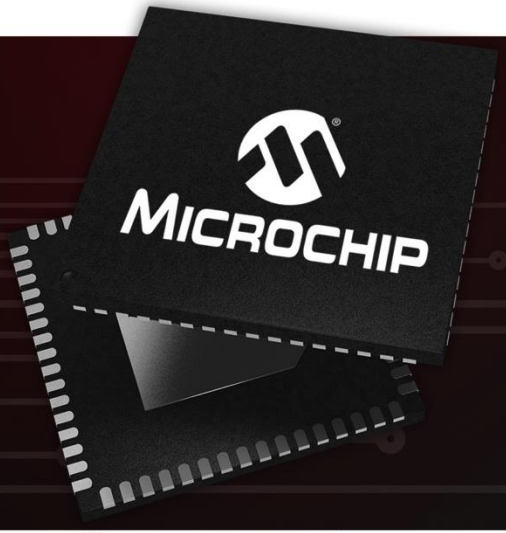
MICROCHIP



A Leading Provider of Microcontroller, Security, Mixed-Signal, Analog & Flash-IP Solutions




Microchip Gigabit Ethernet Solutions

Presenter: Brandon Kim, Embedded Solutions Engineer

Our Mission

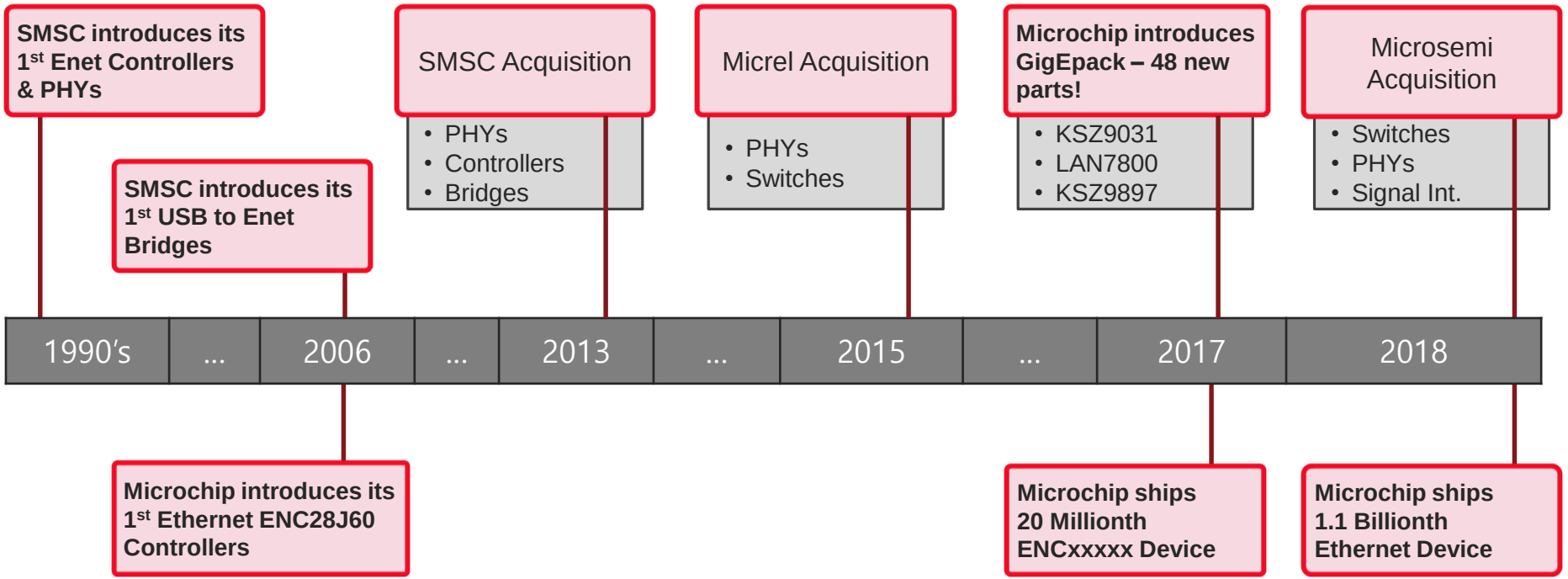
Make Ethernet Accessible to All

- **Broad Portfolio of Solutions**
- **Compliance Tested**
- **Comprehensive Software & Drivers**
- **Copy Ready Application Examples**
- **LANCheck® Online Review**

