

LATTICE SEMICONDUCTOR

*Accelerating Customer Innovation
For A Better Connected World
Industrial & Automotive Division*

Lattice Semiconductor

Company at a glance

MARKETS & PRODUCTS

Enabling processing and connectivity applications where time-to-market, low power, and small size are critical.



CONSUMER



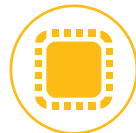
INDUSTRIAL &
AUTOMOTIVE



COMMUNICATIONS
& COMPUTING



PROGRAMMABLE
LOGIC

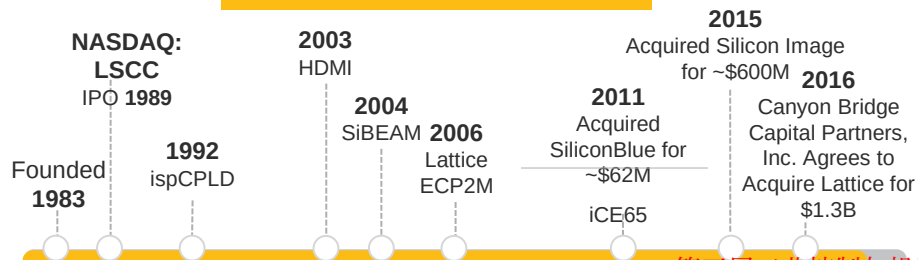


VIDEO
CONNECTIVITY



mmWave

HISTORY OF INNOVATION



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STRONG FINANCIALS

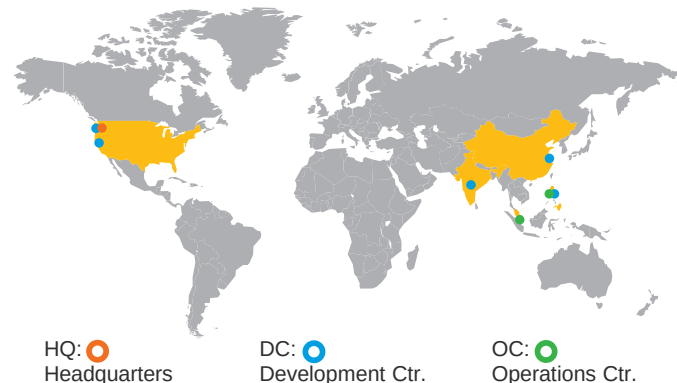
\$406M

2015 Revenue
Consistent double-digit
revenue growth

2 BILLION +

Devices sold by
Lattice in the last 10
years

GLOBAL PRESENCE



第三届工业控制与机器人研讨会演讲稿

<http://bbs.big-bit.com/thread-471474-1-1.html>



INDUSTRIAL & AUTOMOTIVE MARKET



DRIVERS & NEEDS

- More intelligent controls
- HD video processing & storage
- Increased number of sensors
- Wireless networking



OUR SOLUTIONS

- MachXO3 & ECP5 FPGAs
- HD video solutions
 - Wired (HDMI, FPGA)
 - Wireless (WiHD modules)
- Automotive & industrial grade devices



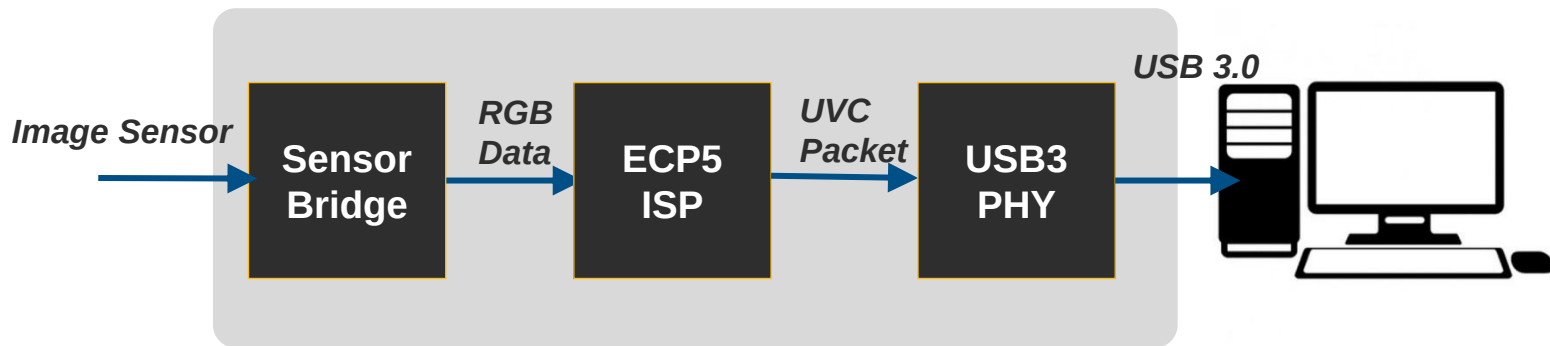
KEY APPLICATIONS

- Machine vision & surveillance cameras
- Industrial control, automation & networking
- Video wall & interactive displays
- Driver assistance & infotainment

USB3 Video Bridge

Challenge: Standard PCs do not have the video input ports to capture the high-definition video

