



# Ocelot Family of Ethernet Switches

December 2016

# Introducing Microsemi's New Ocelot Industrial IoT Ethernet Switch ICs



**Available NOW**

- Ocelot is a low port count, small form factor Ethernet switch family for the Industrial IoT market
- **Adds a low-cost, 4-10 port 1G / 2.5G switch family to overall portfolio**
- Top applications
  - Industrial Automation, Smart Grid, Physical Security, Process Control and Intelligent Transportation Systems



Industrial Ethernet Switch Reference Design Using VSC7514 Ocelot-10 Switch IC and IStAX Software

Part #	Name	1G* Ports	2.5G* Ports	1000BT PHYs	Interfaces			Ext temp	1588	Use Case
					SGMII	QSGMII	PCIe			
VSC7511	Ocelot-4um	4	1	4	■		■	■	**	Unmanaged
VSC7512	Ocelot-10um	10	3	4	■	■	■	■	**	Unmanaged
VSC7513	Ocelot-8	8	1	4	■	■	■	■	■	Managed
VSC7514	Ocelot-10	10	3	4	■	■	■	■	■	Managed

\* Denotes maximum ports. Shall not surpass the device's max available I/O bandwidth.

\*\* Supports Transparent Clock mode only

# Ocelot Applications

## Controlling, Powering & Securing Multiple Industrial Solutions



### Industrial Automation

- Programmable Logic Controllers
- Motor Drive Control
- I/O & Safety Modules

### **Microsemi Products:**

- Ethernet Switches & PHYs
- FPGAs, Timing/1588, PoE
- SiC MOSFETs/modules



### Smart Energy Management

- Power Conversion/EV Charging
- Power Management
- Protection Relays

### **Microsemi Products:**

- ENT Switches and PHY's
- SiC/IGBT FETs/modules
- FPGA, Timing MAC/1588



### IP Security Cameras

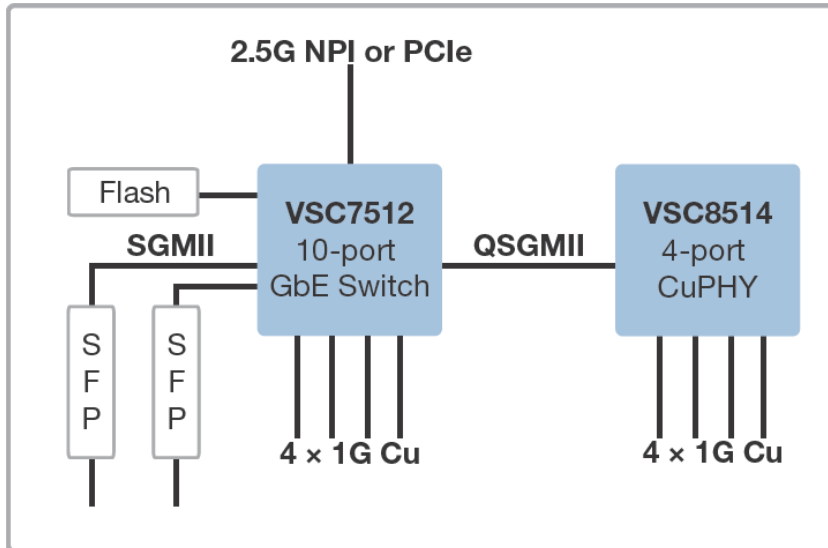
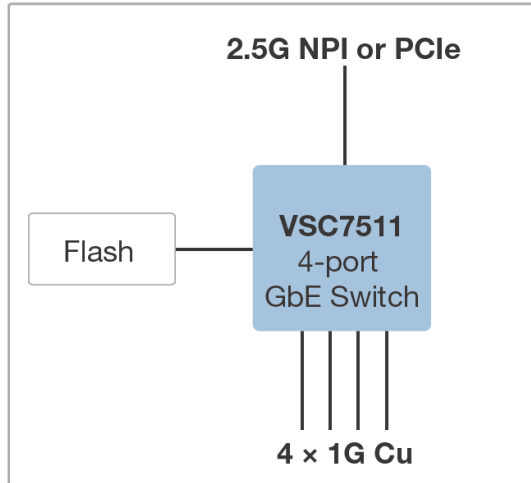
- Voice
- Video Surveillance and Storage
- Power and Connectivity