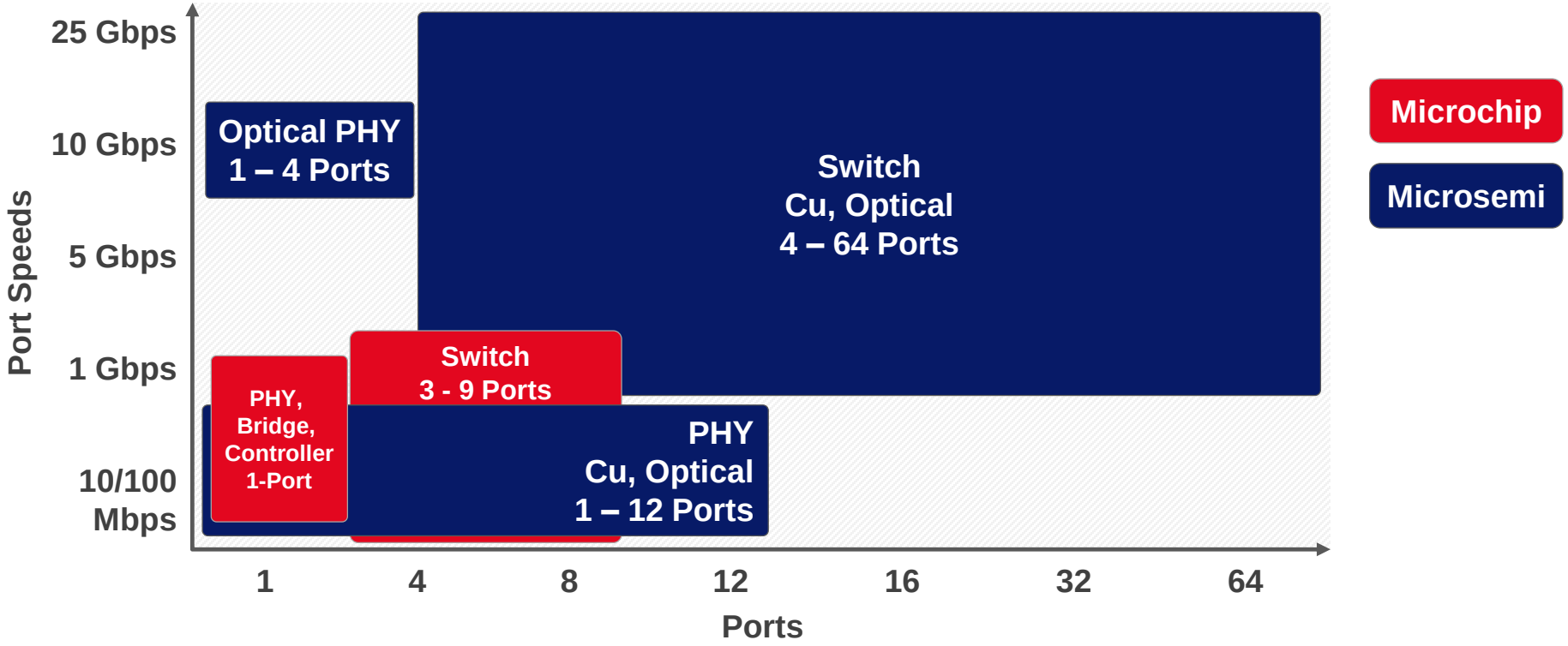
Focus on Robustness

- **Designed for Industrial and Automotive Applications**
  - AEC-Q100 Qualified Solutions
  - Extended Temperature Ranges (up to 105ºC)
- **Advanced Technology Solutions**
  - AVB, TSN, MACsec
  - Advanced Cable Diagnostics, Signal Quality Indicator

