



# *VME Beyond 2020*

## Artesyn VME Product Strategy Update

*November 13<sup>th</sup>, 2015*

# We are Far from the End of VME

- IMS Research Study Shows that VME Will Maintain a Sizable Market for the Next Decade
- Artesyn Has Secured +70 Design Wins over the Past Two Years and the Momentum Continues
- Given the Inherent Conservatism in Design and Long Product Cycle, Defense Programs Continue to Be One of Major Drivers for the VME Market Going Forward
- Budget Restriction Alters the Terms of Maintenance and Upgrade, Extending the Life of Existing Defense Programs
- Slow Adoption Causes a Slower Transition to New Technologies and Industry Standards than Expected
- VME Still Represents an Optimal Solution to New Programs Aiming at Mature Technologies with Low Risk, Low Cost, and Less Steep Learning Curve



# Our VME Products Have Been Deployed in Diverse Mission-Critical Applications



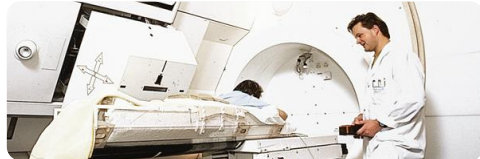
**Industry Robot Control System**



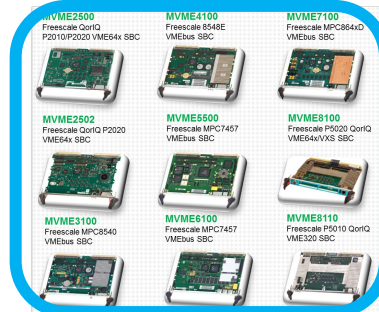
**Semiconductor Lithography System**



**Shipboard Weapon System**



**Protontherapy System and Beam Control**



**Gas Turbine Control**



**Helicopter Test Control System**



**Antenna Control System**

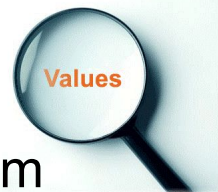


**Airborne Radar System**

# Our Strengths Continue to Enhance Artesyn's Leading Position in the VME

## Market

- **Advanced Technology** – As One of the Founders of VME Technology More Than Two Decades Ago
- **Consistent Focus** – Enormous Expertise Built on the Dedication to Power Architecture-Based SBCs
- **Extensive Portfolio** – Tiered Product Lines Well Positioned to Meet Varying Requirements
- **Supply Longevity** – Track Record with Major Products Serving for More Than 10 Years or Longer
- **Superior Quality** – Reliable Product Supported by World-Class Manufacturing Facility and Established Quality Management System
- **Business Flexibility** – Agile Organization Addresses Customization Smoothly and Promptly
- **Global Support** – Strong Geographic Presence Ensures Customer Proximity and Collaborative Product Service



# Artesyn Targeting to Extend Lifecycle of All Existing Product Lines Up to 2025

## MVME2500

Freescale QorIQ  
P2010/P2020 VME64x SBC



## MVME4100

Freescale 8548E  
VMFhis SRC



## MVME7100

Freescale MPC864xD  
VMEbus SBC



## MVME2502

Freescale QorIQ P2020  
VME64x SBC



## MVME5500

Freescale MPC7457  
VMEbus SBC



## MVME8100

Freescale P5020 QorIQ  
VME64x/VXS SBC



## MVME3100

Freescale MPC8540  
VMEbus SBC



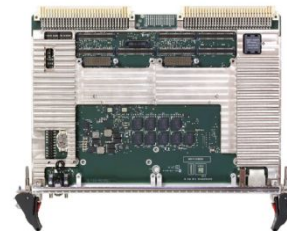
## MVME6100

Freescale MPC7457  
VMEbus SBC



## MVME8110

Freescale P5010 QorIQ  
VME320 SBC



*Extensive, Long  
Lifecycle VME  
Product Portfolio  
Meets Stringent,  
Varying Deployment  
Requirements for  
Most Industries*



# Artesyn Extensive Power Architecture Based VME / VXS Product Portfolio

Current

2015

2016

2017

2018

**MVME8100 / 8110**

QorIQ P5010 / P5020  
Up to 8GB DDR3 ECC / VXS / ENP1, ENP4

**MVME7100**

AltiVec

1.3GHz MPC8641D / 1.06GHz MPC8640D  
Up to 4GB DDR2 ECC / Ext Temp

**MVME6100**

AltiVec

1.3GHZ MPC7457  
Up to 2GB DDR / Ext Temp & Rugged via Elma

**MVME5500**

AltiVec

1GHz MPC7457  
512MB SDRAM / Ext Temp & Rugged via Elma

**MVME4100**

1.3GHz MPC8548E DPFP  
2GB DDR2 SODIMM / Ext Temp

**MVME3100**

Up to 833 MHz MPC8540  
512MB / Ext Temp & Rugged via Elma

**MVME2500 / 2502**

800MHz - 1.2GHz P2010 / 2020  
Up to 2GB DDR3 ECC / ENP1, ENP2

**MVME8105**

QorIQ P5020  
Up to 4GB DDR3  
ECC / ENP1

*Well  
Positioned  
to Extend  
All Existing  
Products  
Lifecycle Up  
to 2025*

