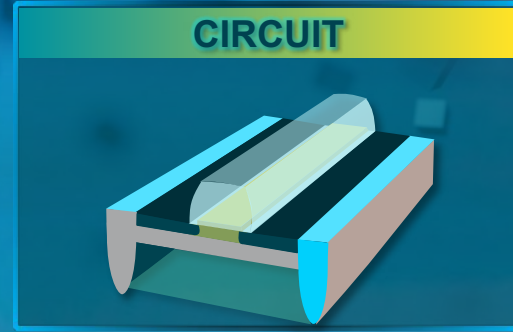
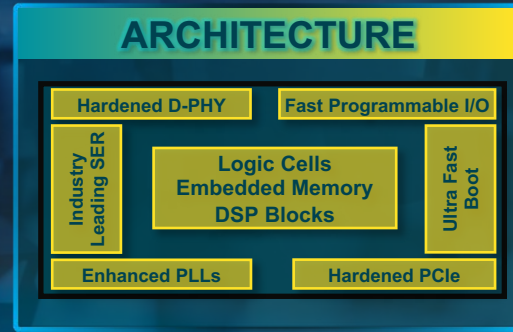
Corporate Vice President,
R&D

Introducing Our New Low Power FPGA Platform



LATTICE **NEXUS**

LATTICE INNOVATION

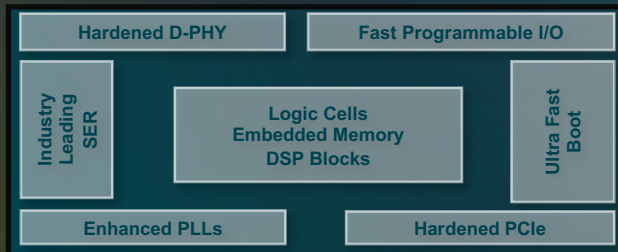


Circuit Innovation

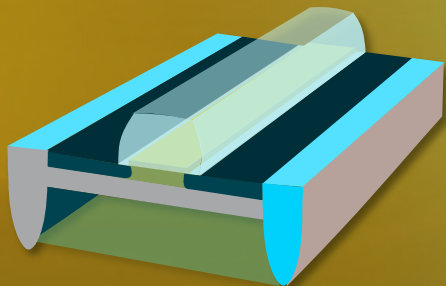
SOLUTIONS



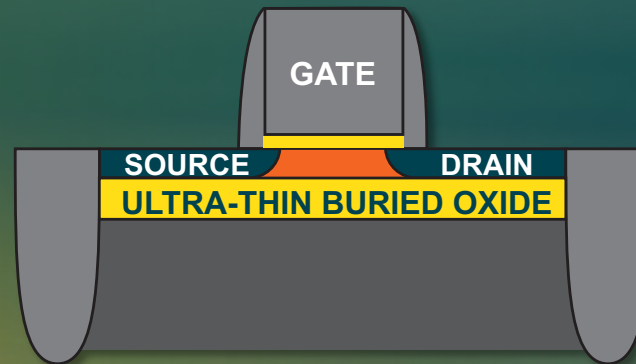
ARCHITECTURE



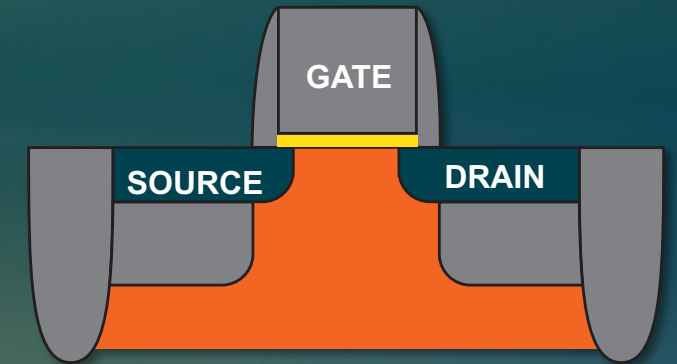
CIRCUIT



LATTICE NEXUS ON FDSOI



TRADITIONAL FPGA ON BULK



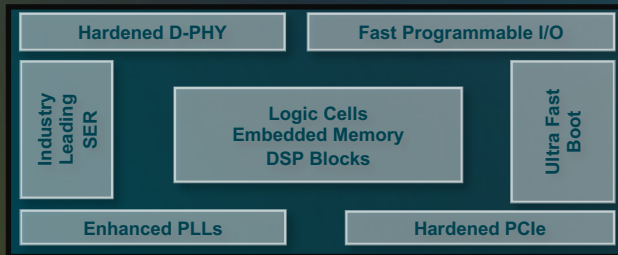
- Greatly reduces transistor leakage and susceptibility to soft errors
- FDSOI leverages bulk CMOS process and has fewer processing steps
- In high volume production today