### **Microsemi Products:**

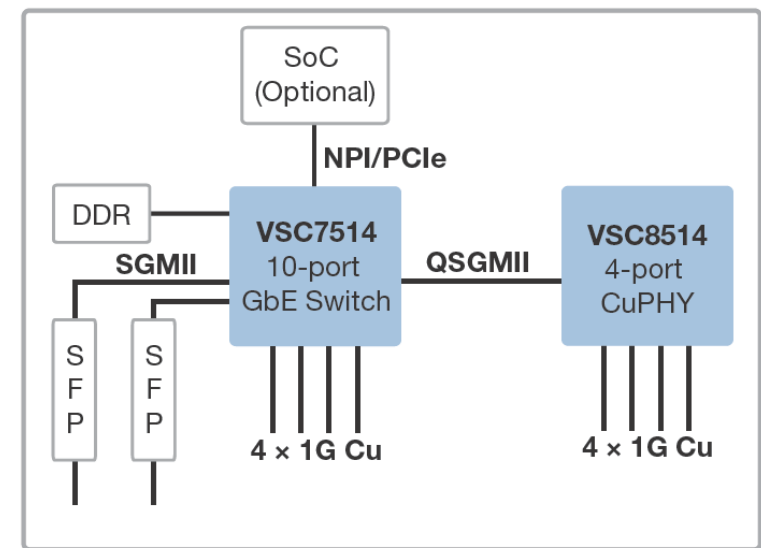
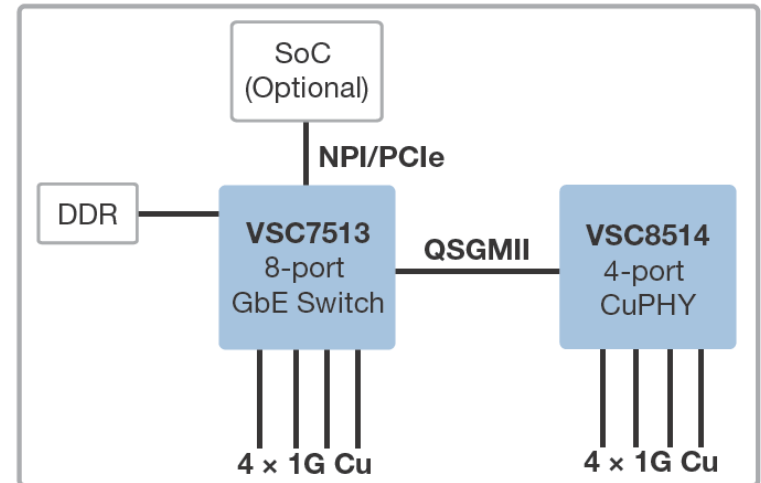
- ENT Switches and PHYs
- PoE/Midspans
- FPGA, Timing