**MVME6700**

AltiVec

QorIQ T2081  
4 Core e6500  
ENP 1

**MVME-Samar**

T1022 / T1042  
2 / 4 Core e5500  
ENP 1

# We Have Been Securing Sufficient Critical EOL Components to Ensure Supply

## Longevity

- As We Promised to Our Customers, We Have Finalized a LTB Purchase Agreement to Secure More than Sufficient Stock of **Tsi148 VME to PCI-X Bridge** and **Marvell System Controller Chip** for the Next **10 Years**
- We Have Also Been Investing Heavily in Securing Other Critical EOL Components Which Enable Us to Effectively Minimize Impact on Customers by Avoiding Major Hardware and Software Changes on Our Existing Products

**Artesyn is Determined When It Comes to Investment in Last Time Buy of Critical EOL Components. We Have Been Actively Implementing the Plan to Grow Our VME Business and Ensure Supply Longevity Up to 2025**



# Critical EOL Component Purchase

#	Related Products	Concerned EOL Component	Status
1	MVME5500	Gigabit Ethernet Controller	Complete
2	MVME7100	PCI-E Switch	Complete
3	MVME4100	SODIMM	Complete
4	All Except MVME5100/5500	Commercial Grade Tsi148 VME Bridge	Complete
5	All Except MVME5100/5500	Industrial Grade Tsi148 VME Bridge	Complete
6	MVME3100 MVME4100 MVME6100	PCI-X Bridge	Complete
7	MVME3100 MVME4100	Clock Generator	Complete
8	MVME5500	System Controller	Complete
9	MVME6100	System Controller	Complete



# How We are Doing Differently

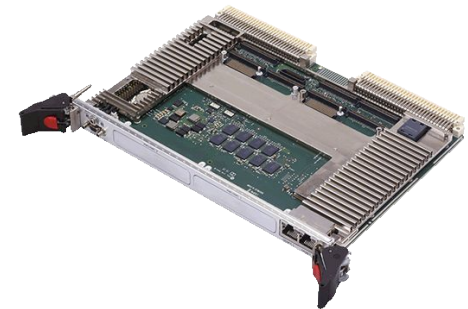
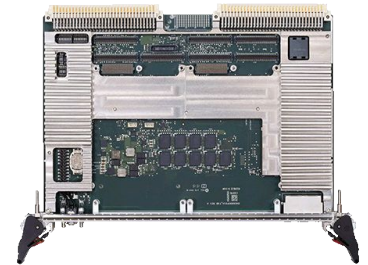
- We are Determined to Continue Our VME Business Beyond 2020
- We are Having Executive Management's Support to Commit to Supply Longevity Our Customers Desire
- We are Investing Significantly in Securing Critical EOL Components Such as Tsi148 VME Bridge Chip
- We Have an Strong Power Architecture SBC Portfolio to Provide Customers with Migration Flexibility
- We are Investing in Legacy OS Support to Meet Customers Special Requirements
- We are Flexible on Customization and Pricing



# MVME8105 Product Update



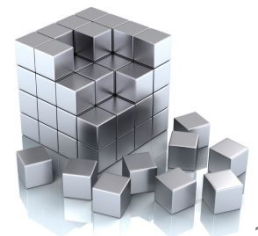
- Artesyn Just Released a New VME Board – MVME8105-01E
- Compared to Other Variants of MVME8100 Series, MVME8105 is Designed to Match the Highest Computing Power with a Reduction of VXS Interface. It Provides Two Gigabit Ethernet Ports on the Front Panel for Applications Requiring Higher Ethernet Connection Capacities
- Product Specifications
  - Freescale QorIQ P5020 Dual-Core 2.0GHz Processor
  - 4GB DDR3-1333 MHz ECC Memory Soldered Down
  - 512KB MRAM
  - 2 PMC/XMC Sites
  - Embedded NAND Flash (8GB eMMC)
  - Up to 2 USB 2.0 Ports
  - Up to 3 Ethernet Ports
  - Up to 5 Serial Ports
  - Power Requirement: 38W Idle, 42W Typical, 54W Max