Our Heritage

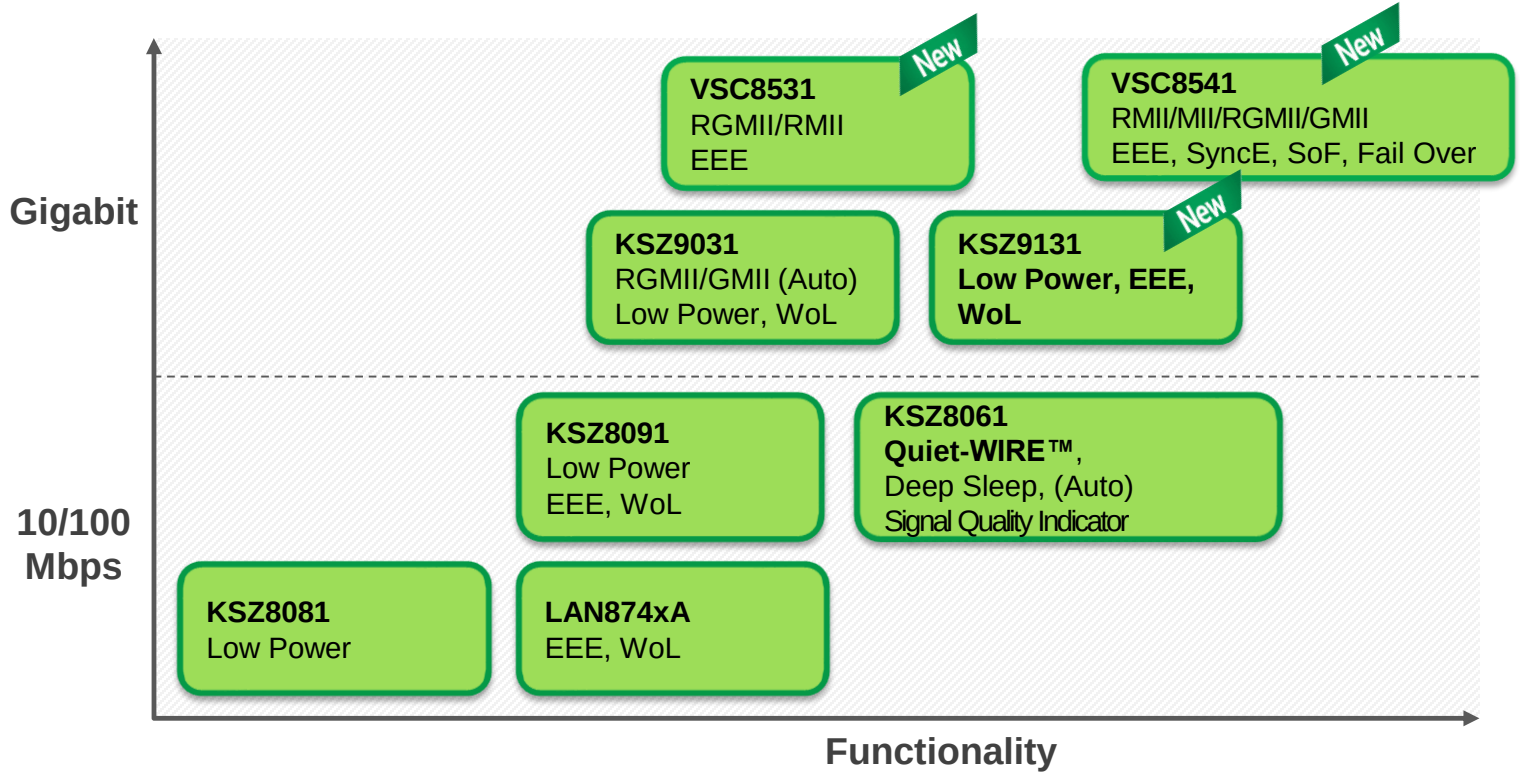


Microchip / Microsemi Ethernet



ETHERNET PHY

Single-Port PHY Roadmap



Single-Port PHY Portfolio

Product	KSZ8081	KSZ8091	LAN8742A	LAN8740A	KSZ8061	KSZ9031	KSZ9131	VSC8541
Bandwidth	10Base-T/100Base-TX					10/100/1000Base-T		
Interface	MII/RMII		RMII	MII/RMII		MII/RGMII/GMII	RGMII/RMII	GMII/MII/RMII/RGMII
Power	155mw (typical)	155mw (typical)	163mW (typical)	180mW (typical)	168mW (typical)	621mW (typical)	410mW (typical)	644mW (typical)
Temp Range	-40 to 85C	-40 to 85C	-40 to 85C	-40 to 85C	-40 to 85C	-40 to 105C	-40 to 105C	-40 to 125C*
Wake-on-LAN	No	Yes	Yes	Yes	No	Yes	Yes	Yes
EEE	No	Yes*See Errata	No	Yes	No	No	Yes	Yes
1588v2	No	No	No	No	No	No	No	Yes
Cable Diags	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Packages	24/32 VQFN, 48/LQFP	24/32 VQFN, 48/LQFP	24/QFN	32 VQFN	32 QFN/WQFN	48 QFN/VQFN, 64 QFN	48 QFN/VQFN, 64 QFN	68-QFN
MAC I/O Voltage	1.8 - 3.3V	1.8 - 3.3V	1.8 - 3.3V	1.8 - 3.3V	1.8 - 3.3V	1.8 - 3.3V	1.8 - 3.3V	1.5-3.3V
Cable Reach	120m	120m	150m	150m	160m	10/100 – 150m	10/100 – 150m	160-200m
						GigE – 120m	GigE – 130m	
10k Pricing	$0.64	$0.75	$0.86	$0.93	$1.16	$1.76	$1.77	$1.91
Voltage Regulator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Special Features	AEC-Q100 available	AEC-Q100 available	AEC-Q100 available	AEC-Q100 available	AEC-Q100 available	AEC-Q100 available	EEE, Lower Power	SyncE, SOF, Alpha Pkg

FE/GE PHY Portfolio

SimpliPHY / SynchroPHY

Ports	Base Part Number	Copper	Fiber	RGMII (2.5V & 3.3V) + *(1.5V & 1.8V)	GMII	SGMII	QSGMII	SFP Pkg	VeriTime™ (IEEE-1588v2), SyncE &or SOF	Intellisec™ (MACsec)	Eco-Ethernet	RoHS6	I-temp (p/n ext)
Single	VSC8221	■				■		■			1	■	
	VSC8211	■	■	■	■ / MII	■					1	■	
	VSC8501	■		■	■ / MII				SyncE		2	■	-3
	VSC8541-01	■		■ / RMII*	■ / MII			■	SyncE & SOF***		2	■	-4
	VSC8531-01	■		■ / RMII*	■			■			2	■	-4
	VSC8540**	■		■ / RMII*					SyncE & SOF***		2	■	-04 only
	VSC8530**	■		■ / RMII*							2	■	-04 only
Dual	VSC8662	■	■			■			SyncE		1	■	-03 (ext.)
	VSC8502	■		■	■				SyncE		2	■	-3
	VSC8552-01	■	■	■		■	■ (1/2)		SyncE		2	■	-4
	VSC8572-01	■	■	■		■	■ (1/2)		VeriTime (10ns) & SyncE		2	■	-4
	VSC8562-11	■	■			■	■ (1/2)		SyncE	128 / 256-bit	2	■	-14
	VSC8582-11	■	■			■	■ (1/2)		VeriTime (4ns) & SyncE	128 / 256-bit	2	■	-14

*** VSC8540 and VSC8530 are FE PHYs. Only available in industrial temp offering*

**** VSC8541 and VSC8540 when in RGMII or RMII modes can support Start-of-Frame outputs, which are targeted to achieve < 1ns 1588 PTP at a system level*