Solution: Lattice USB3 Video Bridge converts image sensor RAW data to USB standard Video Class (UVC) data format



Lattice In Motor Control

Motor Control Solution by DVE:

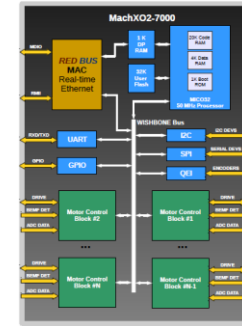
- Low-cost motor control solution
- Based on Lattice MachXO2-7000
- Drives up to 8 stepper motors
- Two phase or three phase motors
- Hardware supports brushless motors
- 32 bit processor @ 50 MHz
- 20 Kbyte code space, 4 Kbyte data space
- 8 QEI interface for encoders
- Space Vector Modulation
- Back-EMF detection
- REDBUS Real-time Ethernet interface
 - 100 Mbit real-time and deterministic data exchange
 - REDBUS Ethernet MAC allows multiple boards connection without Ethernet switch devices

<http://www.developembedded.com/>

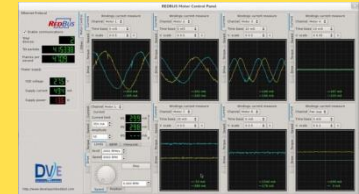
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Motor Control Solution By DVE

IP, and ASSP
licensing models
available



Control GUI

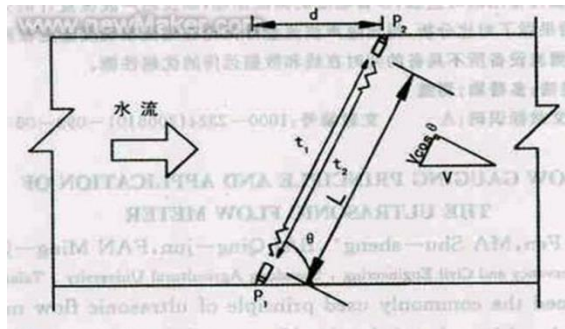
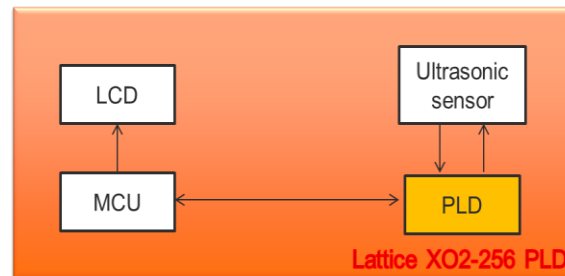
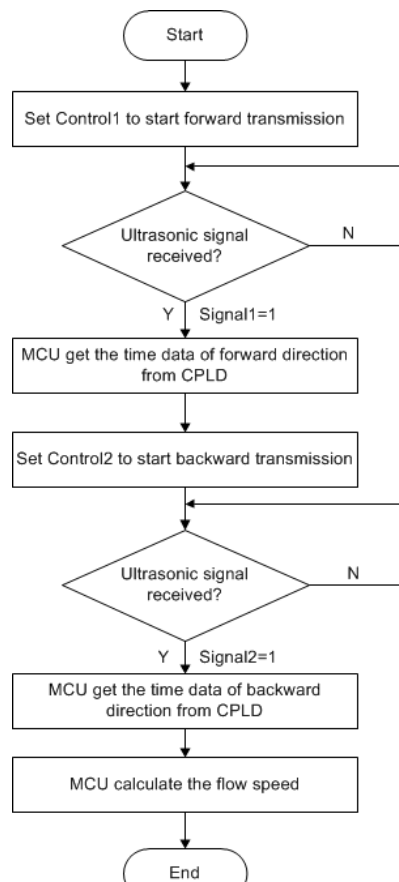


Motor Control
Development
Board



Smart Ultrasonic Flow Meter

- ✓ Low power
- ✓ Small package
- ✓ High security to protect from illegal copying
- ✓ High accurate counting to lower MCU workload
- ✓ Glue logic implementation to reduce the number of discrete components

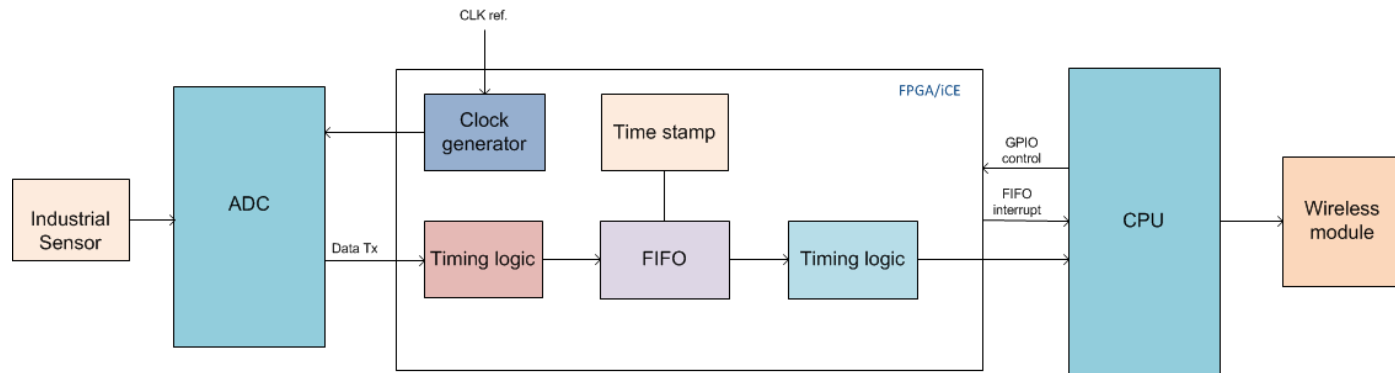


根据上式可求出速度 v :