**Cost Effective Solution for High Performance**

# We Continue to Work on Strategic New Product Development Aiming to Stay Relevant in the Long Run with VME

- **Market** While Targeting to Extend Lifecycles of All Existing Product Lines (Except MVME51X0) Up to 2025, We Continue to Evaluate New Product Development that Fits Our VME Product Portfolio by Enhancing Tiered Product Strategy
- We Have Been Actively Researching On Alternative, Technically and Commercially Viable VME Bridge Solutions for New Development
- Our Goal is to Enable Our Customers to Continue Their Current Deployment Plans with a Smooth Migration to Our Next Generation Products



# Artesyn is Striving to Enhance Our Already-Leading VME Market Position

- We Have a Stellar Track Record with All Major Popular VME Product Families Serving Our Customers for More Than 10 Years, Some Longer than 15 Years
- Leading Lifecycle and Extensive Portfolio Enables Us to Respond to Longevity of Supply and EOL/Obsolescence Issues Better than Other Vendors
- We Believe Transparent and Sufficient Communication Through All Possible Channels Can Ensure Mutual Success between Customers and Artesyn

**SUPPORT**





# MVME51X0 Migration Guidance and Support

# MVME51X0/5500/250X Comparison (1)

Feature / Attribute	MVME5100 / MVME5110	MVME5500	MVME2500-ENP1 / ENP2	MVM2502-ENP1 / ENP2
CPU : Speed	MPC750@450Mhz / MPC7410@4/500Mhz	MPC7457@1Ghz	P2010@800MHz / P2020@1Ghz	P2020@1.2Ghz / P2020@1Ghz
Performance	824 / 917 DMIPS	2300 DMIPS	1920/2400 DMIPS	2880/2400 DMIPS
L1 / L2 / L3	L2: 1MB / 2MB	L2: 256KB L3: 2MB	L2: 512KB	L2: 512KB
DRAM Type / down+mezz : Speed	ECC / .5GB + .5/1GB @ 100Mhz	ECC / .5GB + .5GB @133Mhz	ECC:DDR3 1GB / 2GB @400Mhz	ECC:DDR3 2GB @400Mhz
Core (ISA) / AltiVec	750:G3 32bPPC/ No 7410:G4 32bPPC / Yes	G4 32bPPC / Yes	1x or 2x e500v2 32b BookE / No	2x e500v2 32b BookE / No
Power (typical / est. max) - No [I]PMCs	5100: 14W / 19W 5110: 17.5W / 23.5 (450/500Mhz@512MB)	33.5W / 40W (1Ghz @ 512MB)	14.8W / 18.5W	21W / 29W
			16.6W / 24W	16.6W / 23.3W
Bootloader	PPCbug	MOTLoad	Uboot	Uboot
OS Support	VxWorks 5.5.1, 6.1-6.8, Linux 2.4.25, 2.6.25, LynxOS 3.11, 4.0	VxWorks 5.5.1, 6.1/2/3/6/7/8, Linux 2.4.25, 2.6.14/20, LynxOS 4.2	VxWorks 6.8 (UP/AMP), Fedora 13	VxWorks 6.8 (UP/AMP), Fedora 13

# MVME51X0/5500/250X Comparison (2)

Feature / Attribute	MVME5100 / MVME5110	MVME5500	MVME2500 ECC	MVM2502 ENP1 / ENP2
IPMC Support	IPMC712/761	IPMC712/761	N/A	N/A
PMC Support	(2) PCI 33Mhz, 32/64-bit, 5V only	(2) PCI 33/66, 32/64-bit, 5/3.3V key (mixed ok)	(1) PCI/X 33/66/100/133Mhz, 32/64-bit, <b>3.3V only</b>	(2) PCI/X 33/66/100/133Mhz, 32/64-bit, <b>3.3V only</b>
XMC Support	N/A	N/A	(1) PCIe 1.0a (x2)	(2) PCIe 1.0a (x2)
P2 Pin-out	PMC1/2: P4V2-64ac/46dz	PMC1/2: P4V2-64ac/46dz	PMC1: P4V2-64ac	PMC1: P4V2-64ac
Front Panel I/O	(2) Fast Eth RJ45 (1) COM1 RJ45 PMC 1/2 FP I/O	(1) GbE RJ45 (1) Fast Eth RJ45 (1) COM1 RJ45 PMC 1/2 FP I/O	(1/2) GbE RJ45 (1) COM1 (micro-DE9) (1) USB Type A PMC 1 FP I/O	(2) GbE RJ45 (1) COM1 (micro-DE9) (1) USB Type A PMC 1/2 FP I/O
Rear I/O	Fast Eth / PMC1 I/O, Fast Eth + IPMC1 I/O, PMC2 I/O	Fast Eth / PMC1 I/O, Fast Eth + IPMC1 I/O, PMC2 I/O	(4) RS232 <b>(1/2) GbE</b> <b>PMC1 I/O</b>	(4) RS232 <b>(1/2) GbE</b> <b>PMC1 I/O</b>
Planar I/O	COM2	COM2	N/A	N/A

