



What does Cadence provide for OpenVX?

Cadence Tensilica Processor and DSP IP Business Unit

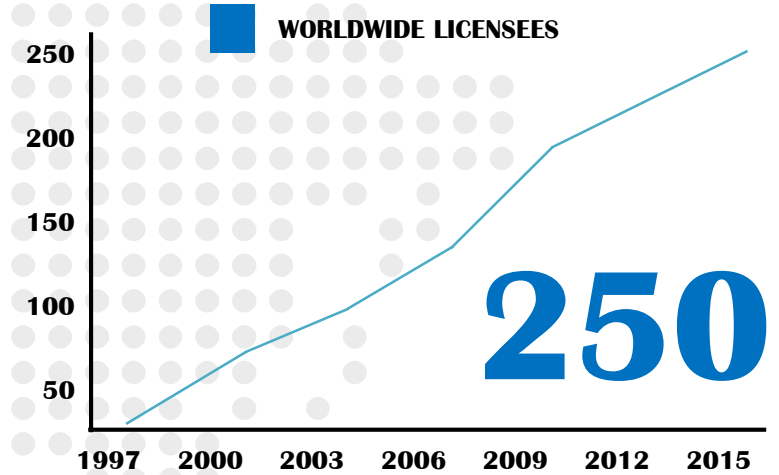
TENSILICA CUSTOMERS

4B+ Processors
SHIPPING
Annually

DSP LICENSING REVENUE

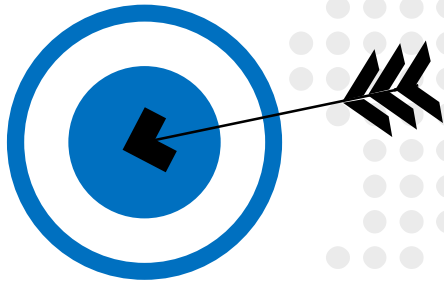
#1 DSP IP
LICENSING
REVENUE

TENSILICA LICENSEES



LEADING AUDIO DSP IP