$$\Delta t = t_1 - t_2 = \frac{2Lv \cos \theta}{c^2}$$

$$v = \frac{L^2}{2d} \times \frac{t_1 - t_2}{t_1 \cdot t_2}$$

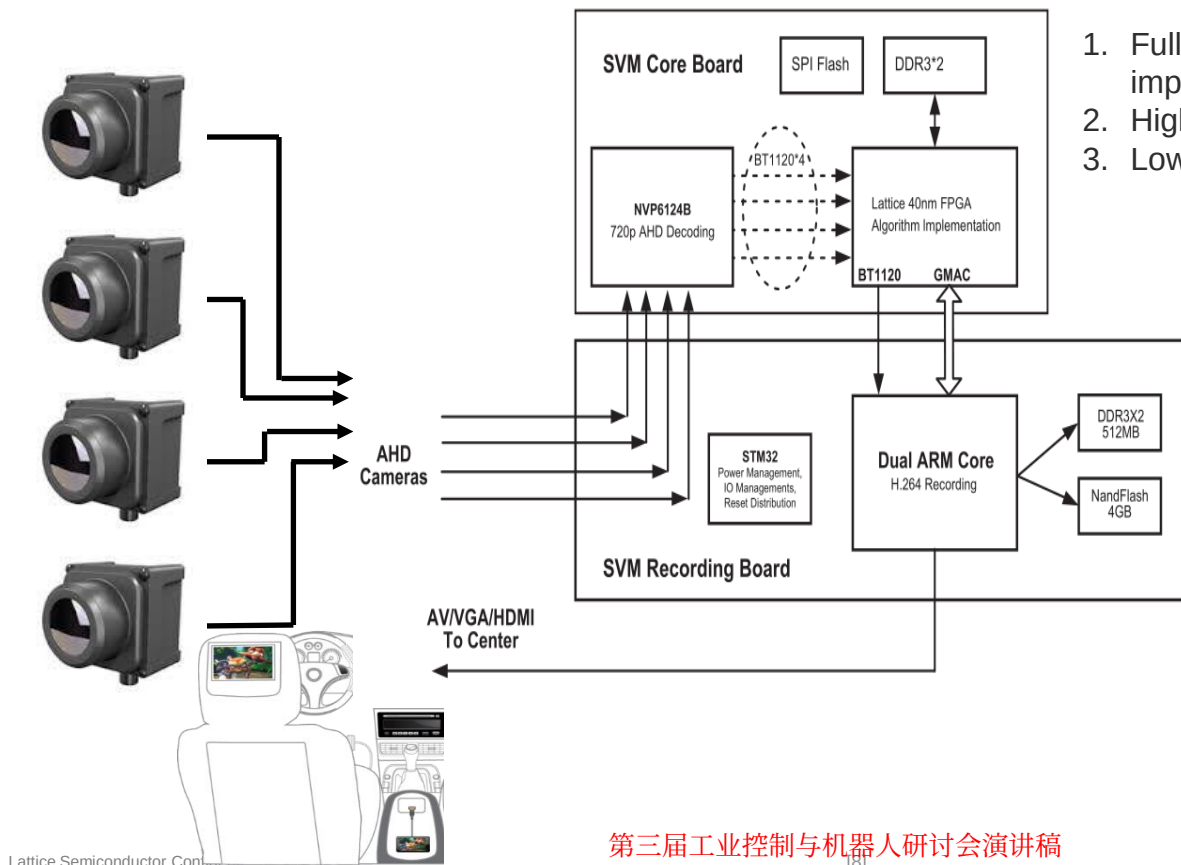
Water Quality Monitoring



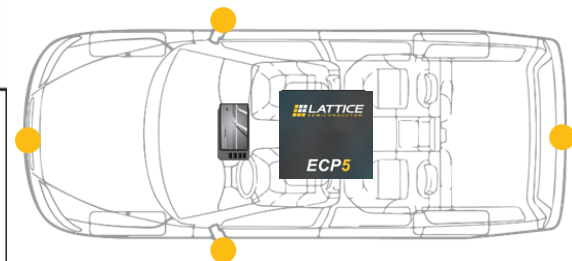
1. Low power, small package.
2. Clock generator.
3. FPGA internal memories to buffer AD's data.
4. Time stamping function.
5. Flexible interface to connect with ADC.
6. Co-processor of CPU to lower CPU workload.