FE/GE PHY Portfolio

SimpliPHY / SynchroPHY

Ports	Base Part Number	Copper	Fiber	RGMII (2.5V & 3.3V) + *(1.5V & 1.8V)	GMII	SGMII	QSGMII	SFP Pkg	VeriTime™ (IEEE-1588v2), SyncE &or SOF	Intellisec™ (MACsec)	Eco-Ethernet	RoHS6	I-temp (p/n ext)
Quad	VSC8244	■		■ + HSTL							1	■	
	VSC8224	■	■	■ + HSTL							1	■	
	VSC8664	■	■			■			SyncE		1	■	-03 (ext.)
	VSC8514*	■					■		SyncE*		2	■	-3
	VSC8504-01	■	■			■	■		SyncE		2	■	-4
	VSC8574-01	■	■			■	■		VeriTime (10ns) & SyncE		2	■	-4
	VSC8575-11	■	■			■	■		VeriTime (4ns) & SyncE		2	■	-14
	VSC8564-11	■	■			■	■		SyncE	128 / 256-bit	2	■	-14
	VSC8584-11	■	■			■	■		VeriTime (4ns) & SyncE	128 / 256-bit	2	■	-14
8	VSC8658	■	■			■					1	■	
12	VSC8512-02	■	■			■	■		SyncE		2	■	-3
	VSC8522-02	■					■		SyncE		2	■	-3

**VSC8514XMK-11 and -14 are also available in lower cost points due to lack of SyncE*

10G PHY Portfolio

SynchroPHY

	Ports	Part #	XGMII	XAUI	RXAUI	XFI	SFI	SFI-4	SyncE	IEEE1588	MACsec	SONET /SDH
10G Ethernet LANWAN PHY	Single	VSC8486-11	■	■		■	3dB only		■			
		VSC8489-15		■	■	■	■		■			
		VSC8491-11		■	■	■	■		■	<4ns	128 / 256-bit	
		VSC8491-14		■	■	■	■		■	<4ns	128 / 256-bit	
	Dual	VSC8489-01		■	■	■	■		■			
		VSC8489-11		■	■	■	■		■	<4ns		
		VSC8489-14		■	■	■	■		■	<4ns		
		VSC8490-11		■	■	■	■		■	<4ns	128 / 256-bit	
		VSC8490-14		■	■	■	■		■	<4ns	128 / 256-bit	
	Quad	VSC8257				■	■		■	<4ns		
		VSC8258				■	■		■	<4ns	128 / 256-bit	

***Note**: These 10G PHYs address fiber and backplane applications. They are not suitable for use in 10GBASE-T twisted-pair copper cabling (i.e. CAT 5/6) applications.*

10G PHY Portfolio

SynchroPHY

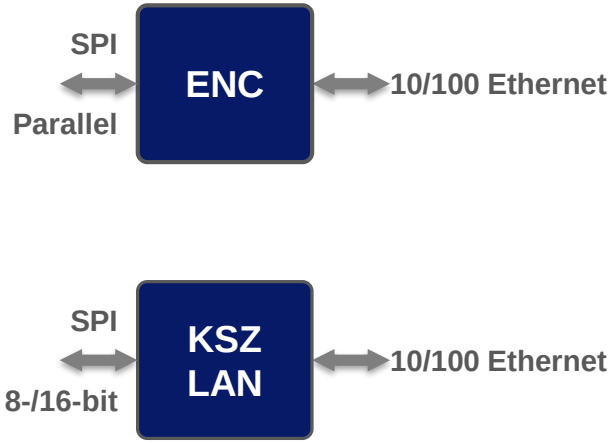
	Ports	Part #	XGMII	XAUI	RXAUI	XFI	SFI	SFI-4	SyncE	IEEE1588	MACsec	SONET /SDH
10G OTN PHY	Dual	VSC8492-12		■	■	■	■		■	<10ns		
		VSC8492-13		■	■	■	■		■	<10ns		■
	Quad	VSC8494-12		■	■	■	■		■	<10ns		
		VSC8494-13		■	■	■	■		■	<10ns		■
10G PON PHY	Single	VSC8479				■		■		■		■

***Note**: These 10G PHYs address fiber and backplane applications. They are not suitable for use in 10GBASE-T twisted-pair copper cabling (i.e. CAT 5/6) applications.*

ETHERNET CONTROLLER/BRIDGE

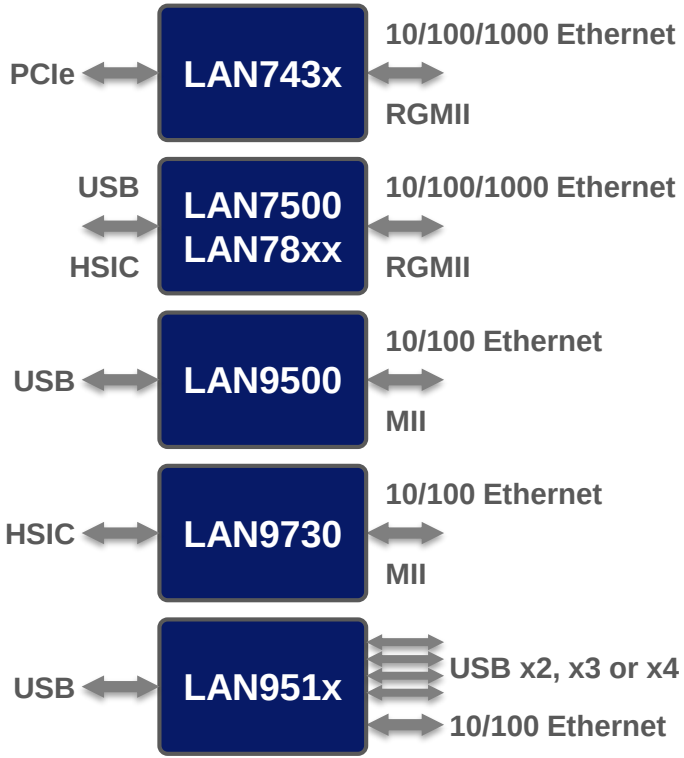
Ethernet Controller Overview

- **Connecting to Hosts without MAC**
  - Via 8-/16-bit, UART, SPI, QSPI interfaces
  - Featuring IEEE1588v2, EEE, WoL, Dual Port options
  - Output to 10/100 Mbps