# Ocelot System Diagrams

## Unmanaged



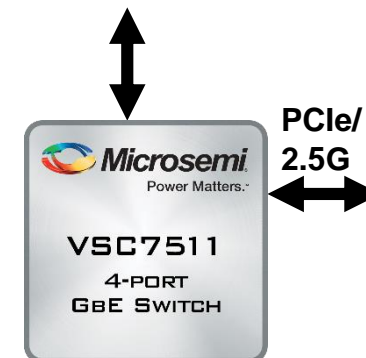
## Managed



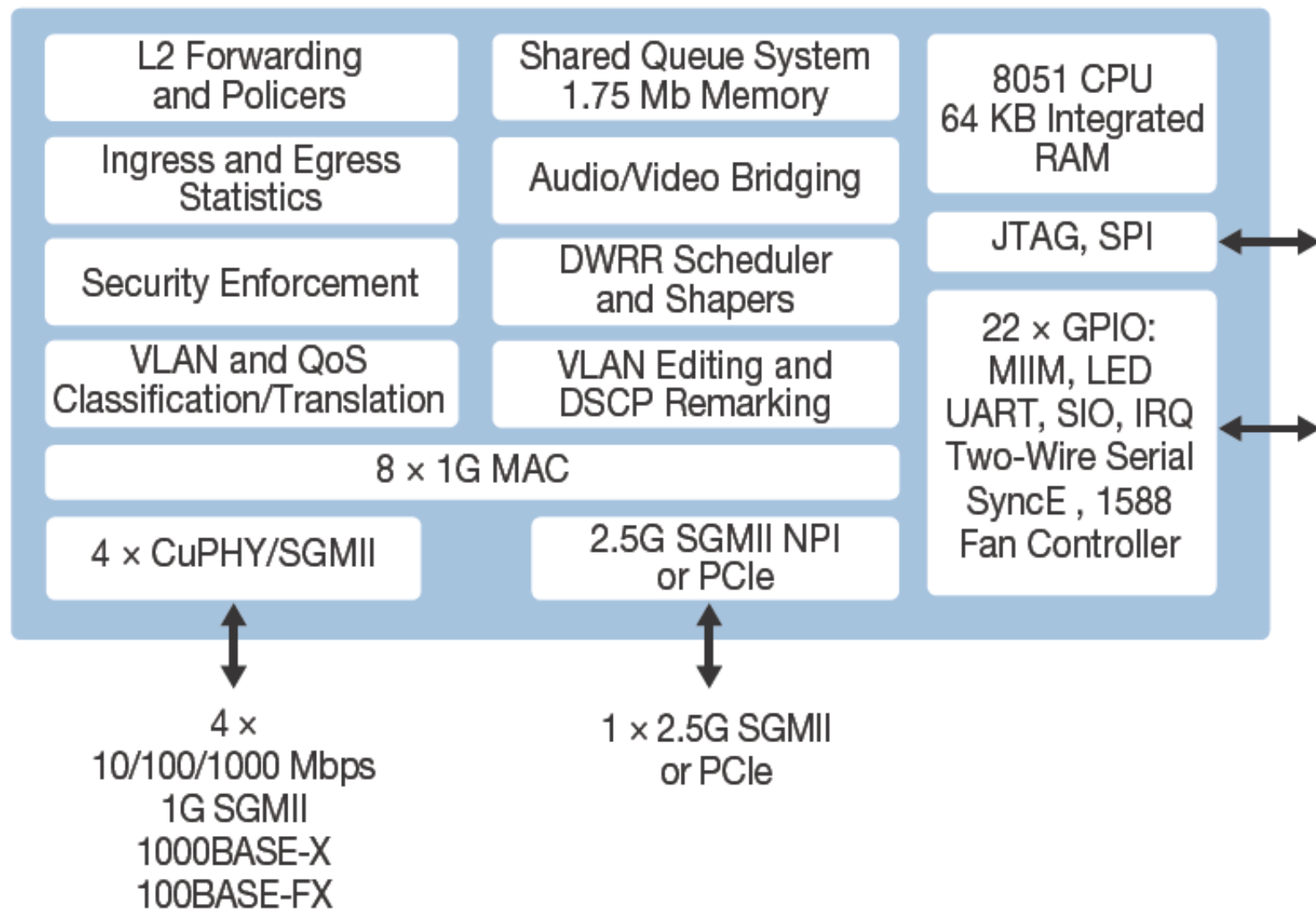
# VSC7511 Ocelot-4um Features

KEY FEATURES	DETAILS
<b>4-Port GbE Switch</b>	4 integrated 10/100/1000BASE-T PHYs 2.5G-NPI or PCIe interface for external CPU port 4K MAC addresses 4K VLANs Jumbo frame (10kB) support 64 ACL based on the largest key size
<b>Integrated TCAM</b>	64 full (IPv6) TCAM entries supporting multi-stage lookup for advanced packet classification
<b>QoS</b>	1.8 Mbits Shared Buffer memory Q-in-Q Support
<b>Power</b>	Typical 2.5W, Max 4.1W (max) Overheat Protect
<b>Package Size</b>	13mm x 13mm DRQFN
<b>Embedded Processor</b>	8051 with 64Kbyte integrated RAM

