mipi® DEVCON

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Mobile Influenced Markets – Evolution of Camera and Display Uses

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MIPI ALLIANCE
DEVELOPERS
CONFERENCE

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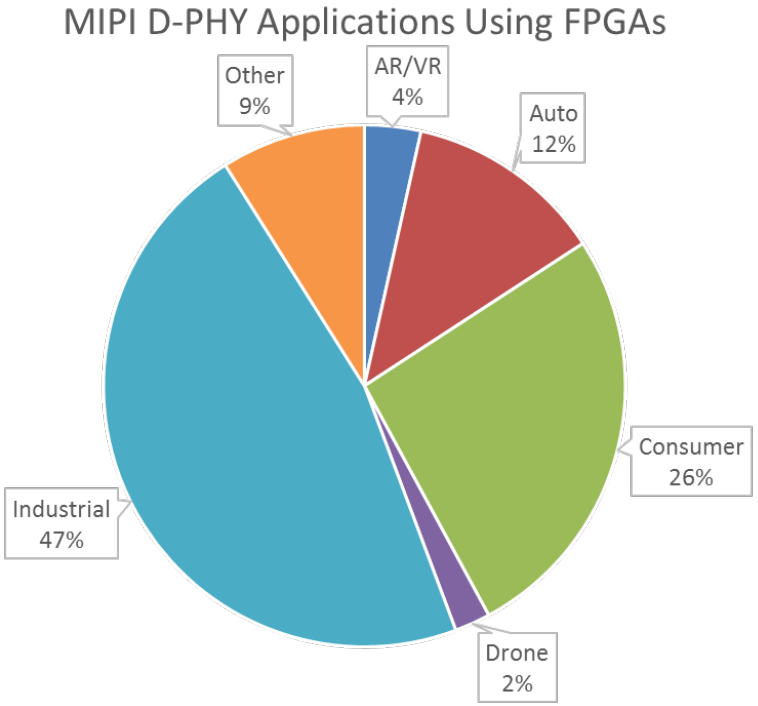
MIPI.ORG/DEVCON

Lattice MIPI D-PHY℠ Applications

- The PC industry created demand in adjacent markets such as test equipment, POS terminals, and industrial controls
- Designers leveraged their access to standardized APIs and hardware
- In a similar way, the mobile industry is experiencing demand for high quality, low cost components in mobile influenced markets



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Traditional Display Applications

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

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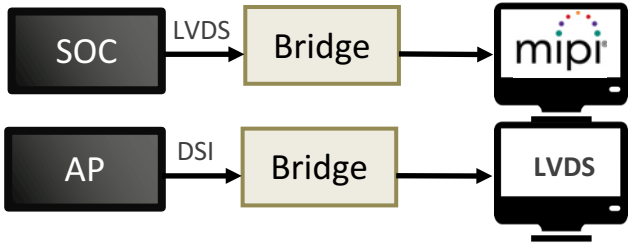
BRIDGING



Many consumer, automotive, and industrial applications use older LVDS interfaces

Appliances

Automotive

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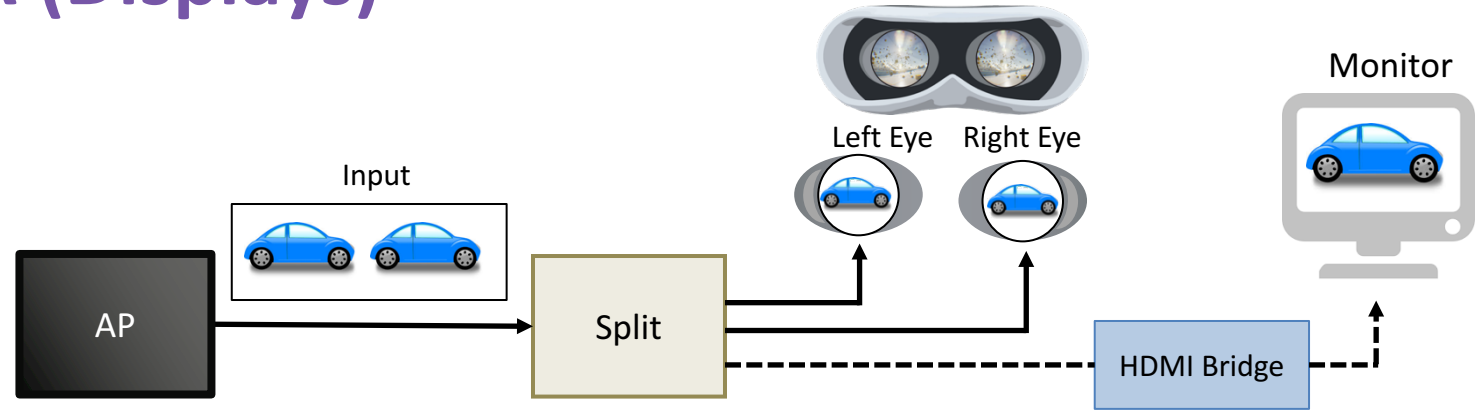
Industrial