ECP5: Surround View Monitoring System

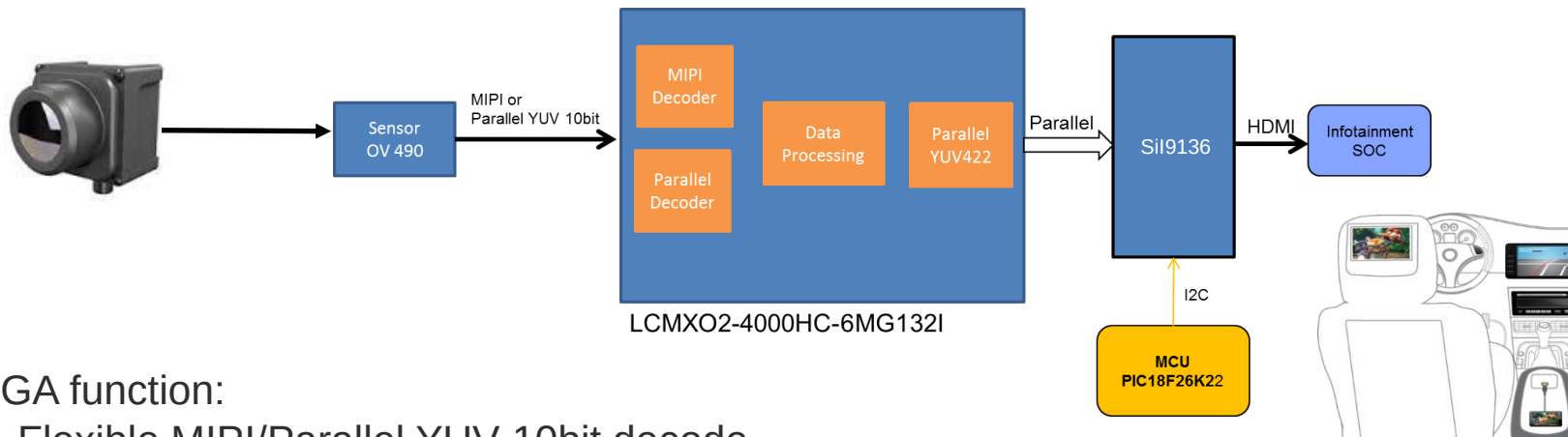
Accelerate Heterogeneous Computing for Imaging and Vision



1. Full MAC function DSP block makes easy to implement algorithm acceleration
2. High DDR3 performance
3. Low cost /Low power consumption.



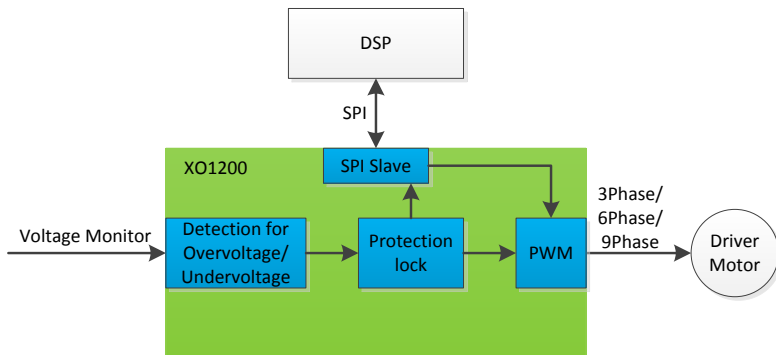
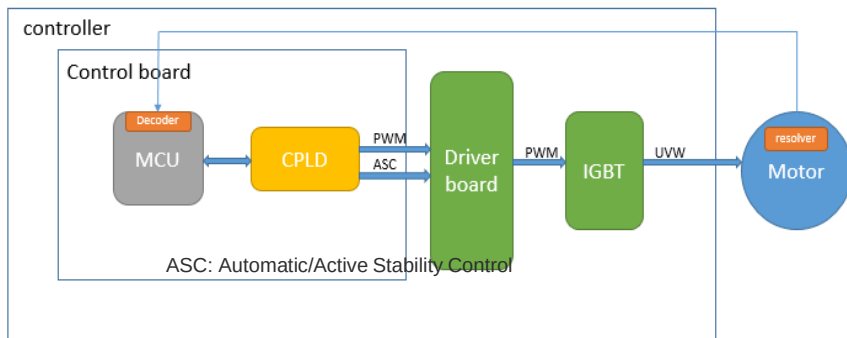
XO2/3: Rear Sensor/Car Infotainment Solution



FPGA function:

1. Flexible MIPI/Parallel YUV 10bit decode,
2. Data relocation,
3. 36-bit Parallel RGB output to SiI9136
4. Low power/Low cost