4x Cu/SGMII

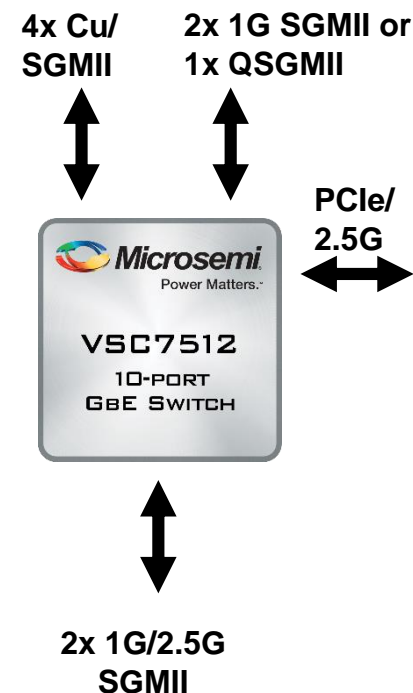


# VSC7511 Ocelot-4um Block Diagram



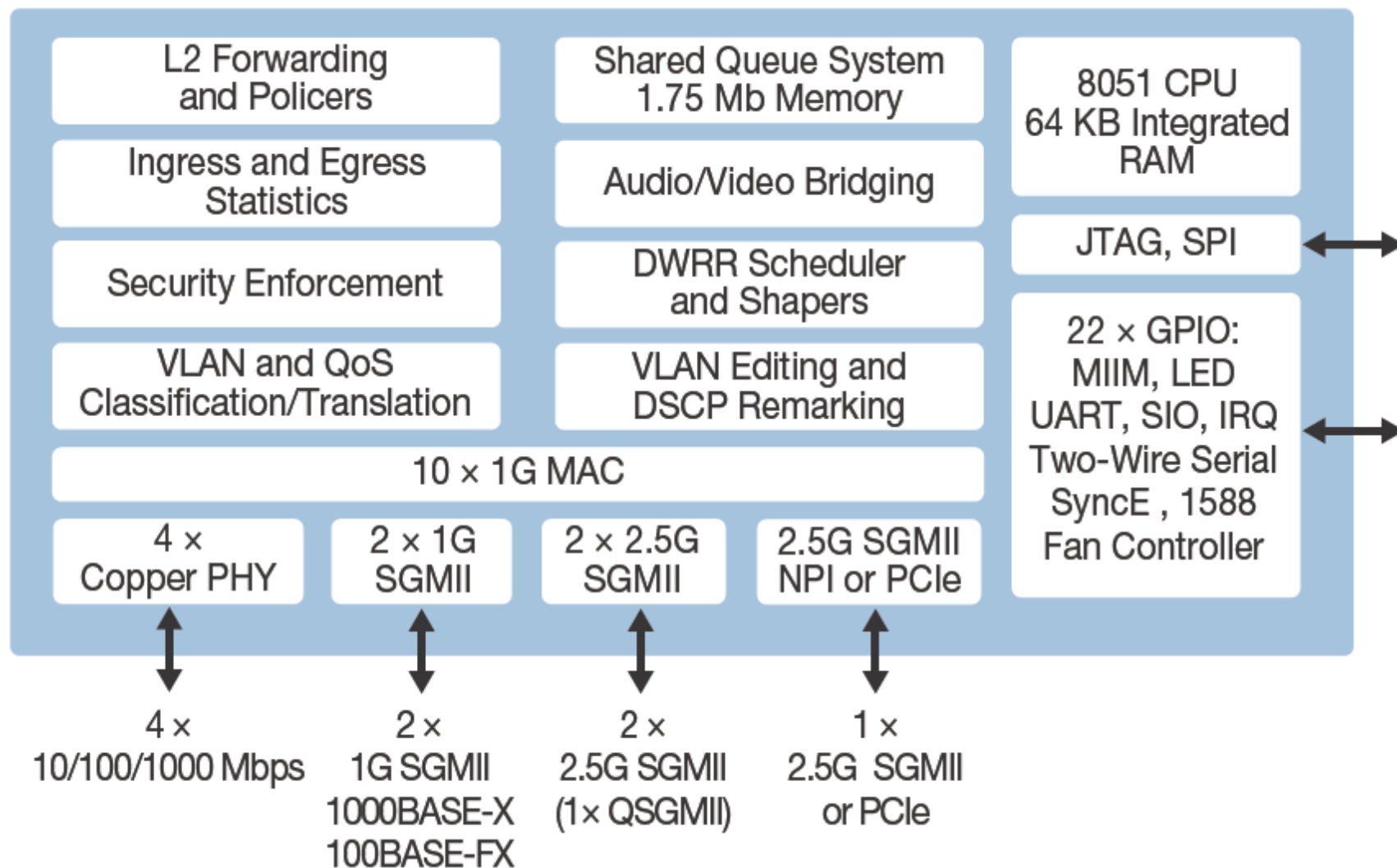
# VSC7512 Ocelot-10um Features

KEY FEATURES	DETAILS
<b>8-Port GbE Switch</b>	4 integrated 10/100/1000BASE-T PHYs 2 x 1G Q/SGMII + 2 x 1G/2.5G SGMII (+1G NPI) 2.5G-NPI or PCIe interface for external CPU port 4K MAC addresses 4K VLANs Jumbo frame (10kB) support 64 ACL based on the largest key size
<b>Integrated TCAM</b>	64 full (IPv6) TCAM entries supporting multi-stage lookup for advanced packet classification
<b>QoS</b>	1.8 Mbits Shared Buffer memory Q-in-Q Support
<b>Power</b>	Typical 2.5W, Max 4.1W Overheat Protect
<b>Package Size</b>	13mm x 13mm DRQFN
<b>Embedded Processor</b>	8051 with 64Kbyte integrated RAM