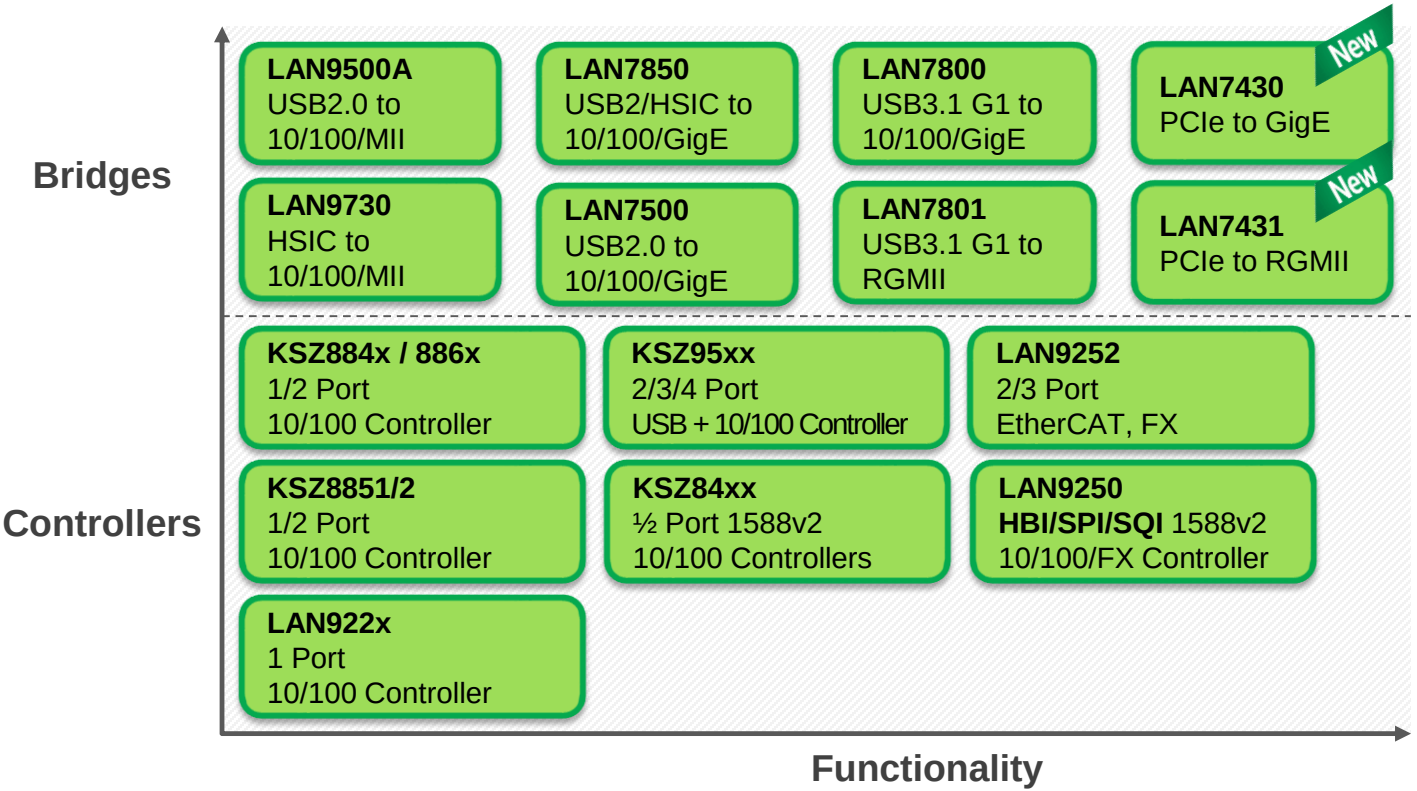


Ethernet Bridge Overview

- **Connecting to Hosts without MAC**
  - A single USB connection for both USB hub Ethernet (100/100/1000) connectivity
  - PCIe®, USB3.1 Gen1, USB2.0, HSIC input options
  - RGMII/MII output options
  - UniClock™ Technology uses single 25 MHz crystal for USB and Ethernet
  - Full EEPROM-less support
  - Option for 2, 3 or 4 USB downstream ports