AR/VR (Displays)



Merging is the favored method to minimize eye-to-eye latency.

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

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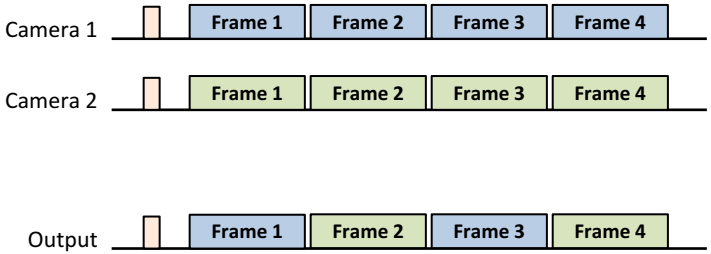
Mux vs Merge

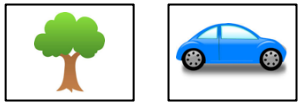
- Video data can be “multiplexed” through a single MIPI D-PHY port by mux-ing frame by frame, or merging to super frames.



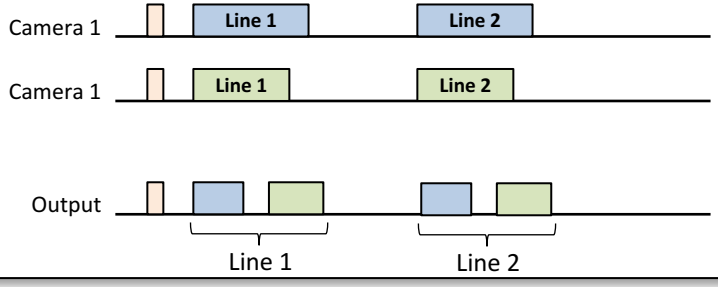
Mux

Input

Output = 1X Input Bandwidth, 1 Frame Latency



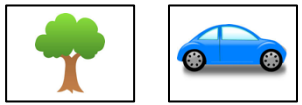
Frame 1 Frame 2 Frame 3



Merge

Input

Output = 2X Input Bandwidth, 0 Latency



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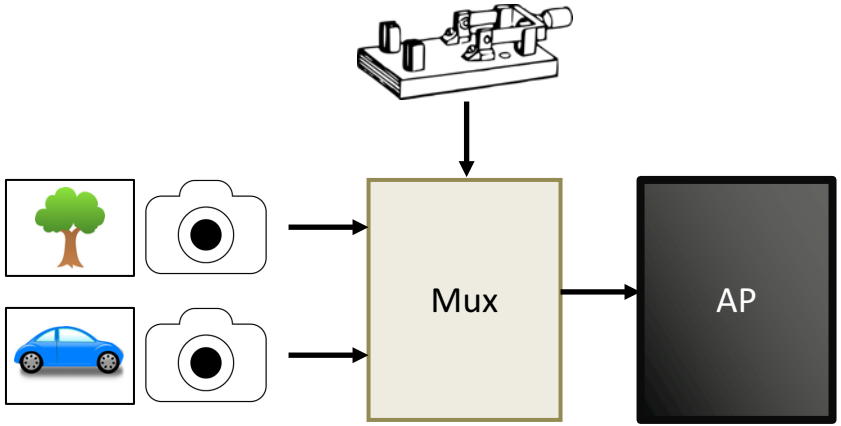
Traditional Camera Applications