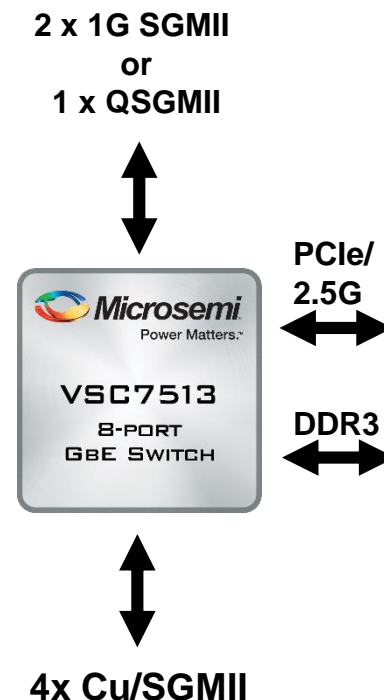
# VSC7512 Ocelot-10um Block Diagram



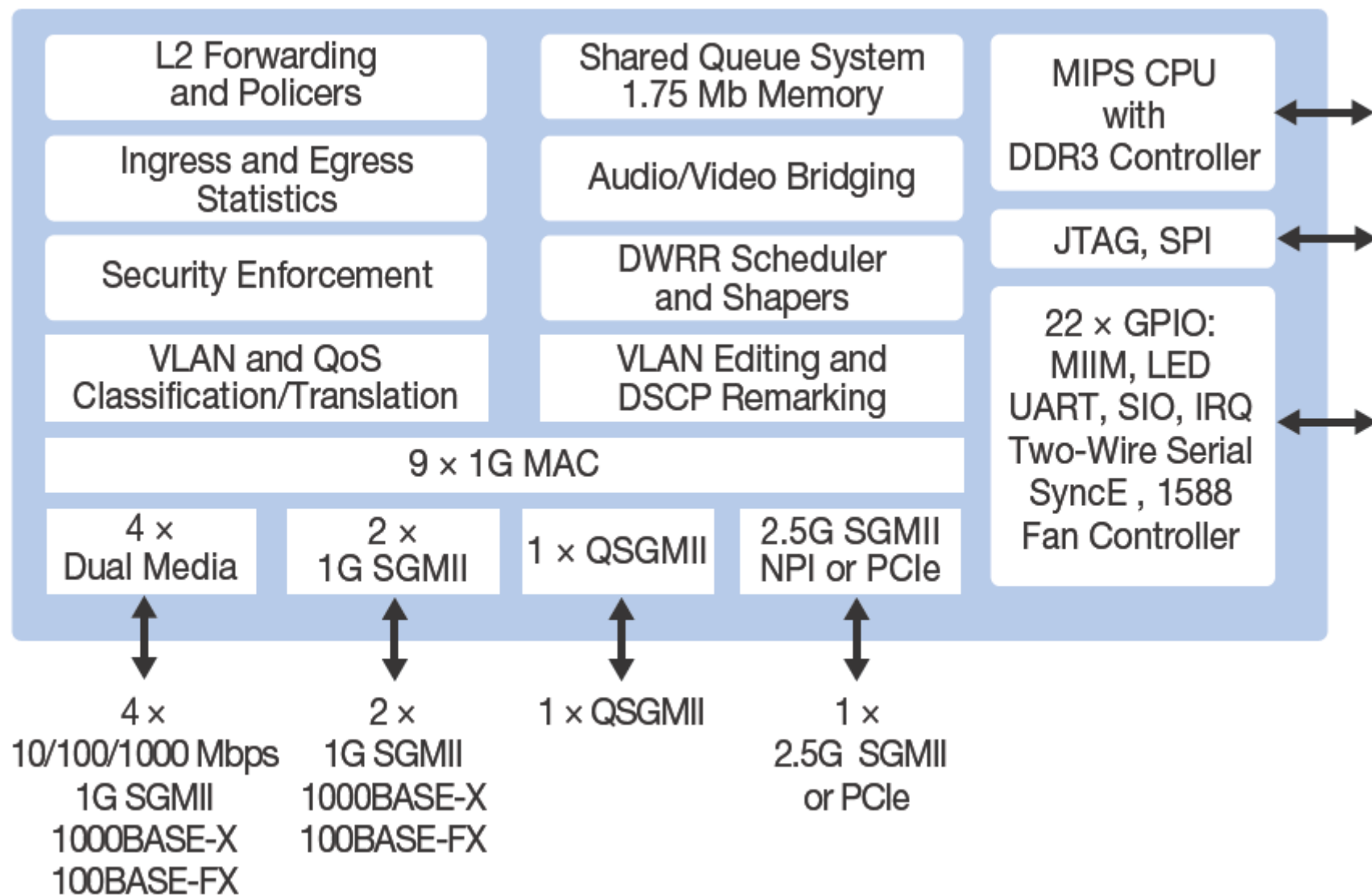


# VSC7513 Ocelot-8 Features

KEY FEATURES	DETAILS
<b>6-Port GbE Switch</b>	4 integrated dual media 10/100/1000BASE-T PHYs 2 x 1G SGMII (+1G NPI) 2.5G-NPI or PCIe interface for external CPU port 4K MAC addresses 4K VLANs Jumbo frame (10KB) support 64 ACL based on the largest key size
<b>Integrated TCAM</b>	64 full (IPv6) TCAM entries supporting multi-stage lookup for advanced packet classification
<b>Advanced QoS for Eight QoS Levels</b>	1.8 Mbits Shared Buffer memory, 1.5K queues, WRED Priority flow control
<b>Timing</b>	IEEE 802.1AS and 1588v2
<b>Power</b>	Typical 2.8W, Max 4.5W
<b>Package Size</b>	17mm x 17mm CABGA
<b>Embedded Processor</b>	500 MHz MIPS Processor