Circuit Innovation

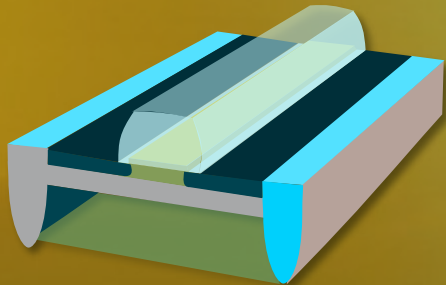
SOLUTIONS



ARCHITECTURE

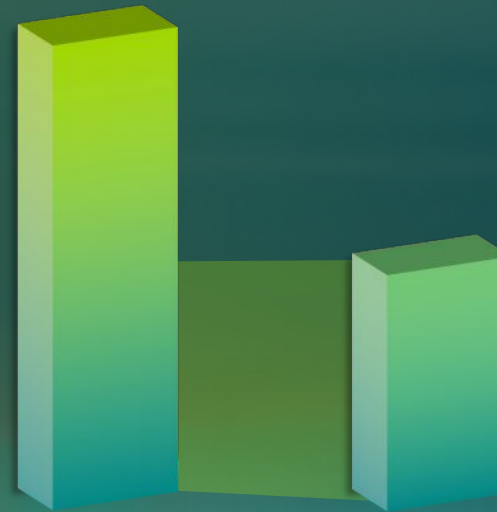


CIRCUIT



POWER

Static Power



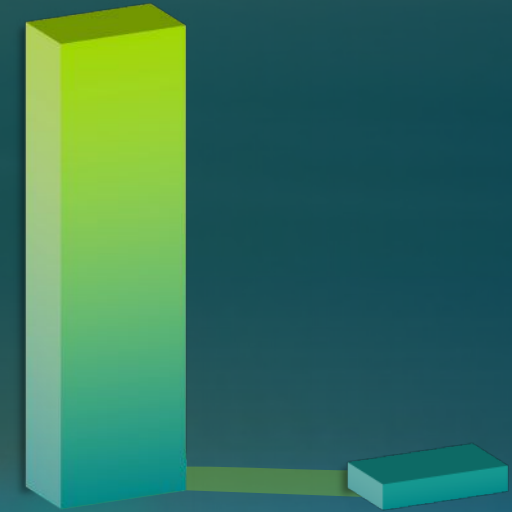
Bulk

FDSOI

Half
The Power

RELIABILITY

Soft Error Rate



Bulk

FDSOI

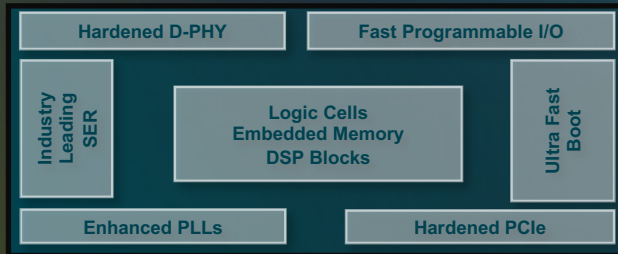
100x
Lower SER

Circuit Innovation

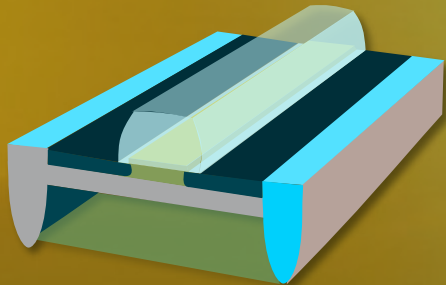
SOLUTIONS



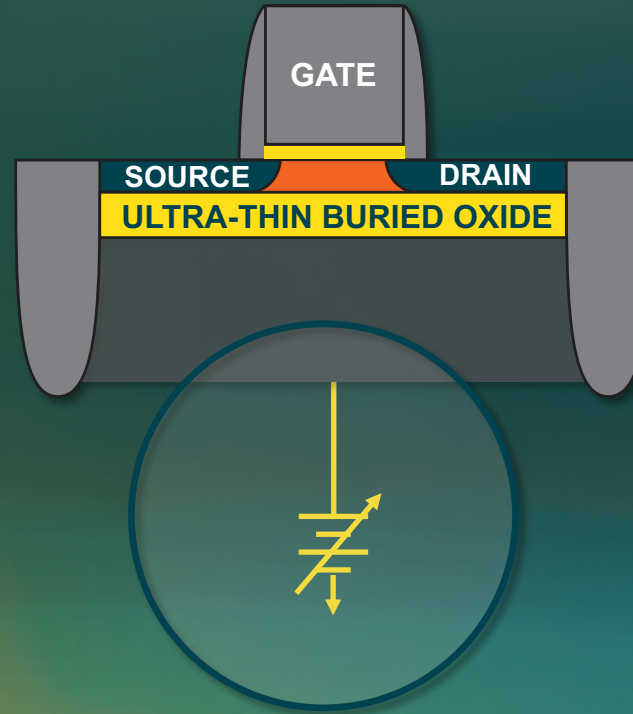
ARCHITECTURE



CIRCUIT



PROGRAMMABLE BODY BIAS



Allows customers to optimize for both:

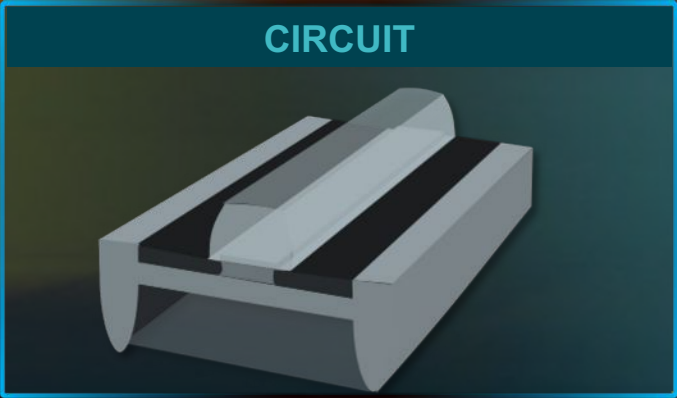
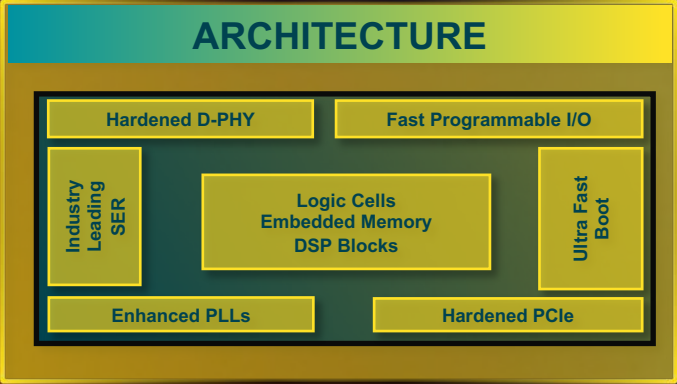