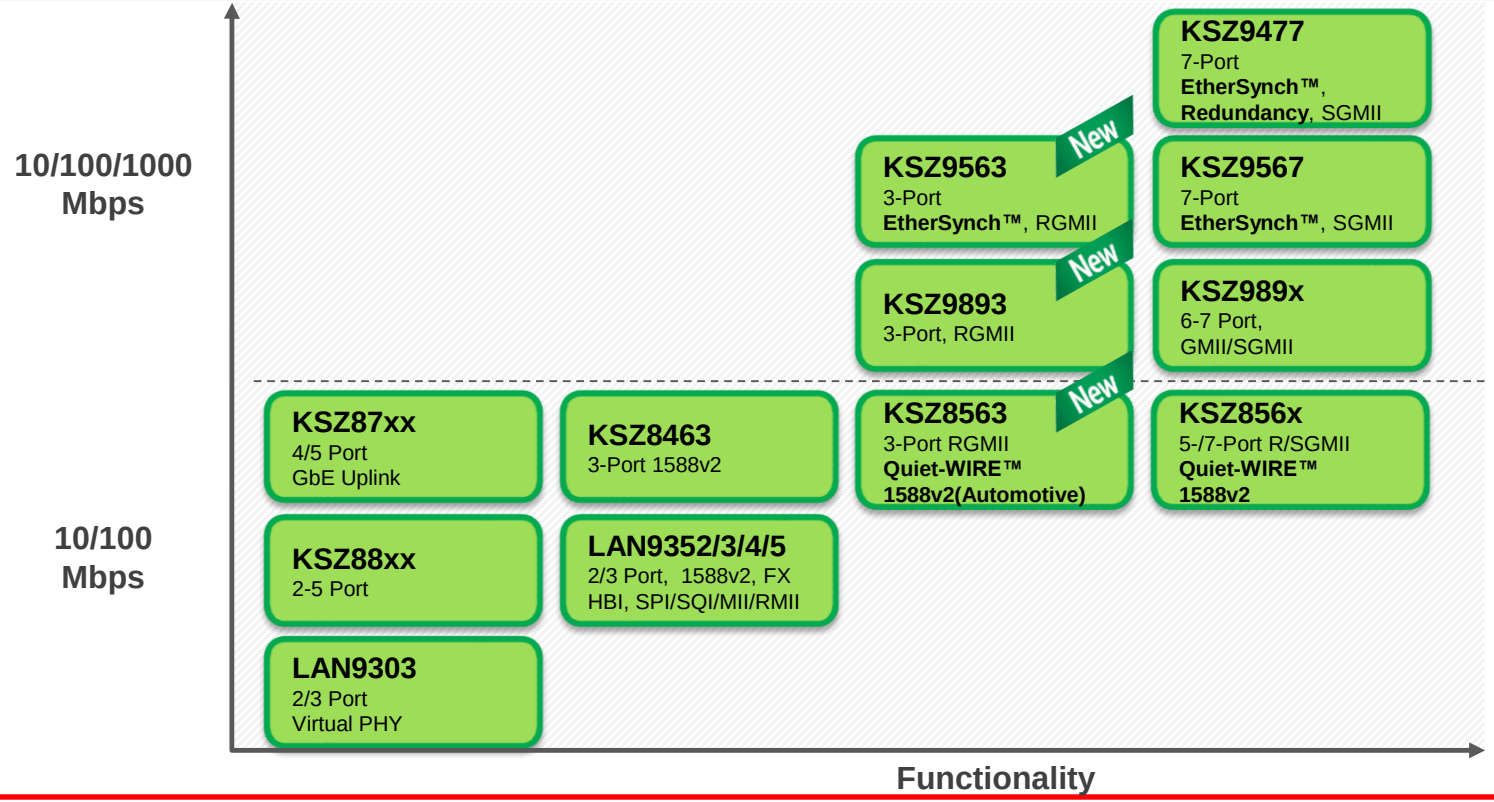


Ethernet Controller/Bridge Roadmap



ETHERNET SWITCH

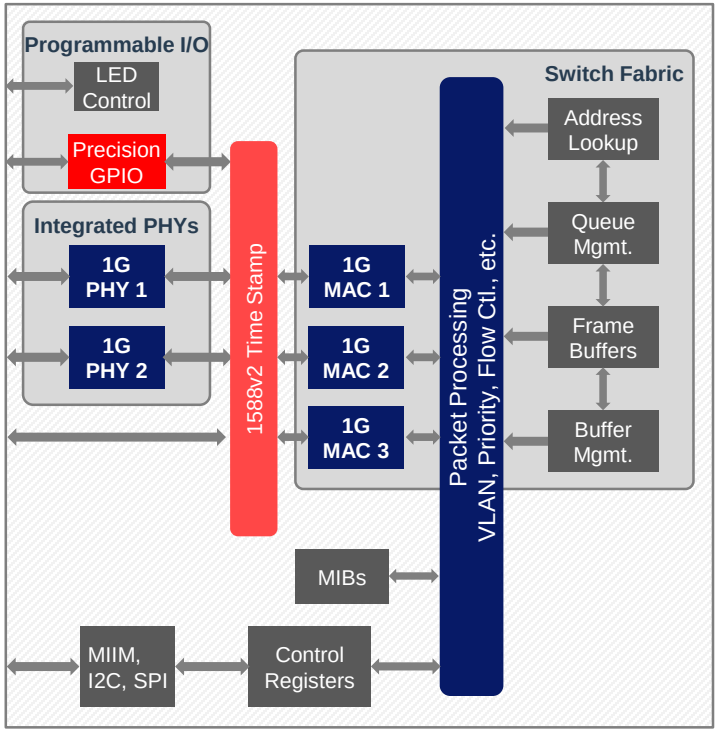
Ethernet Switch Roadmap



KSZ9563

3-Port GigE Switch with Advanced Features

- **EtherSync™**
  - IEEE1588v2 PTP
  - Precision GPIO
  - Traffic scheduling/shaping
- **EtherGREEN™**
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced power management
  - Energy efficient ethernet (IEEE802.3az)
  - Wake-on-LAN (WoL)
- **Fully Managed**
  - VLAN / Priority-based QoS
  - ACL rule-based packet processing
  - IEEE802.1x Authentication
- **Flexible MAC Interface**
  - RGMII / MII / RMII