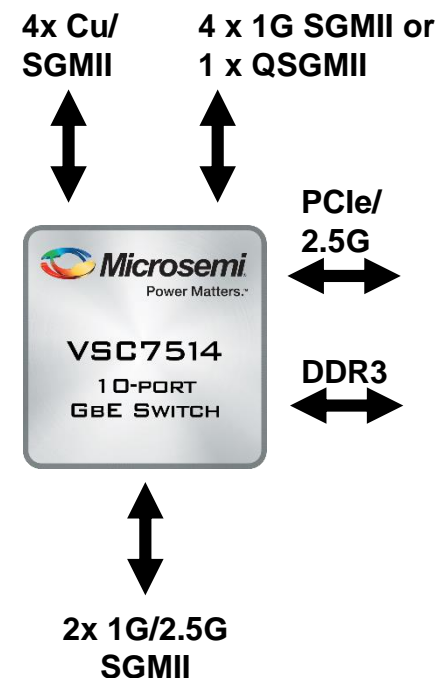


# VSC7513 Ocelot-8 Block Diagram

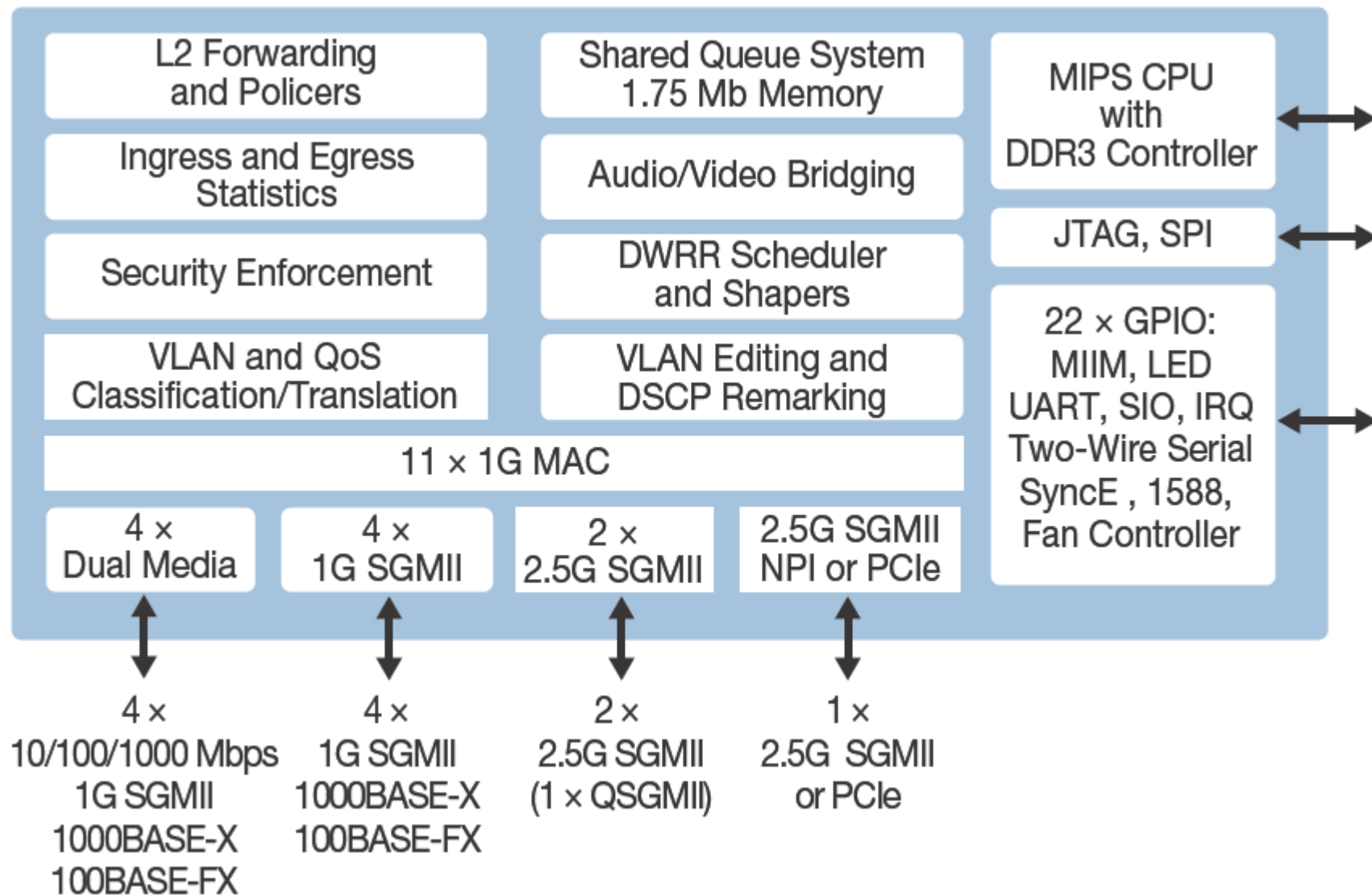


# VSC7514 Ocelot-10 Features

KEY FEATURES	DETAILS
<b>10-Port GbE Switch</b>	4 integrated dual media 10/100/1000BASE-T PHYs 4 x 1G Q/SGMII + 2 x 1G/2.5G SGMII (+1G NPI) 2.5G-NPI or PCIe interface for external CPU port 4K MAC addresses 4K VLANs Jumbo frame (10KB) support 64 ACL based on the largest key size
<b>Integrated TCAM</b>	64 full (IPv6) TCAM entries supporting multi-stage lookup for advanced packet classification
<b>Advanced QoS for Eight QoS Levels</b>	1.8 Mbits Shared Buffer memory, 1.5K queues, WRED Priority flow control
<b>Timing</b>	IEEE 802.1AS and 1588v2
<b>Power</b>	Typical 2.8W, Max 4.5W
<b>Package Size</b>	17mm x 17mm CABGA
<b>Embedded Processor</b>	500 MHz MIPS Processor