HIGHER
PERFORMANCE

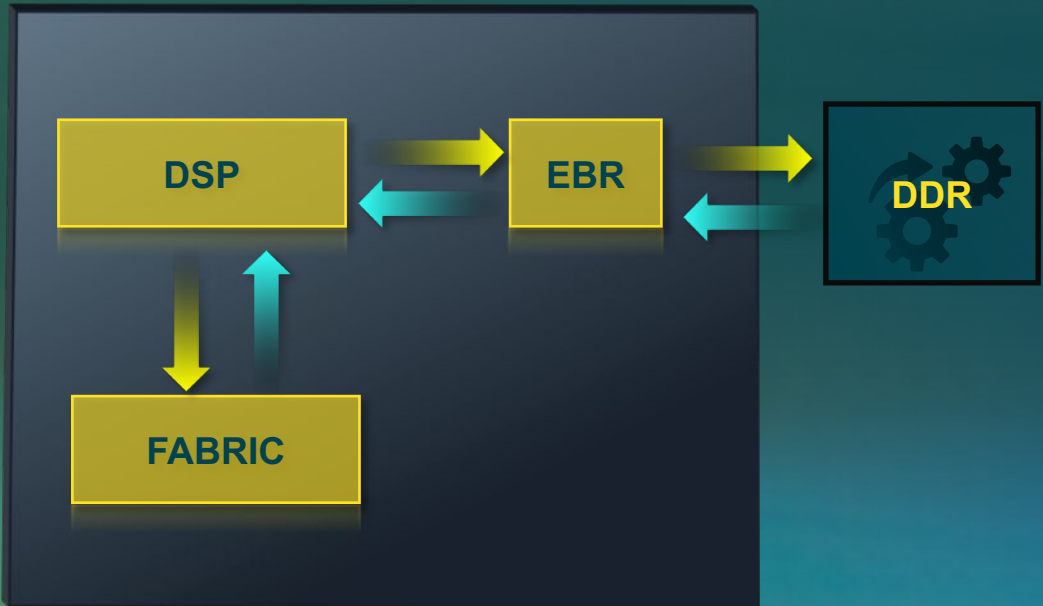


LOWER POWER

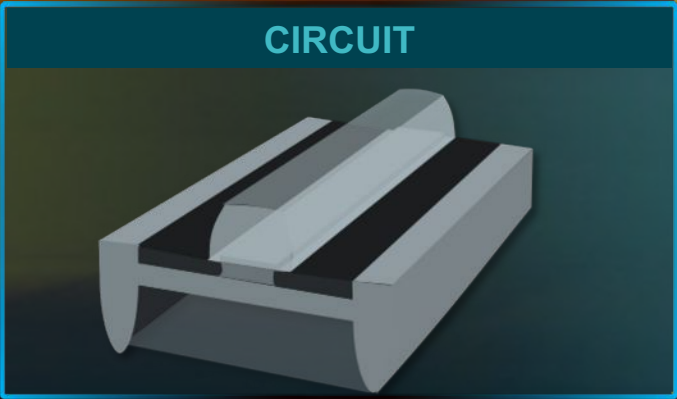
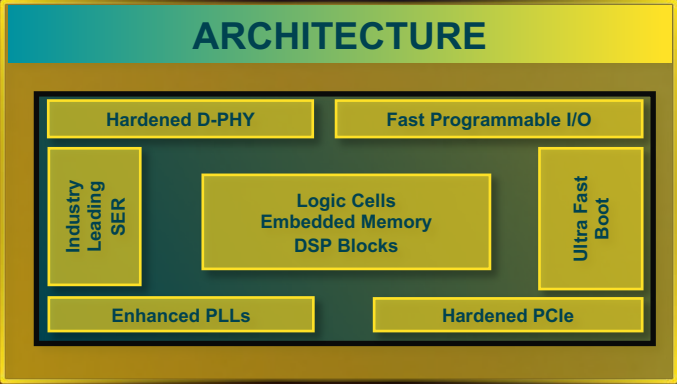
Architecture Innovation



OPTIMIZED FOR POWER EFFICIENT COMPUTING



Architecture Innovation



OPTIMIZED FOR POWER EFFICIENT COMPUTING



2x
Faster Performance

Half
The Power

Note: Performance and power relative to Lattice prior generation devices

Human Presence Detection Demo



OVERVIEW

What You Are Seeing

Human presence detection with bounding box around upper body implemented with our first Lattice Nexus based device.

Why It Matters

Human presence detection is a common AI use case in many Edge applications including security cameras, client compute, factory automation, and automotive.

KEY APPLICATIONS



Industrial
safety



Security
cameras

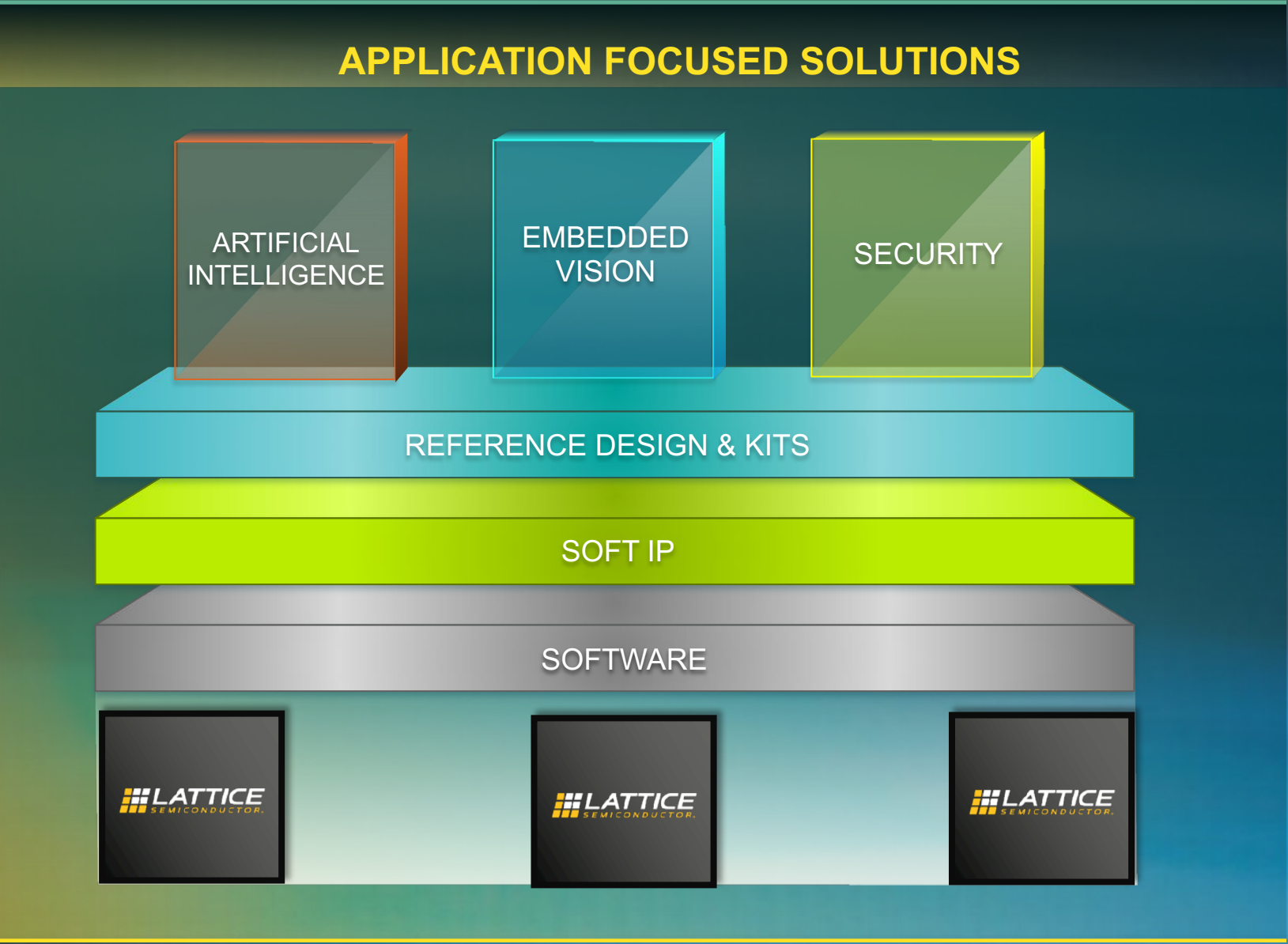
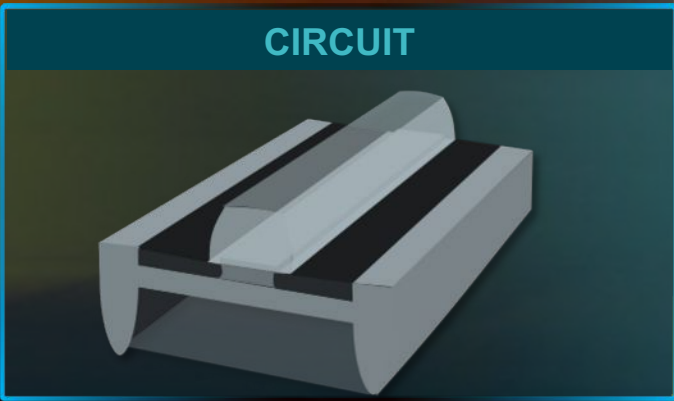
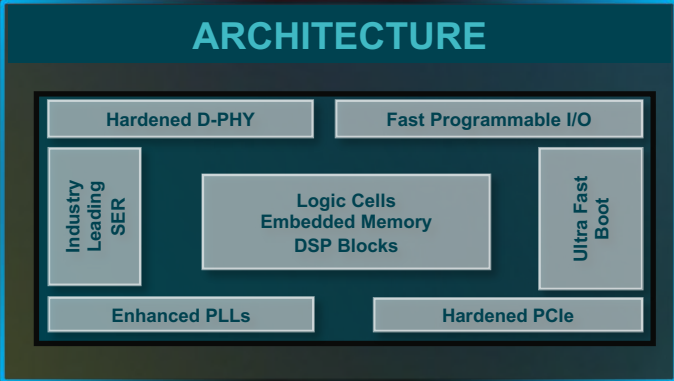