Rear Camera

Front Camera



- Traditional camera applications statically switch from one camera to the other

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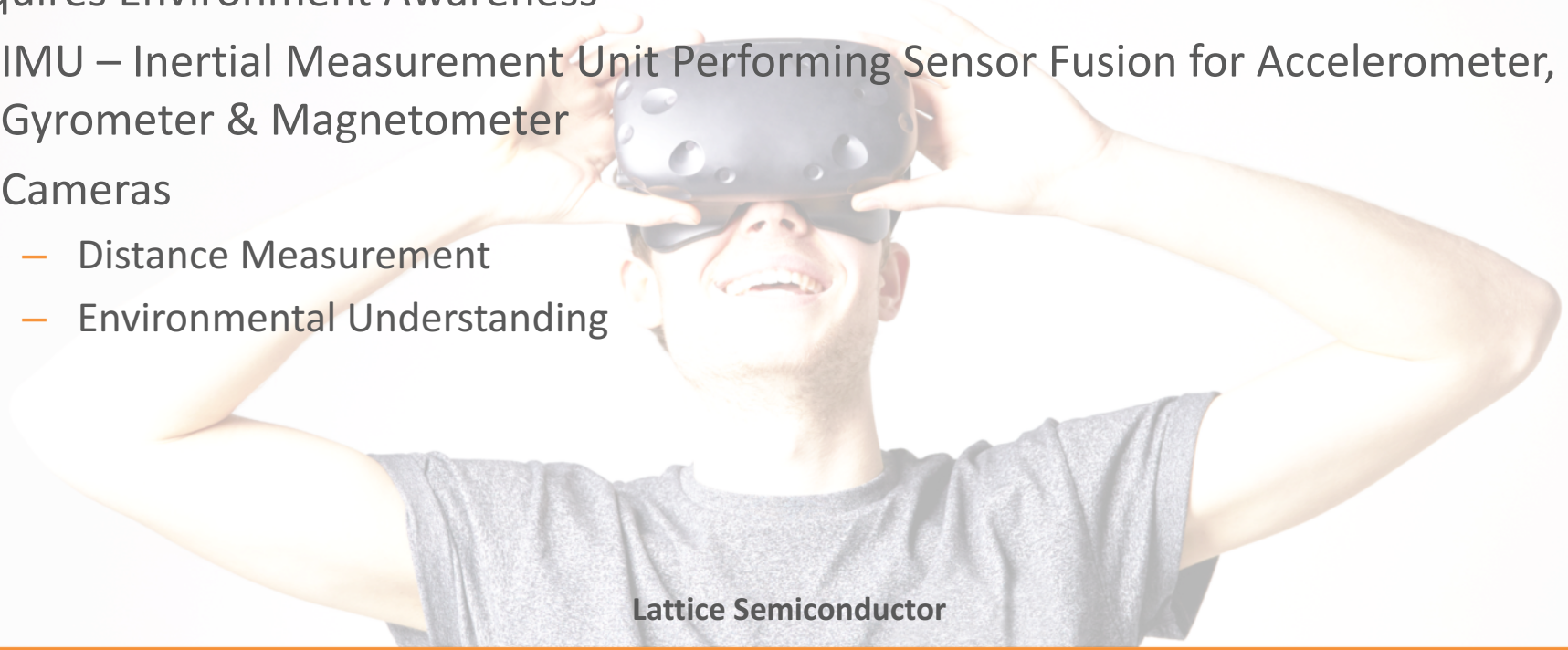
AR/VR (Cameras)