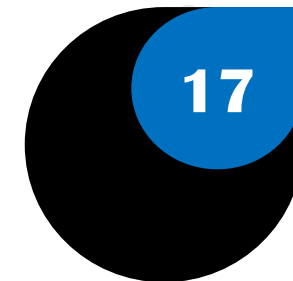
TOP
AUDIO DSP
CHOICE



GLOBAL ECOSYSTEM

200+ ECOSYSTEM
PARTNERS

SEMICONDUCTORS

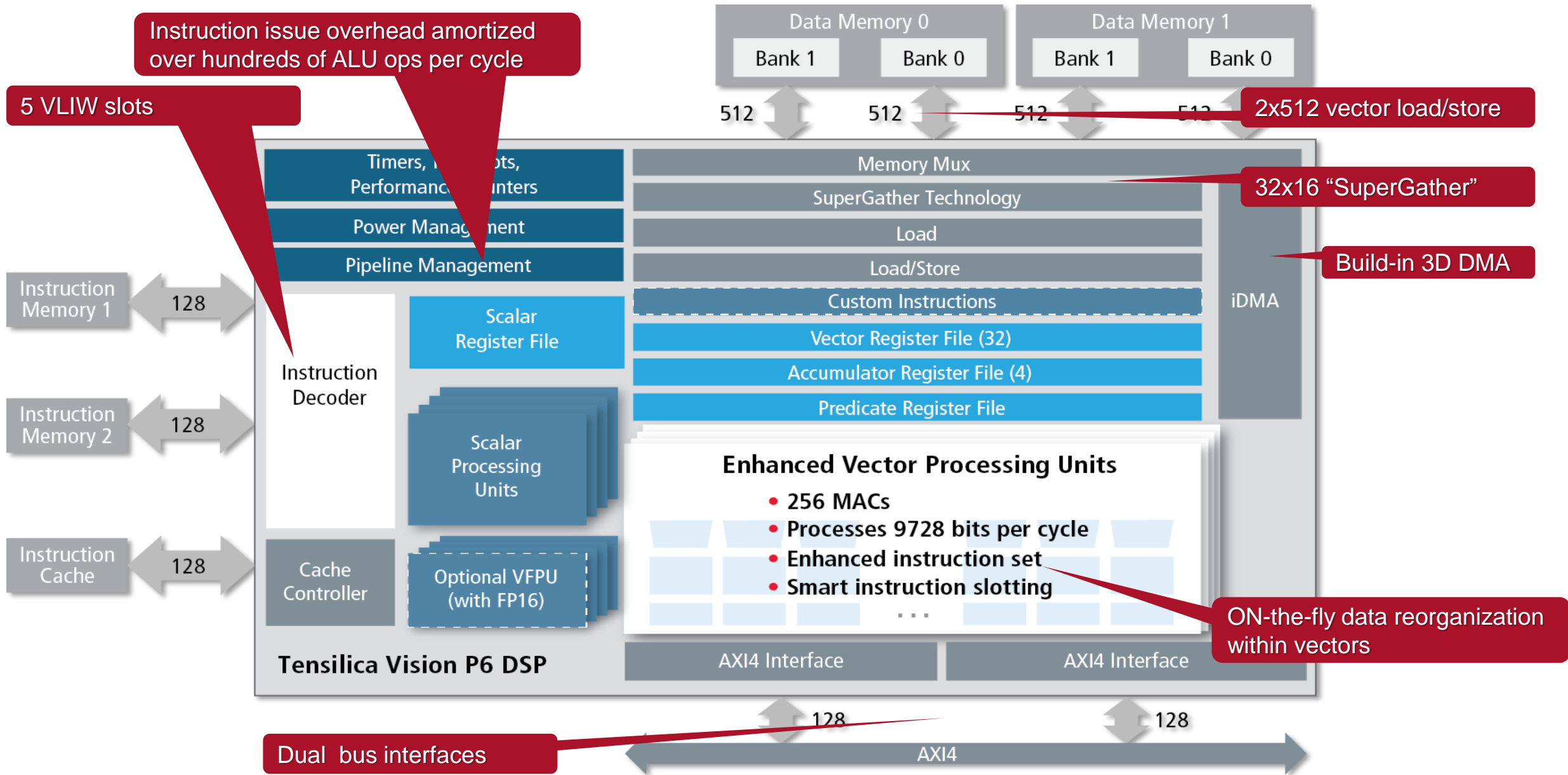


17 of the Top 20
SEMICONDUCTOR
VENDORS
USE TENSILICA

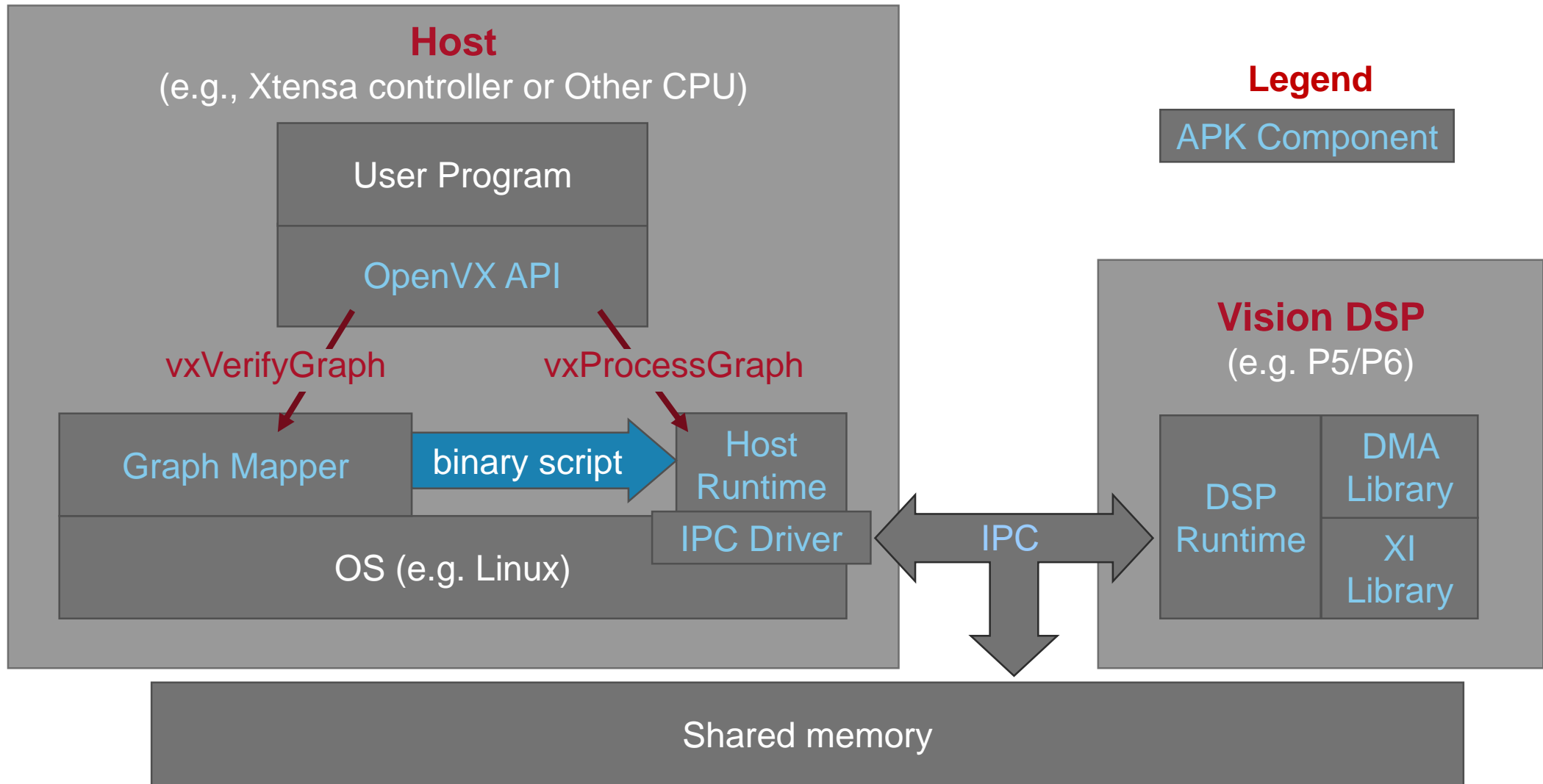
Cadence Application Programming Kit (APK) includes:

- **Front end:** the OpenVX API, compliant to OpenVX 1.1
 - Calling any OpenVX API invokes the API “front end” module
- **Graph Mapper:** Translates OpenVX graph to a “script” that can run on Vision DSPs
 - Is invoked by graph verification, usually via vxVerifyGraph, but sometimes also indirectly via vxProcessGraph or vxScheduleGraph
 - Determines kernels to use, tile sizes, memory requirements, etc.
- **Runtime:** executes scripts
 - Invoked by vxProcessGraph or vxScheduleGraph
 - Launches optimized kernels on the Vision DSP
 - Handles DMA, kernel execution, notification of completion for vxWaitGraph
- **XI Library:** executes kernels
 - Highly optimized kernels for OpenVX functions

Cadence Vision P6 DSP



Cadence OpenVX block diagram (dual core)



Cadence OpenVX

- Fully compliant to OpenVX 1.1
- Highly optimized kernels leveraging the Cadence XI Library
 - Performance benchmarks provided
- Automatic tiling, DMA, local memory management, scatter-gather kernels
 - Via provided Graph Mapper and Runtime
- Automatic overlapping of data transfer (DMA) and compute
- Supported on Tensilica Vision P5 and Vision P6 processor cores
 - Compliance tested for 2-core system with Xtensa host running Linux 4.3 connected to Vision DSP
- Vision DSP IP license includes source code for all APK modules

Example Application

- Sparse optical flow:
 - Harris corners → Gaussian pyramid construction → Pyramidal LKT tracking
- From the Khronos OpenVX tutorial materials
 - Graph runs unmodified on Cadence APK 4.0 (replaced OpenCV video I/O functions)
- In video frames below, pedestrians walk through a scene
 - Red dots are detected features; yellow arrows indicate features tracked from previous frame



Zoomed in on following slide

Source: <http://www.cvg.reading.ac.uk/PETS2009/a.html>

Deliverables

- A single core bare metal (no OS) workspace
 - An Xtensa Xplorer workspace (*apk4_vision_ovx_package.xws*)
 - Enables quick start up and efficient simulation on DSP
 - A good workspace to start with and become familiarize with OpenVX
- A Dual core (Host and DSP) workspace with Linux on Host
 - Delivered as a gzipped tar archive file (*openvx-linux-apk-4.0.tar.gz*)
 - Simulates a separate controller to run the “host” and Vision DSP executes the graph
 - A good workspace which will be closer to real deployment system
- A folder with all the test input images for Optical_Flow_Test example
- Release Notes

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