Client
compute



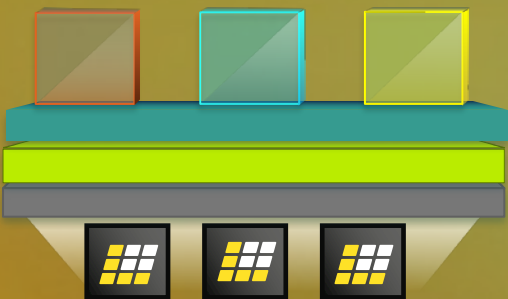
Smart
doorbells

Solutions Innovation

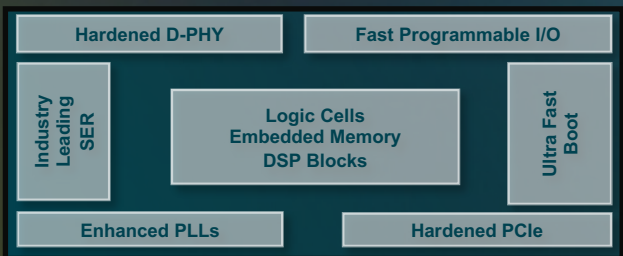


Solutions Innovation

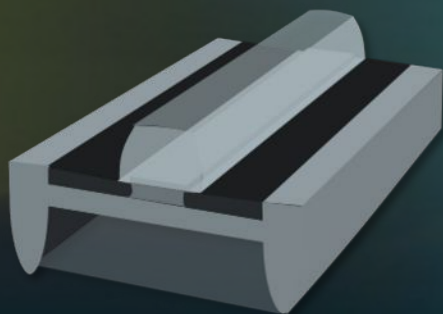
SOLUTIONS



ARCHITECTURE



CIRCUIT



APPLICATION FOCUSED SOLUTIONS

EMBEDDED VISION

SENSOR BRIDGING



SENSOR AGGREGATION

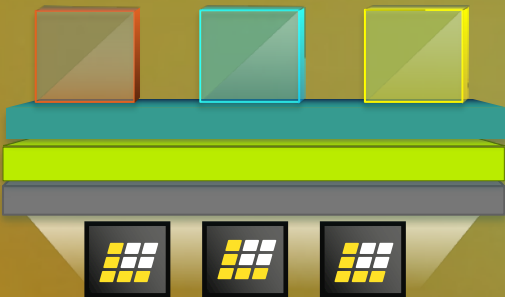


IMAGE PROCESSING

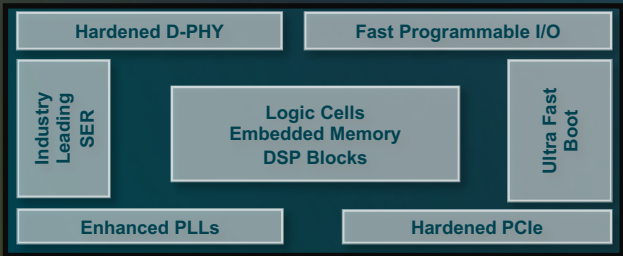


Solutions Innovation

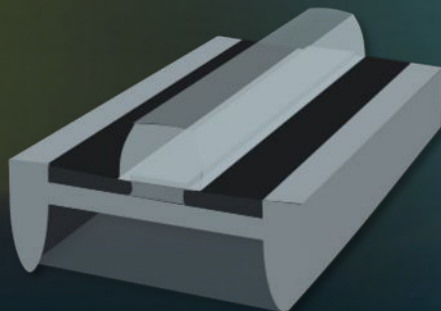
SOLUTIONS



ARCHITECTURE



CIRCUIT



APPLICATION FOCUSED SOLUTIONS

EMBEDDED VISION

SENSOR BRIDGING



SENSOR AGGREGATION

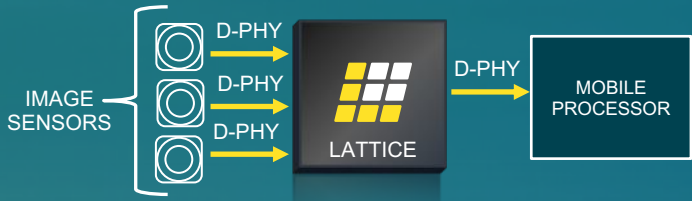


IMAGE PROCESSING



Camera Aggregation Demo



KEY APPLICATIONS



AR / VR



Drones



ADAS



Robotics

OVERVIEW

What You Are Seeing

MIPI CSI-2 data streams from 4 cameras are aggregated into a single data stream, bridged to parallel data and displayed in a single HDMI output.

Why It Matters

Number of sensors are increasing, and the application processors have limited MIPI inputs.

Number of screen sizes and resolutions are increasing.

Need solution that can aggregate data streams for multiple image sensors in applications such as ADAS, drones, AR/VR, robots etc.