Requires Environment Awareness

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



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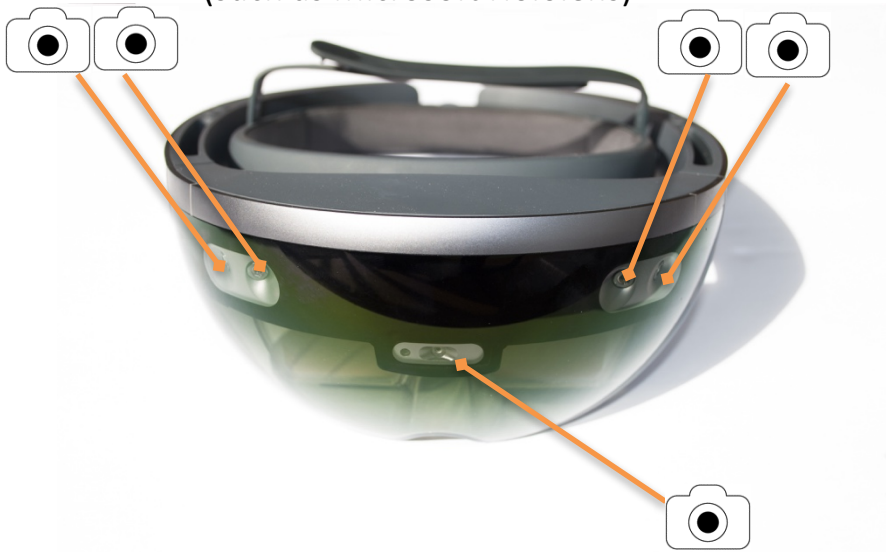
AR/VR Tracking

Outside-In System

Inside-Out System
(such as Microsoft Hololens)



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

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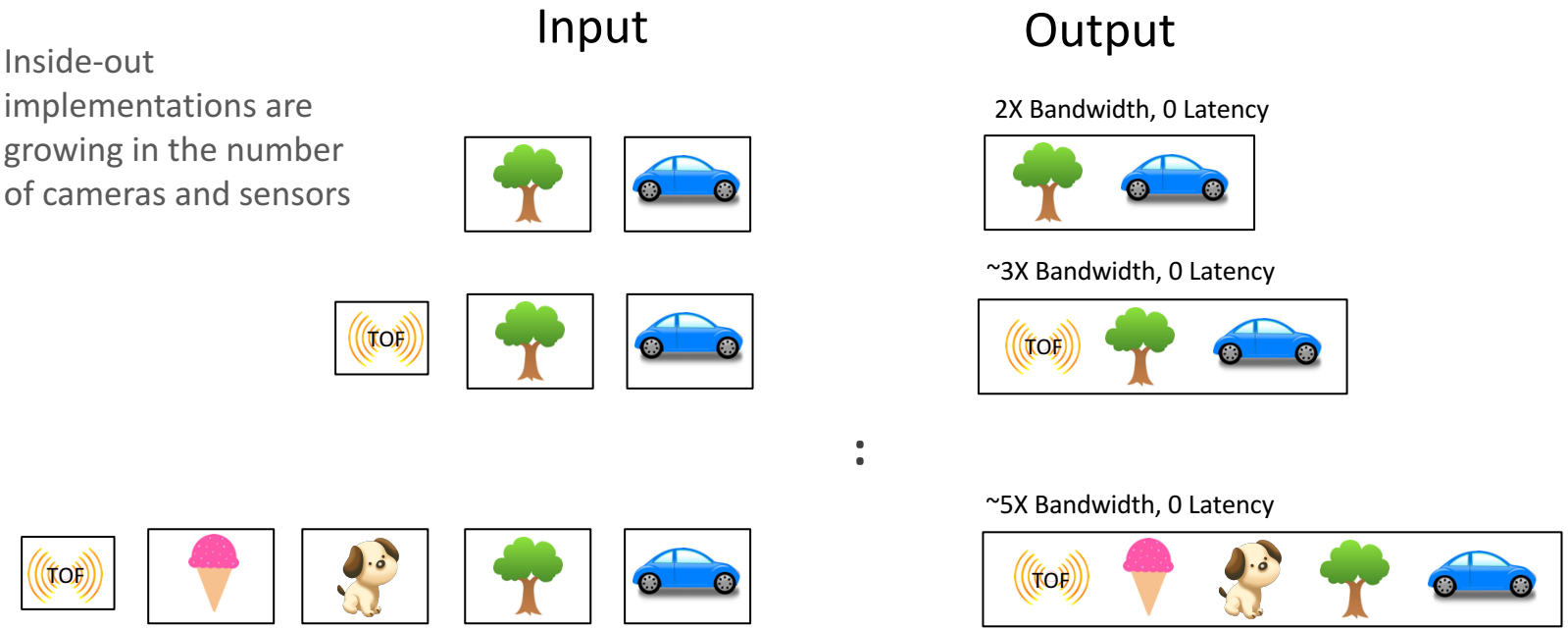
AR/VR Permutations for Inside-Out