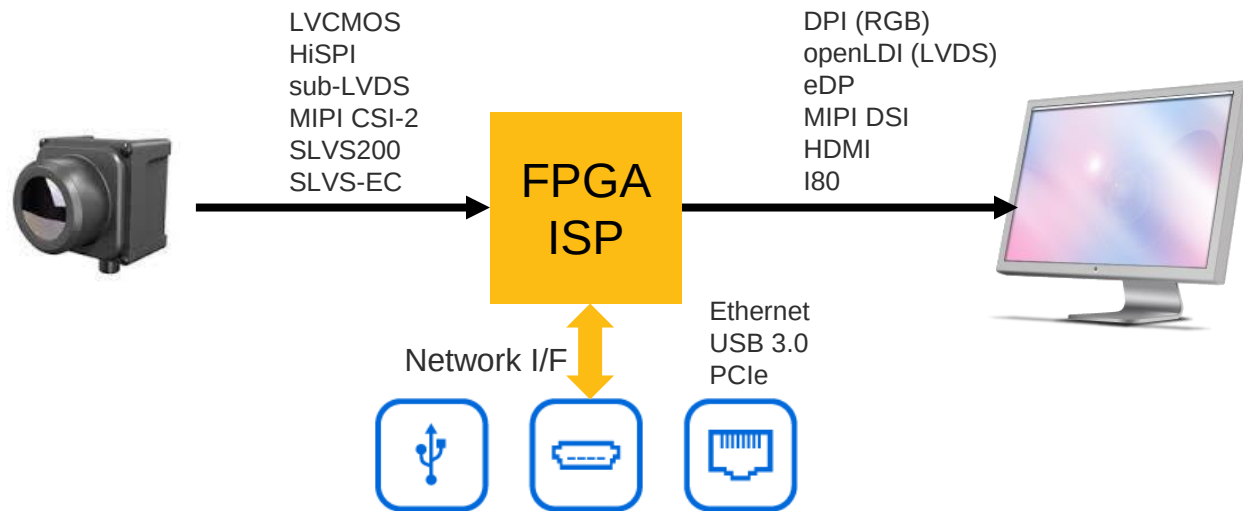
Electric driver system



Lattice Value Propositions:

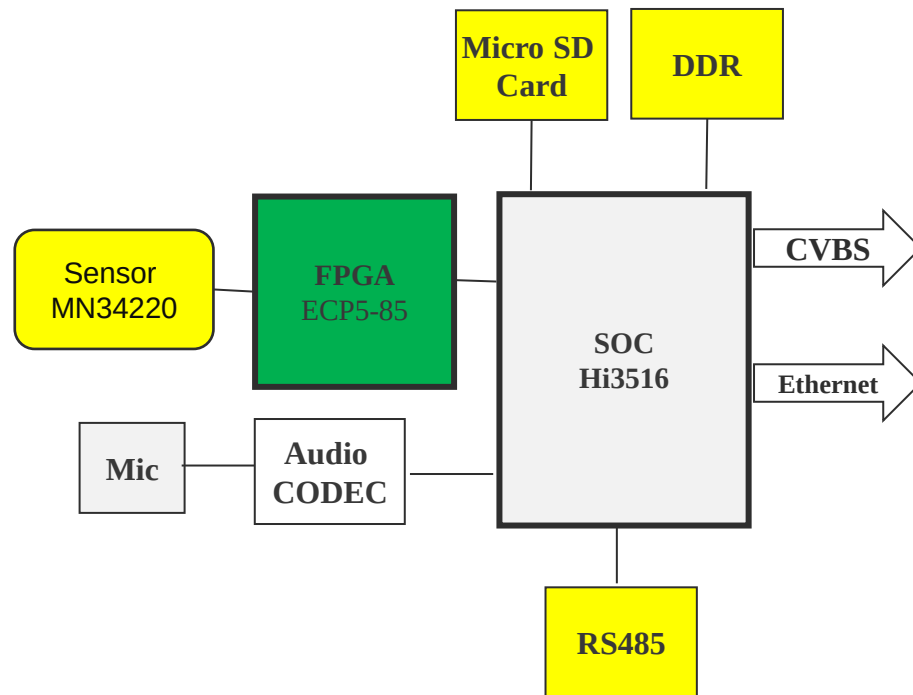
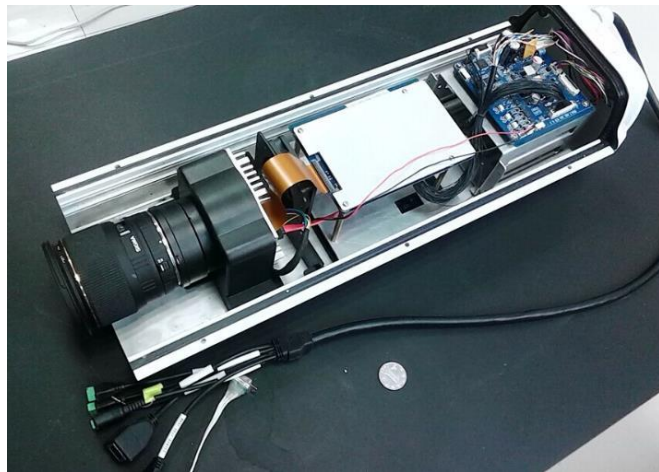
- Fastest response speed for abnormal situation. MCU/DSP sequentially process the tasks, it is hard to avoid the lower response when interrupting from processing other tasks. CPLD parallel processing ability makes the response more faster. (Over voltage, over current, MCU/DSP crash, etc.)
- Flexible on protection strategy design.
- Co-process with MCU/DSP, double the reliability of the system. Hardware is the highest priority for any abnormal situation. So using CPLD can be taken as **a function safety strategy.**