Introducing Our New Low Power FPGA Platform



LATTICE **NEXUS**

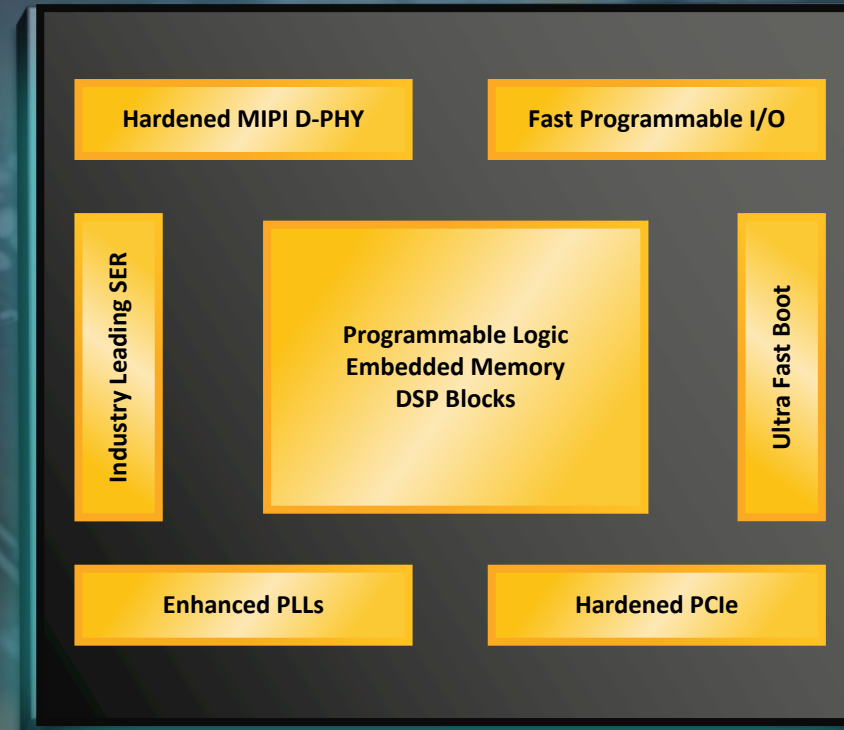


Introducing Lattice CrossLink-NX



CrossLink-NX

Introducing Lattice CrossLink-NX



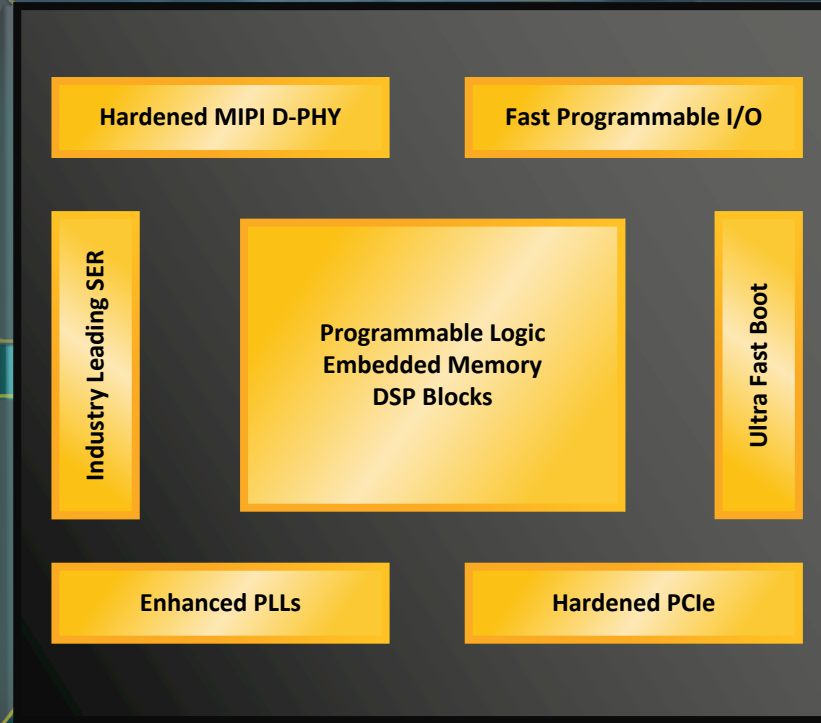
A Closer Look at CrossLink-NX

PROGRAMMABLE LOGIC CORE

- Low power mode
- High performance mode
- High embedded memory count
- Optimized DSP blocks

DEDICATED INTERFACES

- 8 D-PHY lanes @ 2.5 Gbps
- One lane PCIe @ 5 Gbps



FAST PROGRAMMABLE I/O

- Up to 12 MIPI D-PHY interfaces @ 1.5 Gbps
- LVDS, subLVDS, SGMII
- DDR3 @ 1066 Mbps
- Up to 192 total I/O

INSTANT-ON

- 3 ms I/O configuration
- 14 ms device configuration

Enhanced for Customer Needs: Power Efficiency, Performance, Reliability



Esam Elashmawi

Chief Marketing &
Strategy Officer

Customer Engagement



LOW POWER



PERFORMANCE



HIGH RELIABILITY



Solving the Power Challenge

LOW POWER



PERFORMANCE



HIGH RELIABILITY



POWER IS KEY TO SOLVE

PORTABLE & AUTONOMOUS CHALLENGES



SYSTEM & OPERATING COSTS



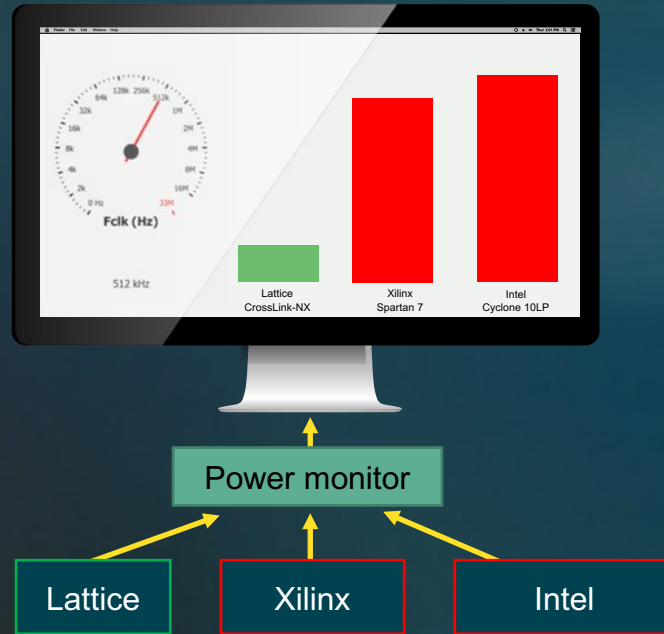
LOWEST POWER FPGA ...

Up to 75% lower power compared to competition

Operating Power Consumption



CrossLink-NX Low Power Demo



OVERVIEW

What You Are Seeing

Power consumption for Lattice CrossLink-NX-40 running a typical design compared with Xilinx Spartan 7 (XC7S50) and Intel Cyclone 10LP (10CL025).