# MVME51X0/5500/250X Comparison (3)

Feature / Attribute	MVME5100 / MVME5110	MVME5500	MVME2500 ECC	MVM2502 ENP1 / ENP2
IPMC I/O	712: 8/16b SCSI, parport, (3)RS232, (1)sync / async serial 761: 8b SCSI, parport, (2)RS232, (2)sync / async ser	712: 8/16b SCSI, parport, (3)RS232, (1)sync / async serial 761: 8b SCSI, parport, (2)RS232, (2)sync / async ser	N/A	N/A
VME	VME64x, Universe II	VME64x, Universe II	VME320, Tsi148	VME320, Tsi148
Flash	1MB + 16MB	8MB + 32MB	8MB + 8MB	8MB + 8MB
RTM	MVME712M / 761	MVME712M / 761	MVME721	MVME721
Storage	SCSI (IPMC)	SCSI (IPMC)	SDHC Slot SATA Drive kit	8GB eMMC SATA Drive kit
User NVRAM	4KB SRAM	32KB SRAM 8KB EEPROM	(2) 64KB EEPROM 512KB MRAM	(2) 64KB EEPROM 512KB MRAM
PMCSpan Support	Yes	Yes	No	No



# Migration from MVME51X0 to

## Migration Advantages

Feature	Benefits
1 Performance per Watt	Range of 250x variants offers >2x CPU DMIPS (1920-2440 v.s. 824-917) with about same power requirements as 51x0. >3x DMIPS possible with 20-50% power increase. With VxWorks 6.8 AMP and P2020, 2 cores available, each @ 2-3x DMIPS of 51x0.
2 Technology	Upgrade to USB, 2x GbE (front or rear), VME320 (2eSST), SATA , XMC I/O
3 Memory / Storage	Up to 2GB DRAM, 512KB MRAM, 128KB EEPROM, user-configurable SDHC or 8GB eMMC storage, SATA HDD or SSD mounting options
4 Expansion	PCI/X PMC support, XMC support (w/rear PMC I/O)

## Potential Changes

Feature	Impact
1 Instruction Set	Subset of MPC7xx/74xx. Floating point via emulation and/or libraries, using signal processing (vector) engine (SPE) instructions. No AltiVec support.
2 IPMC / RTM	Not supported. On-board I/O to rear is subset of 51x0 + IPMC [+ RTM] functionality
3 P2 pin-out	Differs from 51x0. PMC1 I/O only.
4 PMC	No PMCSpan support. Lowest power/cost 2500 supports (1) PMC; 2502 supports (2).
5 Firmware	Uboot v.s. PPCBug. Boot, SW upgrade and diagnostic procedures will change
6 OS	VxWorks 6.8 (also supported on 5xx0). 5.5.1->6.8 Porting guides/support available from Wind River. Possible support of 5.5.1 on 250x dependent on demand.
7 Application SW	Application SW making direct access to HW registers (e.g. System registers, VME bridge registers, devices w/o BSP API/driver) needs to be inspected or modified.

# Migration from MVME51X0 to

## Migration Advantages

Feature		Benefits
1	IPMC / RTMs	Supports the same 712/761 models
2	PMC / PMC Span	Supports older, 5V PMCs and same PMC Span
3	P2 Pin-Out	Same P2 pin-out; compatible with custom backplanes
4	VxWorks	Supports VxWorks 5.5.1; same APIs; BSP should hide most HW differences
5	Instruction Set Architecture	Same ISA with native IEEE HW floating point, (@ 2x clock speed). Supports AltiVec (same as 5110 [MPC7410]).
6	Cooling	Same specified cooling requirement of 400 LFM
7	VME	Same VME bridge (Universe II); behavior / programming similar or same

## Potential Changes

Feature		Impact
1	Power	Currently specified power requirements are higher; need to be verified
2	Firmware	MOTLoad vs. PPCBug. Boot, SW upgrade and diagnostic procedures will change
3	Application SW	Application SW making direct access to HW registers (e.g. System registers, devices w/o BSP API/driver) needs to be inspected or modified.

# Artesyn VxWorks 5.5.1 BSP Support on MVME250X Update

Variant	MVME2500	MVME2502
Available BSP Modes on SWORD	UP / AMP	Currently Not Available
BSP Support from	Artesyn	Artesyn
Limitations	No Support for SATA, SD, SPI Flash, or USB I/O. Limited Boot Support for These Devices	N/A
Solution to Limitations	Artesyn is Refreshing the Existing BSP to Fix the Missing Functionality. Expected to Finish in Nov/Dec 2015	Artesyn is Developing VxWork 5.5.1 BSP for MVME2502. Expected to Finish in Nov/Dec 2015
Cost to Customers	Free of Charge	Free of Charge



**ARTESYN**<sup>TM</sup>  
EMBEDDED TECHNOLOGIES