Video Interface Bridge and ISP



- Lattice Video Interface Bridge and ISP solutions support serial and parallel data transfer protocols, such as MIPI, LVDS, DisplayPort and HDMI, to facilitate the designing of industrial camera and display products

ECP5-Intelligent camera

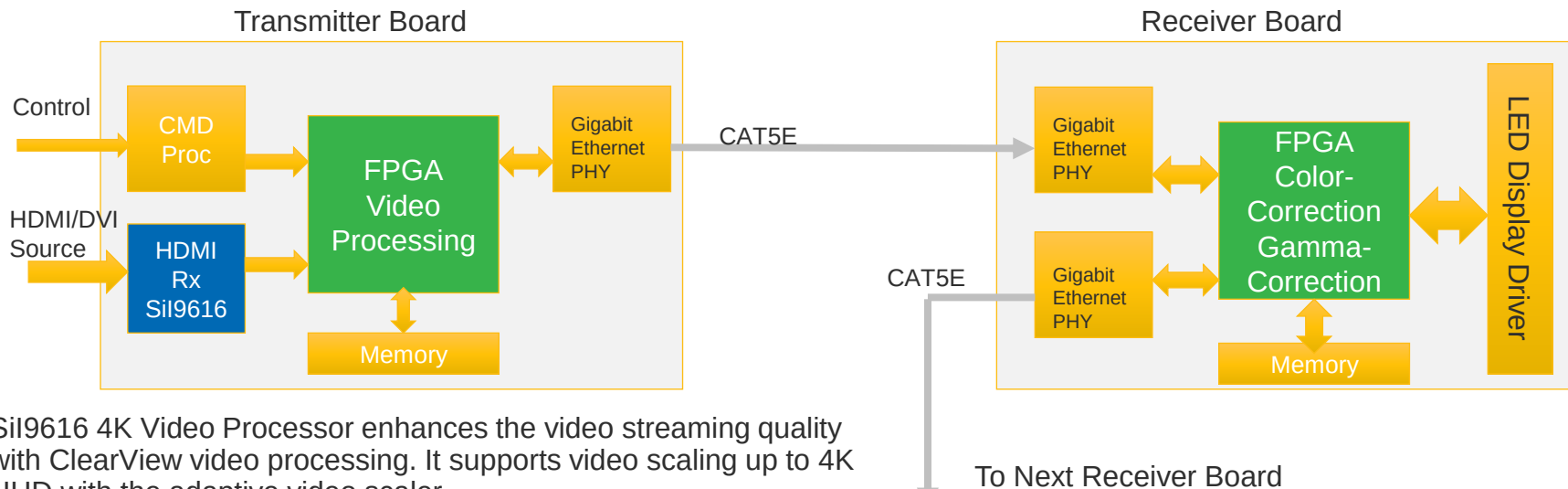


Public signage and Video Wall

Requirement: Display HDMI video on LED Video Wall

Challenge: HDMI ASSP devices do not support video wall multi-screen LED displays

Lattice Solution:



- Sil9616 4K Video Processor enhances the video streaming quality with ClearView video processing. It supports video scaling up to 4K UHD with the adaptive video scaler.