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



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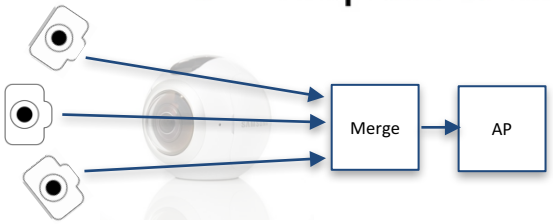
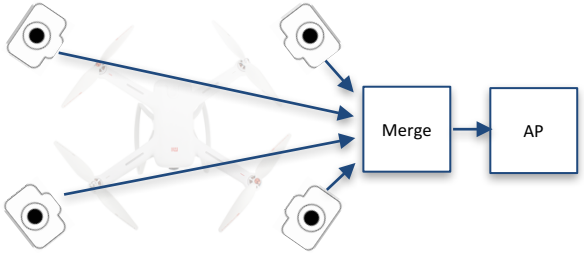
360 Cameras

- Just more cameras



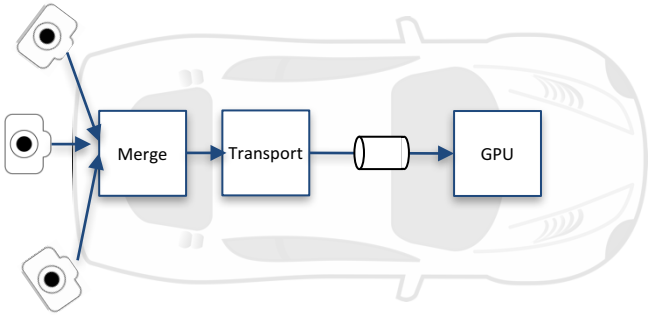
Drones

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



Automotive

- Require same things as AR/VR
- Plus transport



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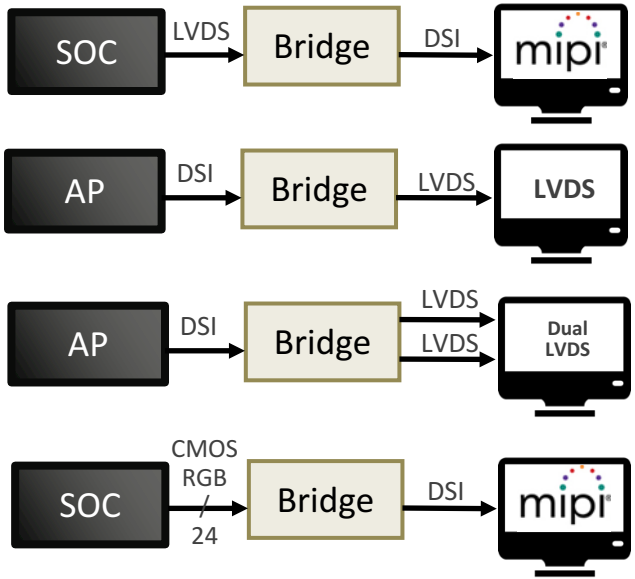
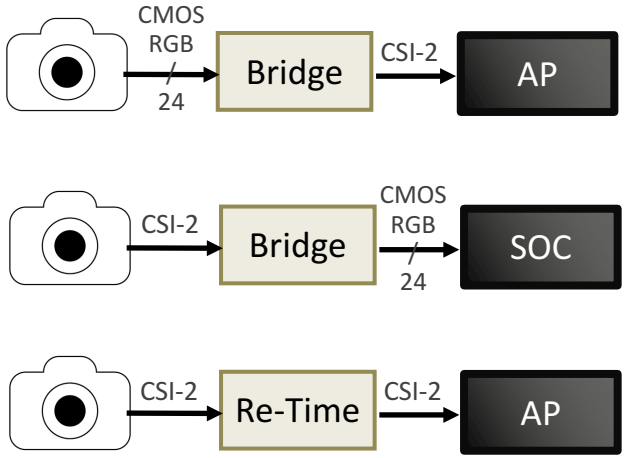
Everything Else