Why It Matters

- Simplifies thermal management
- Improves operating costs
- Extends battery life

KEY APPLICATIONS



Solving the Performance Challenge

LOW POWER



PERFORMANCE



HIGH RELIABILITY



PERFORMANCE IS KEY TO SOLVE

USER EXPERIENCE

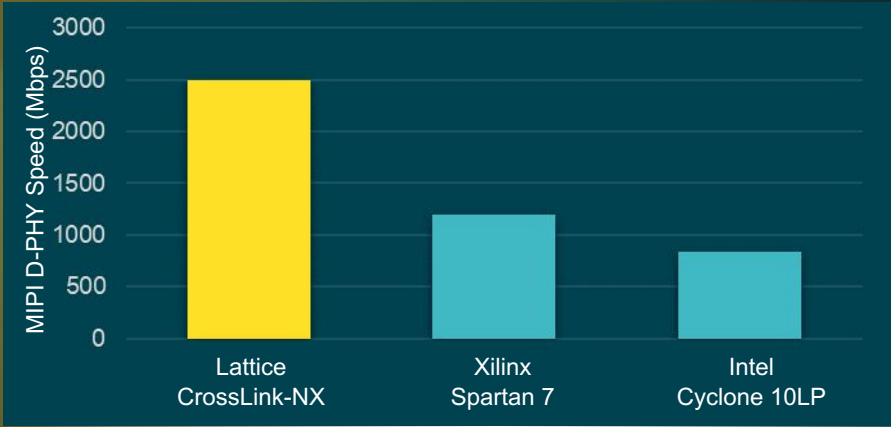


PERFORMANCE FOR AI

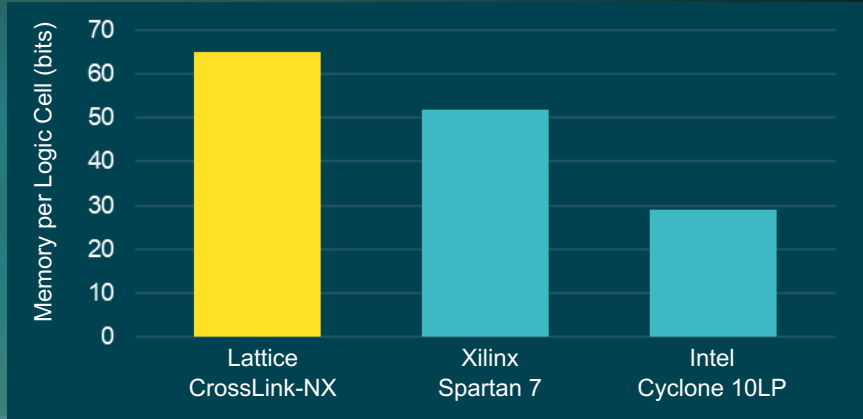


ENHANCED PERFORMANCE FEATURES

Fastest display connection

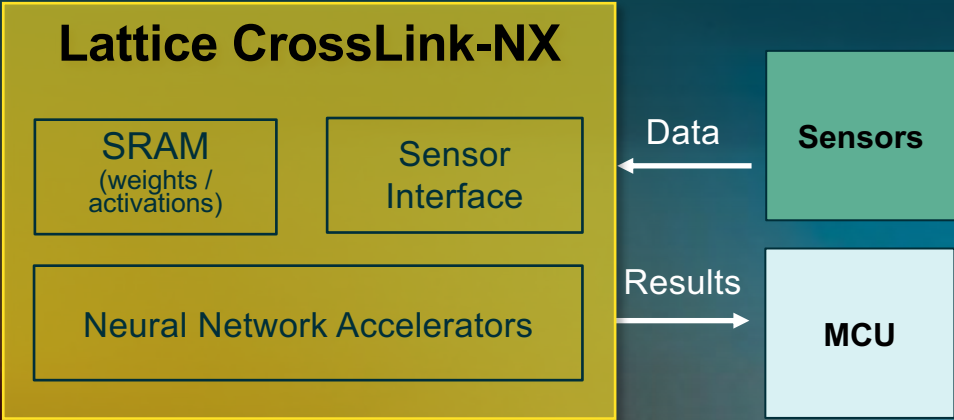


Optimized for power efficient computing

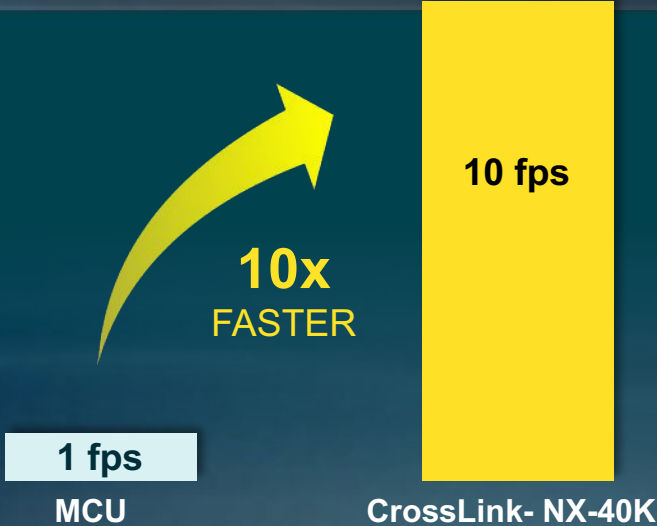


sensAI Application Example: Retail Security Camera

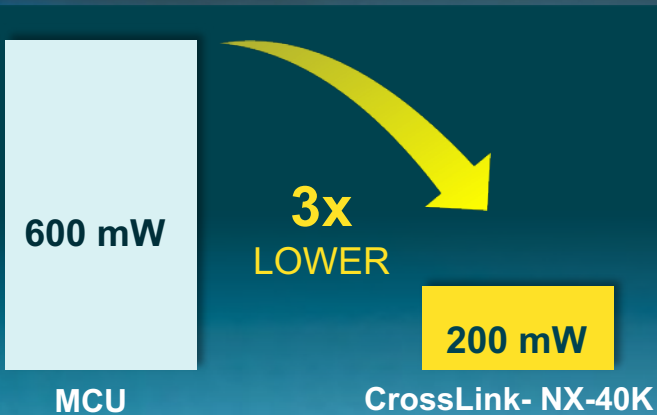
ALWAYS-ON HUMAN COUNTING



PERFORMANCE



POWER



Instant-on

LOW POWER



PERFORMANCE



HIGH RELIABILITY



PERFORMANCE IS KEY TO SOLVE

INCREASED DEMAND FOR INSTANT-ON APPLICATIONS

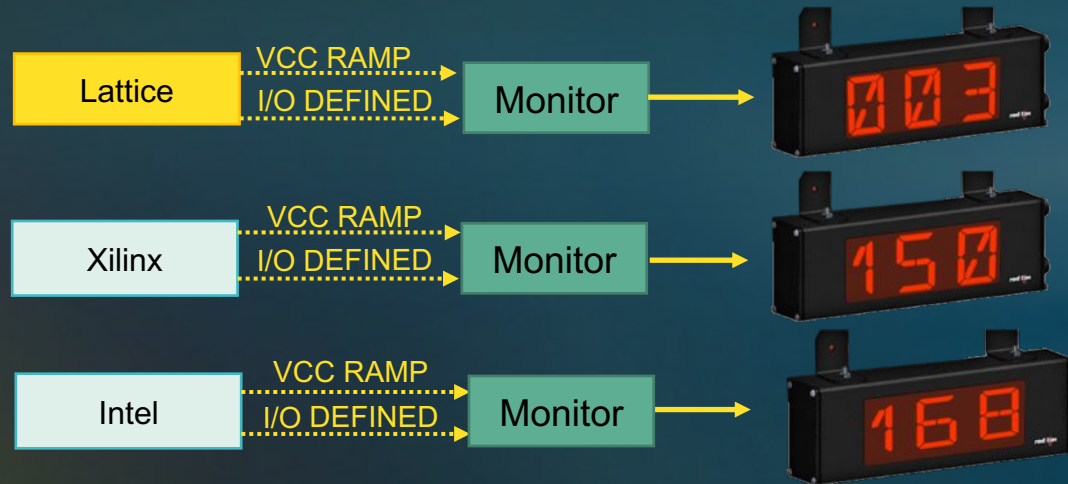


UP TO 50X FASTER

I/O wake up time



CrossLink-NX Instant-on Demo



OVERVIEW

What You Are Seeing

Time for device to self configure I/O to a user defined state for Lattice CrossLink-NX-40 compared with Xilinx Spartan 7 (XCS7-50) and Intel Cyclone 10LP (10LP025).

Why It Matters

“Instant-on” I/O configuration is important for applications such as LED drivers, motor control and board housekeeping.

Reduces complexity, cost, and power dissipation of customer systems.

KEY APPLICATIONS



Motor Control



Human Machine Interfaces



ADAS

Note: based on competition's evaluation boards running at similar frequencies

Solving the Reliability Challenge

