Tom Watzka & Satwant Singh
Lattice Semiconductor

Mobile Influenced Markets – Evolution of Camera and Display Uses
Lattice CrossLink™

CrossLink Block Diagram

- The Lattice CrossLink FPGA will bridge almost anything to MIPI D-PHY℠
- Many of our solutions go outside the traditional mobile market

CrossLink Applications

- AR/VR
- Auto
- Consumer
- Drone
- Industrial
- Other

Lattice Semiconductor
Traditional Display Applications

- Traditional Display applications will include one (maybe two) static displays

Lattice Semiconductor
Many consumer, automotive, and industrial applications involve LVDS.
Video data can be “multiplexed” through a single D-PHY port by mux-ing frame by frame, or merging to super frames.
AR/VR (Displays)

Merging is favored method to minimize eye-eye latency.

Minimum frame rate of 75Hz needed to avoid motion sickness.

Lattice Semiconductor
Traditional Camera Applications

- Traditional Camera applications statically switch from one camera to the other
AR/VR (Cameras)

Requires Environment Awareness

- IMU – Inertial Measurement Unit Performing Sensor Fusion for Accelerometer, Gyrometer & Magnetometer
- Cameras
  - Distance Measurement
  - Environmental Understanding
AR/VR Tracking

• Two approaches to positional tracking:
  – Outside-In requires external hardware
  – Inside-out is self contained

Outside-In System

Inside-Out System (such as Microsoft Hololens)

Lattice Semiconductor
AR/VR Permutations for Inside-Out

- Inside-out implementations are growing in the number of cameras and sensors

**Input**
- 2X Bandwidth, 0 Latency
- ~3X Bandwidth, 0 Latency
- ~5X Bandwidth, 0 Latency

**Output**
- 2X Bandwidth, 0 Latency
- ~3X Bandwidth, 0 Latency
- ~5X Bandwidth, 0 Latency

Lattice Semiconductor
360 Cameras
- Just more cameras

Drones
- Require same things as AR/VR
- Plus more cameras

Automotive
- Require same things as AR/VR
- Plus transport

Lattice Semiconductor
Summary

- MIPI Components have become ubiquitous
  - Cameras, Displays, APs, Accelerometers, Gyrometers, Magnetometers …
- Mobile Influenced Markets are leveraging these components in all sorts of ways and combinations
- FPGAs have been instrumental in enabling these new (and unforeseen) markets in ways that simple bridges cannot.
mipi®

DEVCON

THANK YOU

HSINCHU CITY, TAIWAN

MIPI.ORG/DEVCON

2017
MIPI ALLIANCE
DEVELOPERS
CONFERENCE