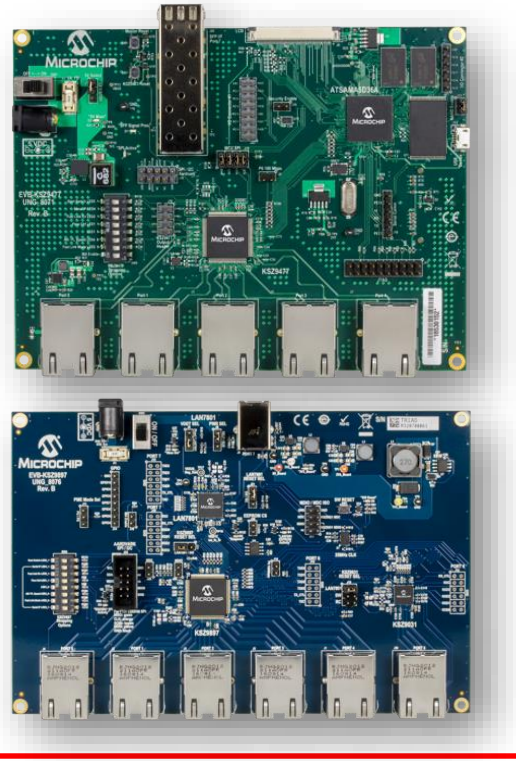


Block Diagram of KSZ9563

Evaluation Boards

- **Host and Switch EVB**
  - SAM A5D3 Processor
  - SGMII Connector
  - 5-Ports RJ-45
  - $250 (#EVB-KSZ9477)

- **Unmanaged Switch EVB**
  - Also includes LAN7801 and KSZ9031
  - 6-Ports and USB
  - $250 (#EVB-KSZ9897)

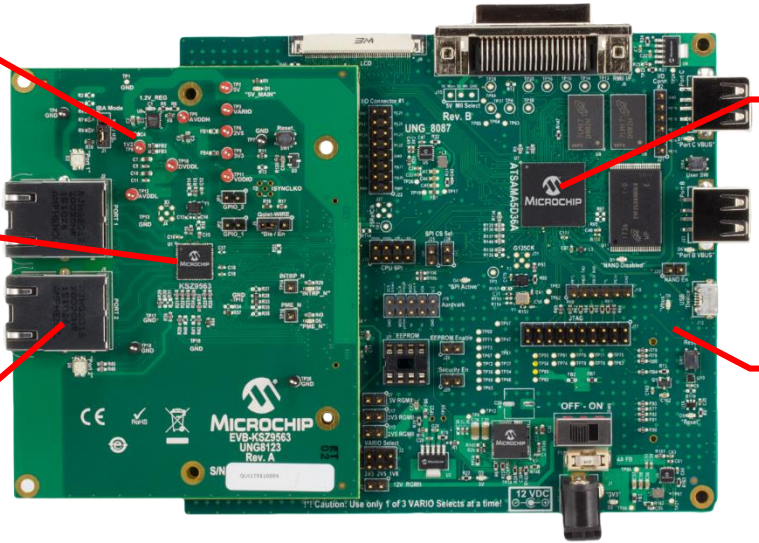


Development System

Variety of
Low Cost
Ethernet Cards

EVB-KSZ9563
3-port Switch
Card

2 Gigabit PHYs
1x RGMII



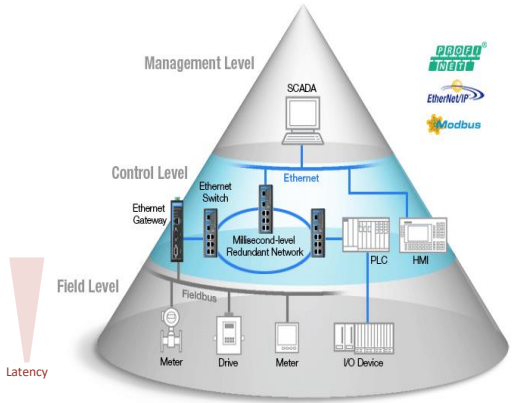
SAMA5D3
Linux®
Host Processor
- Driver Support
- AVB
- IEEE1588
- Security

Low Cost, Reusable
Ethernet Development
System Base Board
SAMA5D3-EDS

ENTERPRISE, INDUSTRIAL & CARRIER ETHERNET SWITCH

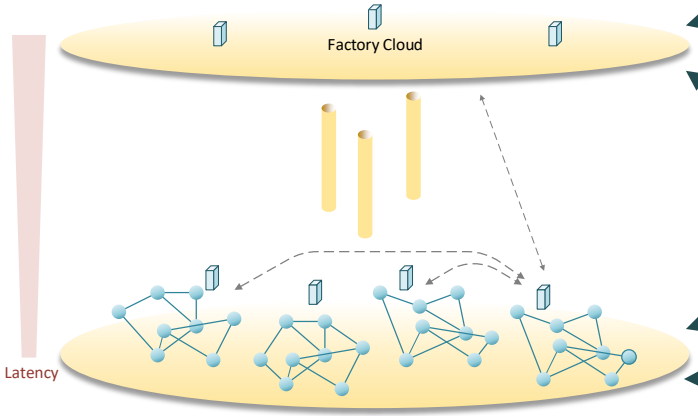
IIoT Product Strategy

Industrie 3.0



- Hierarchical network, strict separation between OT and IT
- OT dominated by field busses
- Ethernet in different flavours