LOW POWER



PERFORMANCE



HIGH RELIABILITY



RELIABILITY IS KEY TO SOLVE

CRITICAL SAFETY & RUGGEDIZED



SYSTEM UP TIME



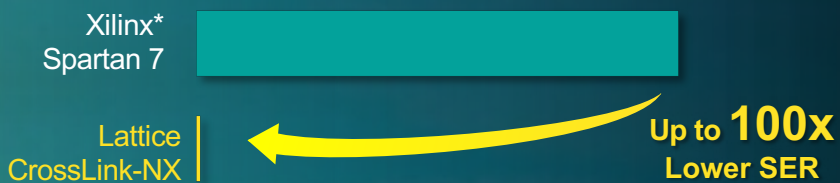
MOST RELIABLE FPGA FOR RUGGEDIZED APPS

Temperature Ranges



Suitable for:
OUTDOOR | AUTOMOTIVE | INDUSTRIAL | AVIONICS

Soft Error Rates (FIT)



FIT (Failure In Time) (1B device hours)
* Based on Xilinx published data

Small Size Matters





WAYMO





Engaged with > 65 customers

Early Access Program with 30+ customers

Solutions available today



Jim Anderson

President, Chief Executive
Officer

The Lowest Power FPGA Platform

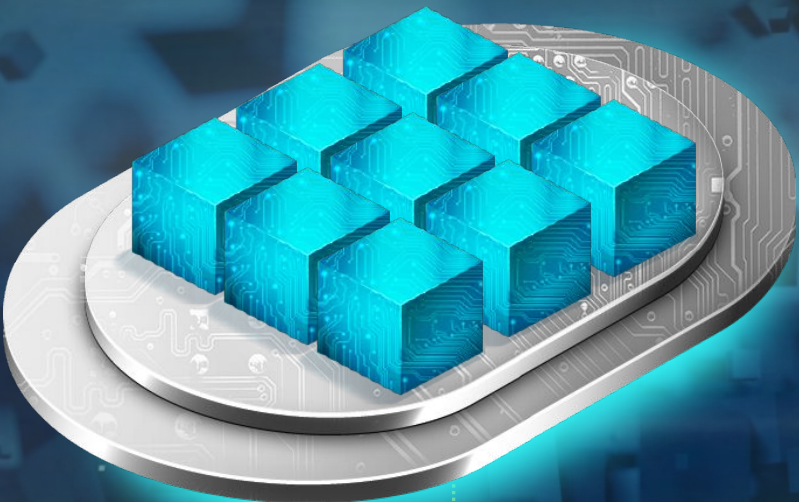
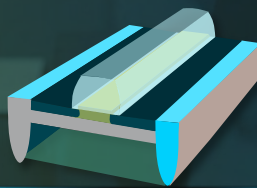
SOLUTIONS



ARCHITECTURE

Hardened D-PHY		Fast Programmable I/O	
Industry Leading SER	Logic Cells Embedded Memory DSP Blocks		Ultra Fast Boot
Enhanced PLLs		Hardened PCIe	

CIRCUIT




LATTICE NEXUS



CrossLink-NX

LOW POWER



PERFORMANCE



HIGH RELIABILITY



Faster Cadence of New Devices and Solutions





LATTICE **NEXUS**

CrossLink-**NX**

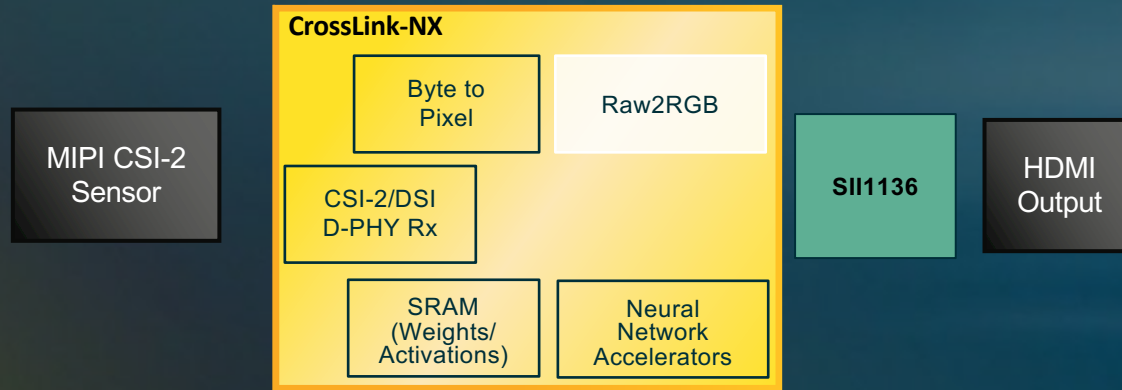


The Low Power Programmable Leader

DEMO SIGNAGE

Human Presence Detection & Counting

BLOCK DIAGRAM



OVERVIEW

What You Are Seeing

Human presence detection and counting with bounding box around upper body implemented with Lattice CrossLink-NX

Why It Matters

Human presence detection is a common AI use case in many Edge applications including security cameras, client compute, factory automation, and automotive.