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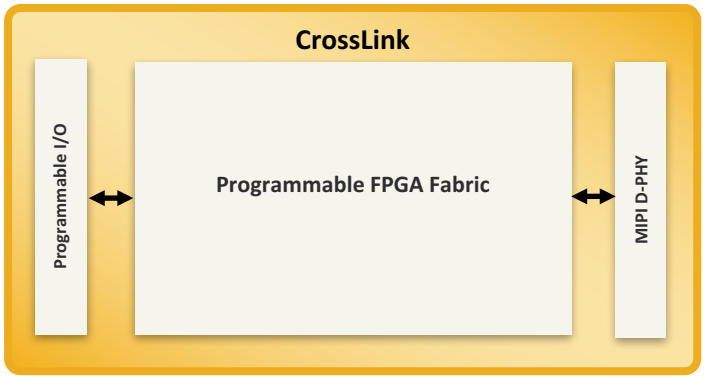
Why FPGAs? Flexibility



- FPGAs have general purpose IOs in addition to specialized IOs such as MIPI D-PHY
- FPGAs provide an array of flexible programmable logic cells that can support high speed data flow including splitting and merging functions

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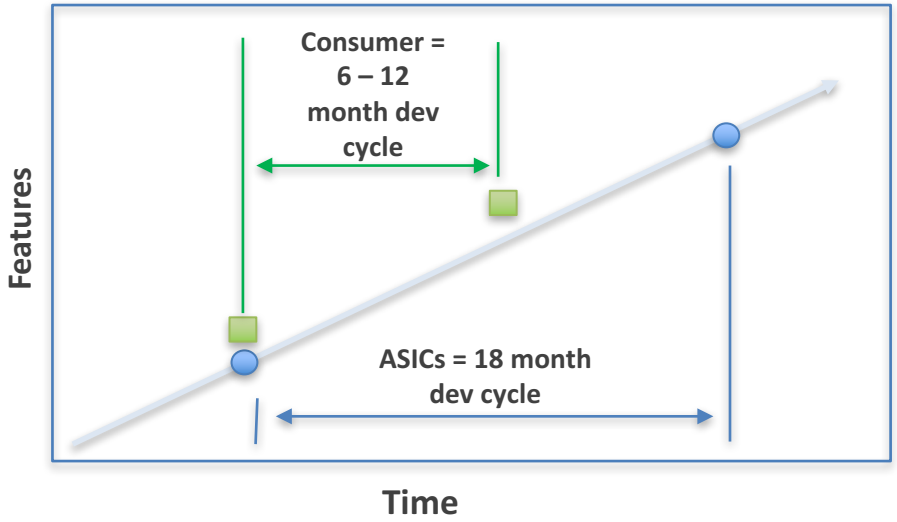
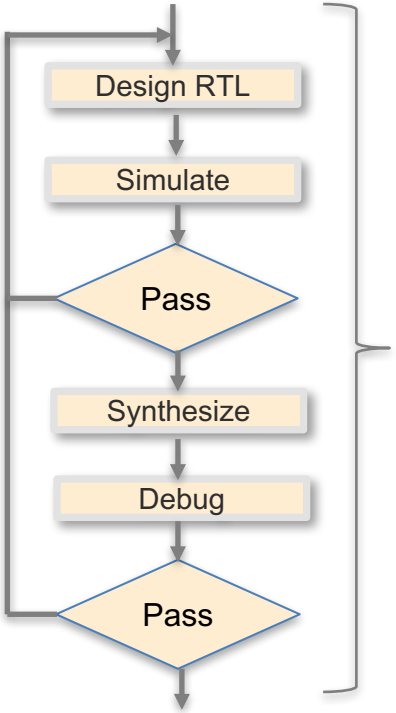
Why FPGAs? Time To Market

- Product development cycle is much faster than ASIC cycles
- FPGAs enable innovation





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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, in terms of time and functionality

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