# VSC7514 Ocelot-10 Block Diagram



# Microsemi's New Ocelot Ethernet Switches: Key Differentiation

## ■ **Optimized for Industrial markets**

- Port counts and interfaces (4-10 ports, SGMII, QSGMII, PCIe)
- Managed and unmanaged
- Up to three 2.5GE SGMII ports
- Dual media support (copper and fiber) with integrated PHYs
- Industry-specific features (including 1588 and remote monitoring)
- G.8032 Ethernet Ring Protection Switching (redundancy)
- Low power (<3W)
- Cable diagnostics (VeriPHY) while carrying active traffic
- Industrial temp range

## ■ **Commitment to Industrial Software Roadmap**

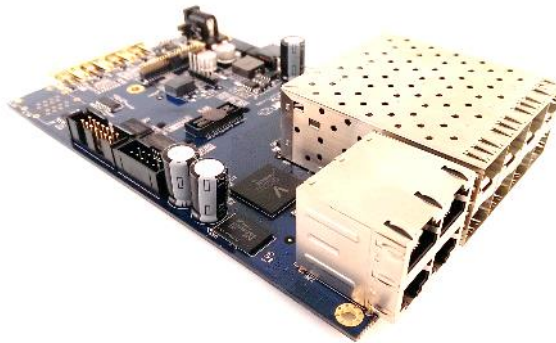
- IStaX package targeted specifically for Industrial applications
  - Minimizes time to market
  - Easy set up and management with a simple GUI and customizable look/feel

# Microsemi's New Ocelot Ethernet Switches: Documentation and Reference Designs

- **Datasheets and product briefs** are available on the Microsemi web site NOW
  - Register and sign-in at <https://ethernet.microsemi.com/signin>
- **Three reference designs** are available



**VSC5634EV - Unmanaged**



**VSC7514EV - Managed**



**VSC5635EV - Industrial**

# Ocelot Reference Designs: VSC5634EV – Unmanaged

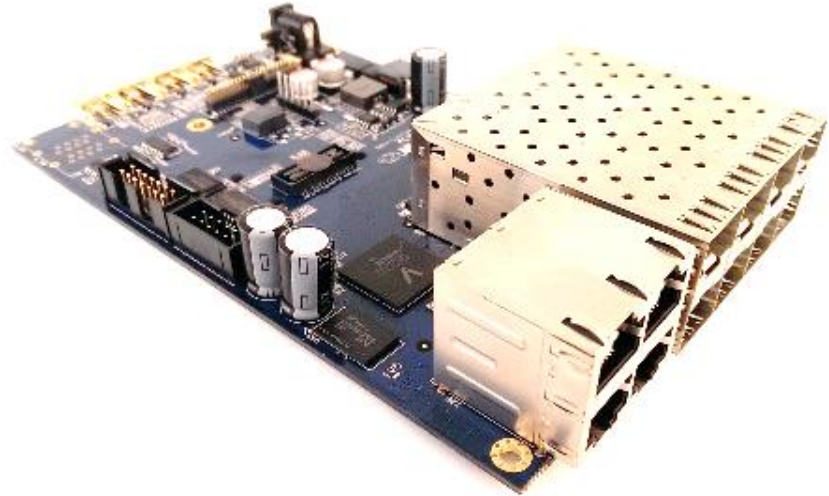
- 8 x 10/100/1000BASE-T + 2 x SFP + Management port (10/100/1000BT)
  - Microsemi devices:
    - 1x VSC7512
    - 1x VSC8514
  - Interfaces:
    - 8x RJ45
    - 2x SFP
  - Optional add-on Port
    - 1x VSC8221 (Cu PHY)





# Ocelot Reference Designs: VSC7514EV – Managed

- 4 x 10/100/1000BASE-T + 8 x SFP (two of these for dual media) + Management port (10/100/1000BT)
  - Microsemi devices:
    - 1x VSC7514
  - Interfaces:
    - 4x RJ45
    - 8x SFP
    - PTP
    - SyncE
    - PoE
  - Optional add-on Port
    - 1x VSC8221 (Cu PHY)



# Ocelot Reference Designs: VSC5635EV – Industrial

- Turn-key design for Industrial applications
  - Mounted in DIN rail chassis
  - 8 x 10/100/1000BASE-T + 2 x SFP (1G/2.5G)
  - PoE+ support on all Cu ports
  - Redundant 56V PSUs
  - Microsemi devices:
    - 1x VSC7514
    - 1x VSC8584
  - Interfaces:
    - 8x RJ45
    - 2x SFP
    - PoE



# The Microsemi Advantage

## A Complete Industrial Ethernet Networking Solution

- Integrated Circuits
  - Ethernet Switches, PHYs, Timing PLLs and Oscillators, FPGAs, PoE Controllers and Line Drivers
- Software
  - IStaX, 1588 Timing
- IP
  - FGPA/SoC IP
- Systems
  - PoE Midspans, 1588 Grandmaster Clocks
- Ecosystem Partners
  - Nine Ways, Veracity