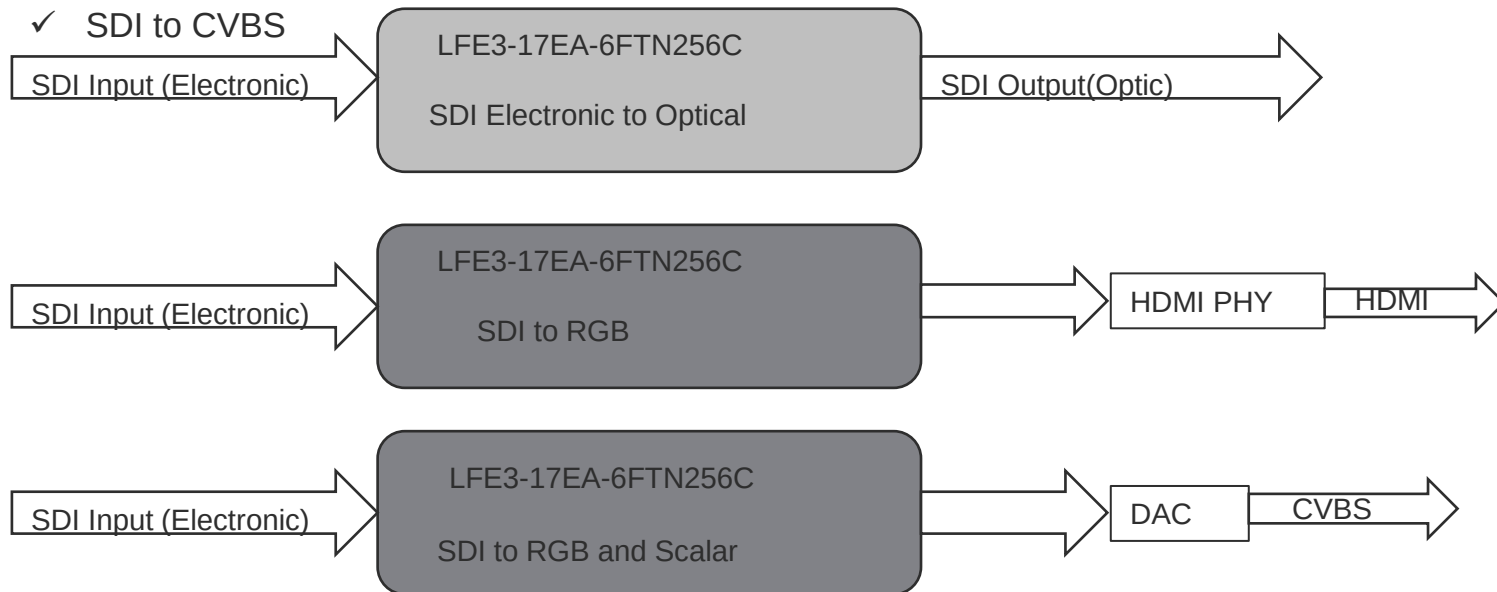
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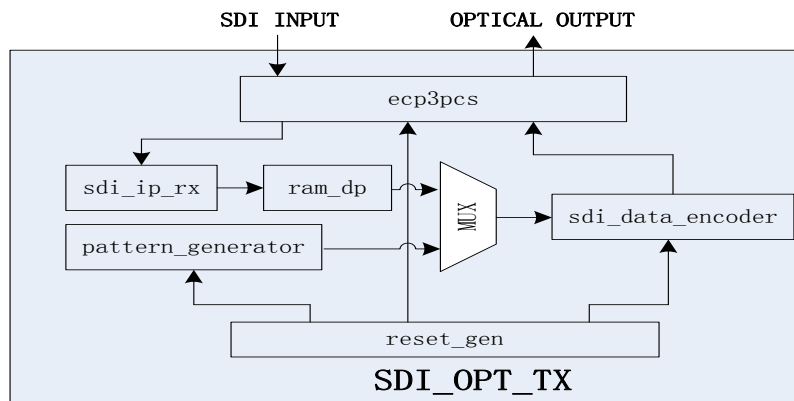
Optic PDH and I/F Converter -Diagram

- Optic terminal machine/ different I/Fs conversion board

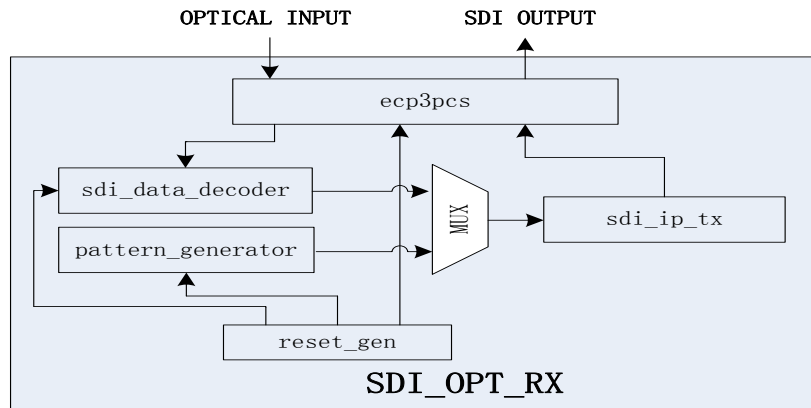
- ✓ SDI Electronic to optic
- ✓ SDI to HDMI
- ✓ SDI to CVBS



SDI Optical Transmission



SDI=>OPTICAL



OPTICAL => SDI

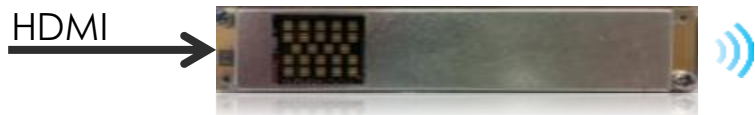
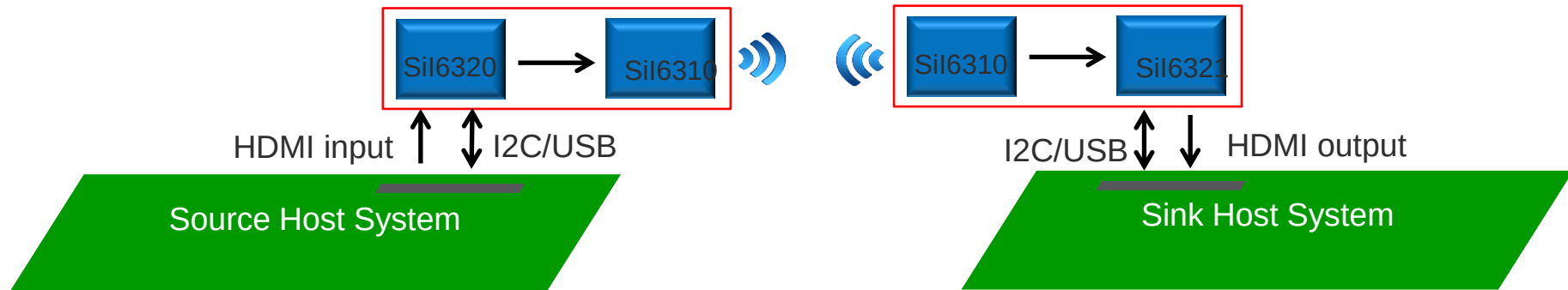
SDI Video PDH(SDI Optic Terminal Machine) Solution advantage:

- General, SDI can use Optic as the transmission media, but the SDI optic module is expensive
- But for general optic module, the price is cheap
- So our solution is transferring SDI to RGB signal at first, then use general Optic module transmit the signal, in the receiver, we transfer the RGB signal to SDI

60GHz Wireless Video Module Block Diagram

WiHD Tx Module

WiHD Rx Module

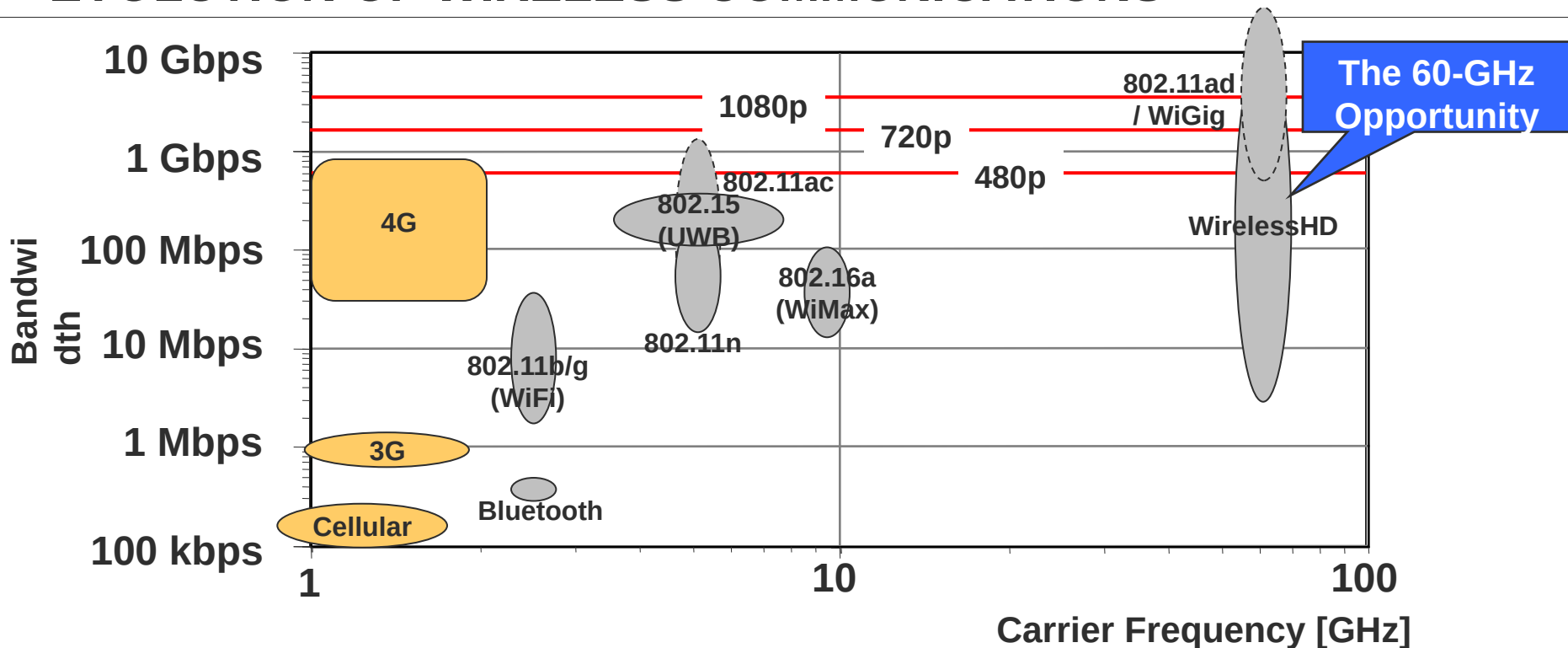


Transmitter: MOD6320-T
Source side



Receiver: MOD6321-R
Sink side

EVOLUTION OF WIRELESS COMMUNICATIONS



Pixel-perfect 1080p video easily carried at 60GHz

2.4/5GHz solutions require overly compressed techniques compromising visual quality

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60GHZ WIRELESS VIDEO MODULE IN INDUSTRIAL AND MEDICAL



Industrial



In factory automation, the human eye and hand is being replaced by cameras and mechanical sorters (MachineVision). Displays are used for monitoring the lines. WirelessHD solves cable length and routing issues.

In Medical, cameras and displays are replacing optical magnification. Wires mean extra sterilization efforts, tripping hazards, routing challenges, and typically exceed maximum length for HDMI cables. WirelessHD solves that.



Medical

THANK YOU