The Lattice Advantage

Lattice CrossLink-NX supports detection at 2x frame rate and 0.5x the power of prior generation

Lattice CrossLink-NX supports detection at 10x higher frame rate and 0.3x power compared to MCUs

Integrated D-PHY to reduce power and BOM cost

FPGA flexibility for additional pre/post processing compared to fixed function ASICs

KEY APPLICATIONS



Security cameras



Client compute



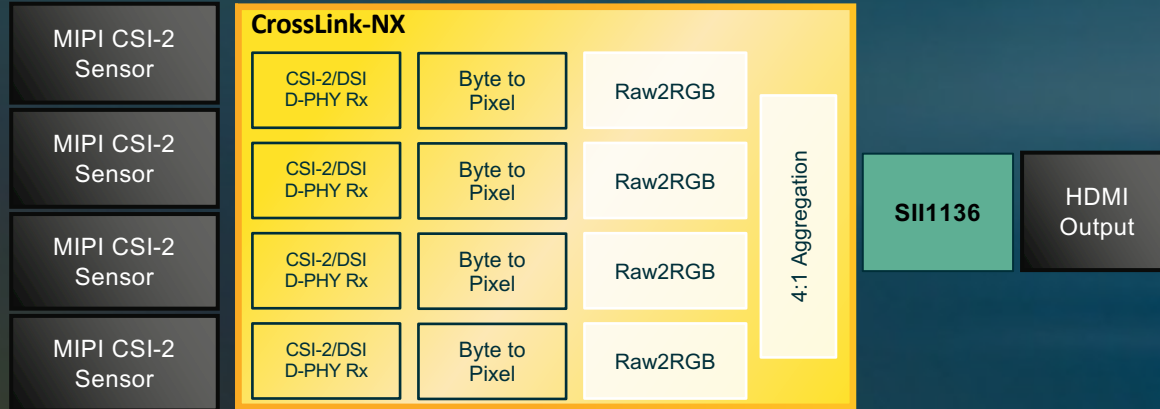
Smart doorbells



Smart appliances

Camera Aggregation

BLOCK DIAGRAM



KEY APPLICATIONS



AR / VR



Drones



ADAS



Robotics

OVERVIEW

What You Are Seeing

4 cameras, each providing a separate MIPI CSI-2 data stream aggregated into a single data stream, bridged to parallel data and displayed in a single HDMI output.

Why It Matters

Application processors with limited MIPI D-PHY inputs cannot interface to multiple image sensors in applications such as ADAS, drones, AR/VR, robots etc.

The Lattice Advantage

Only FPGA with up to 8 hard D-PHY lanes @ 2.5 Gbps

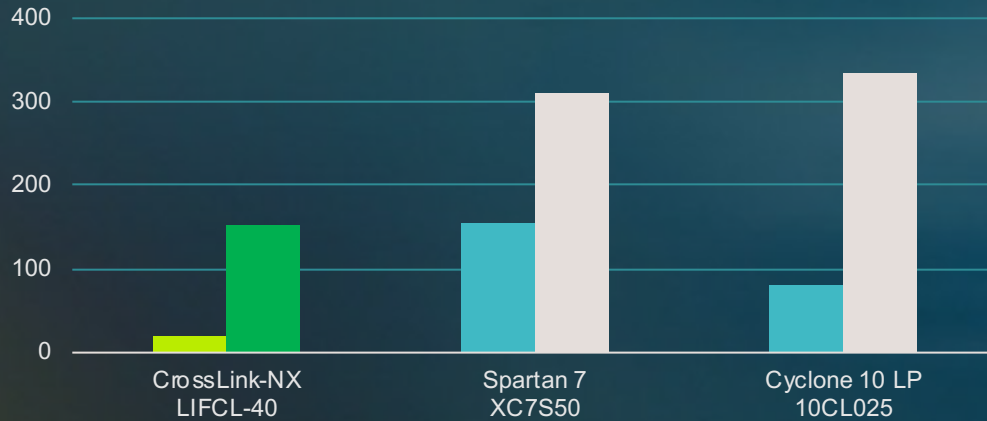
Scalable to support up to 14 MIPI D-PHY interfaces

Low power consumption ~300 mW

Up to 40K LUTs for customization and additional image processing

CrossLink-NX Delivering Up to 75% Lower Power

OPERATING POWER (mW) @ 2 MHz and 200 MHz



OVERVIEW

What You Are Seeing

Power consumption for Lattice CrossLink-NX-40 running a typical design compared with Xilinx Spartan 7 (XC7S50) and Intel Cyclone 10LP (10CL025) running at a variety of frequencies

Why It Matters

Low power consumption simplifies thermal management, improves operating costs and where applicable extends battery life

The Lattice Advantage

Up to 75% lower power than Xilinx Spartan 7 and Intel Cyclone 10LP

Programmable back bias for per device performance / static power optimization

28 nm FD-SOI technology provides best in class dynamic power

HP and LP user modes

KEY APPLICATIONS



Industrial Robots

Drones

Medical

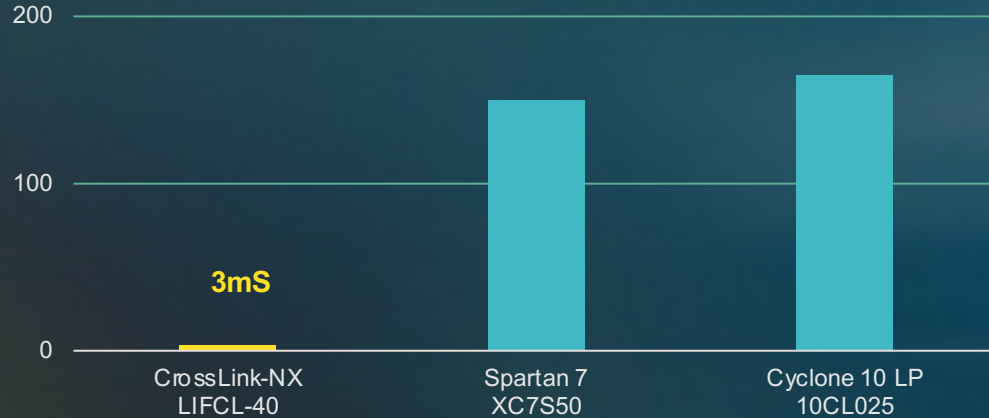
Factory Automation

Servers

5G

CrossLink-NX Enabling Up to 50x Faster I/O Wake Up Time

I/O Self Configuration Time (mS)



OVERVIEW

What You Are Seeing

The I/O self configuration time of the Lattice CrossLink-NX-40 running on the Lattice development board compared with Xilinx Spartan 7 (XCS7-50) and Intel Cyclone 10LP (10LP025) configured for the fastest possible configuration times on their associated development boards.

Why It Matters

“Instant-on” I/O configuration is important for applications such as LED drivers, motor control and board housekeeping.

Reduces complexity, cost, and power dissipation of customer systems

The Lattice Advantage

Smart monitor of SPI configuration memory avoids delay timers

150 MHz Quad SPI configuration interface for high speed configuration data transfer

Early I/O configuration ensures outputs stable as soon as possible

KEY APPLICATIONS



Motor Control



Human Machine Interfaces



ADAS