A Complete Solution Focusing on  
**Power optimization ▪ Flexibility ▪ Reliability ▪  
Security ▪ Interoperability ▪ Determinism**

# Ethernet Switch/NPU Family

*caracal* *serval* *LYNX* *JAGUAR*  
Ocelot SparX E-StaX WinPath

More details at: <http://www.microsemi.com/products/ethernet-solutions/ethernet-switches>

  Fully Managed Switch

  Un-/Lightly Managed Switch

  NPU

Part #	Name	I/O BW (Gbps)	1G*** Ports	2.5G*** Ports	10G*** Ports	Integrated PHYs 10G SFP+ 1000BT	SGMII	RGMII	QSGMII	XAUI	SFI/XFI	PCIe	Ext temp	SyncE	1588	Internal Shared Memory	L3 Routing	Stacking	Carrier Ethernet
VSC7468	Jaguar-2	80	52	24	4	4	■		■	■	■	■	■	■	■	32 Mbits	■		■
VSC7464	LynX-2	52	26	16	4	4	■		■	■	■	■	■	■	■	32 Mbits	■		■
VSC7460	Jaguar-1	68	31	10	4		■			■			■	■	■	32 Mbits	■		■
VSC7462	LynX-1	52	20	10	4		■			■			■	■	■	32 Mbits	■		■
VSC7438	Serval-2	32	14	12	2	2	■		■	■	■	■	■	■	■	16 Mbits	■		■
VSC7429	Caracal-2	29	26	2			12	■		■			■	■	■	4 Mbits	■		■
VSC7428	Caracal-1	13	11	2			8	■					■	■	■	4 Mbits	■		■
VSC7418	Serval-1	13	11	2				■				■	■	■	■	8 Mbits	■		■
VSC7436	Serval2-Lite	34	10	6	2	2	2	■			■	■	■	■	■	8 Mbits	■		■
VSC7423	Caracal-Lite	9	7	2			5	■					■	■	■	4 Mbits	■		■
VSC7416	Serval-Lite	9	6	2				■					■	■	■	8 Mbits	■		■
WP3-SPO	WP3 SuperLite	2	6	3				■	■			■	■	■	■	0.75 MB + 1x DDR3	■		■
WP3SL	WP3 SuperLite	4	6	3				■	■			■	■	■	■	0.75 MB + 2x DDR3	■		■
WP3	WinPath3	10	16	6	2			■	■	■		■	■	■	■	2.5 MB + 3x DDR3	■		■
WP4	WinPath4	40	24	12	4			■	■	■	■	■	■	■	■	8.5 MB + 7x DDR3	■		■
VSC7434	E-StaX-III-68	68	29	4	4		■			■						32 Mbits	■	■	
VSC7432	E-StaX-III-48	48	27	2	2		■			■						16 Mbits	■	■	
VSC7431	E-StaX-III-28	48	28				■									16 Mbits	■	■	
VSC7449	SparX-IV-90	90	52	24	4	4	■			■ R	■	■	■	■	■	32 Mbits	■		
VSC7448	SparX-IV-80	80	52	24	4	4	■			■ R	■	■	■	■	■	32 Mbits	■		
VSC7442	SparX-IV-52	52	52				■		■			■	■	■	■	16 Mbits	■		
VSC7444	SparX-IV-44	44	26	16	2	2	■		■	■ R	■	■	■	■	■	16 Mbits	■		
VSC7440	SparX-IV-34	34	10	6	2	2	2	■				■	■	■	■	8 Mbits	■		
VSC7427	SparX-III-26	26	26				12	■		■						4 Mbits			
VSC7422	SparX-III-25um	26.5	25	1			12	■		■				■		4 Mbits			
VSC7426	SparX-III-24	24	24				12			■						4 Mbits			
VSC7425	SparX-III-18	18	18				12	■		■						4 Mbits			
VSC7421	SparX-III-17um	19	17	2			12	■					■			4 Mbits			
VSC7414	SparX-III-11	13	11	2				■				■	■	■	■	8 Mbits			
VSC7424	SparX-III-10	10	10				8	■								4 Mbits			
VSC7420	SparX-III-10um	13	10	2			8	■						■		4 Mbits			
VSC7511	Ocelot-4um	6.4	4				4	■				■	■			1.75 Mbits			
VSC7512	Ocelot-10um	12.5	10	2			4	■		■		■	■			1.75 Mbits			
VSC7513	Ocelot-8	8	8				4	■		■		■	■		■	1.75 Mbits			
VSC7514	Ocelot-10	13	10	2			4	■		■		■	■		■	1.75 Mbits			

NOTES: R = RXAUI / XAUI

\*\*\* = (1) These are MAX ports excluding the NPI port (VSC742X NPI port included),

(2) MAX 1G / 2.5G / 10G are not supported at the same time and shall not surpass the max available I/O bandwidth

(3) 1G integrated ports support dual media Copper or Fiber applications

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