Industrie 4.0



- Increase in number of IoT devices
- IT/OT-distinction blurring
- Local cloud-nodes (Fog) and in-factory data centers for low latency, distributed processing

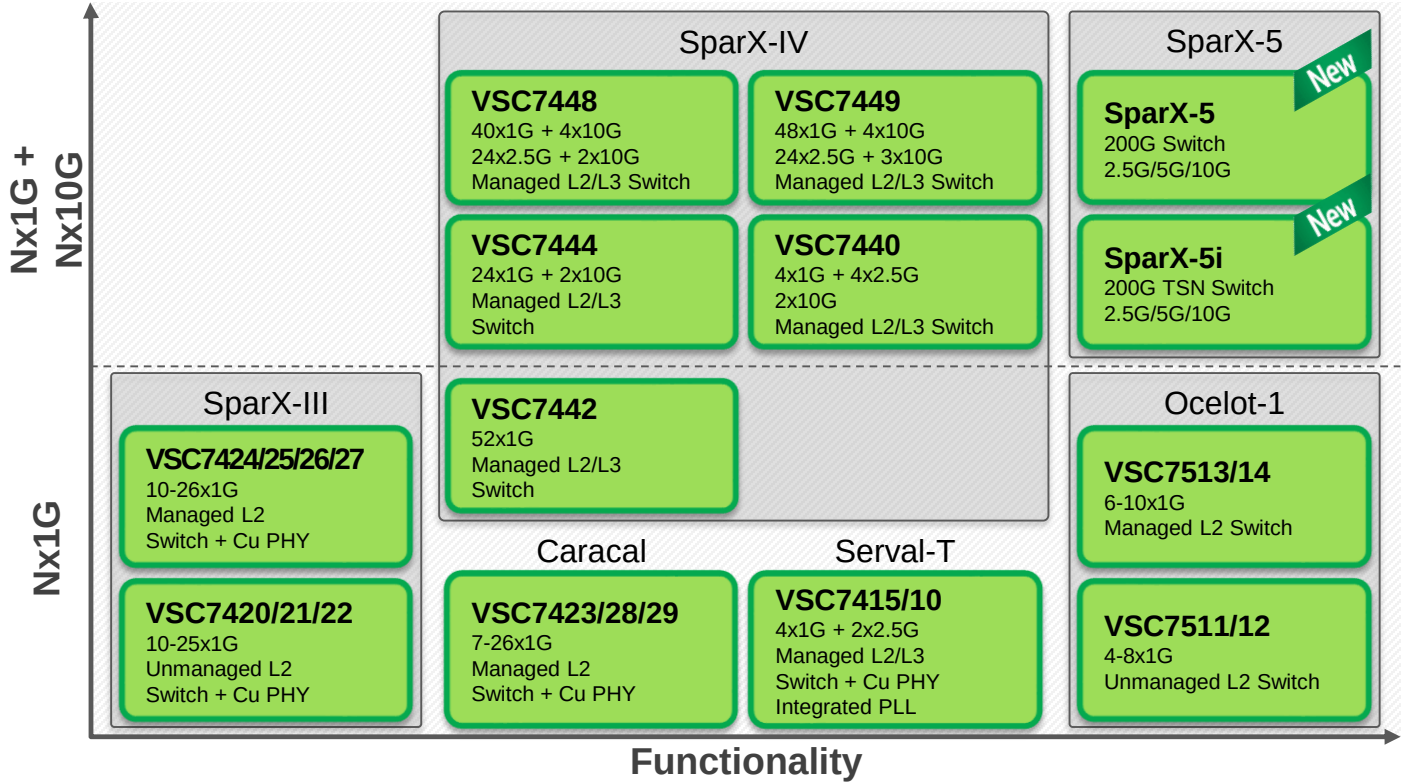
SparX-5i
8x25G,16x1G
32x2.5G/5G

Laguna
24x1GE
2x10GE

LAN9662/8
2/8x 1G End Node

Same TSN Across Platforms

Enterprise/Industrial Switch Roadmap



SparX-5

Next Gen Enterprise Ethernet Switches

Part	Total Bandwidth	1G Ports	2.5G Ports	5G Ports	10G Ports	25G Ports
VSC7546	64Gb	64x	24x	12x	6x	
VSC7549	90Gb	64x	36x	18x	9x	
VSC7552	128Gb	64x	48x	24x	12x	4x
VSC7556	160Gb	64x	64x	32x	16x	6x
VSC7558	200Gb	64x	64x	32x	20x	8x

Note: up to 24x 100Base-FX ports available on all SKUs

- **Various Configurations Supported**
- **Limiting Factors:**
  - Bandwidth
  - Number of SerDes

SparX-5i

TSN Industrial Ethernet Switches

Part	Total Bandwidth	1G Ports	2.5G Ports	5G Ports	10G Ports	25G Ports
VSC7546	64Gb	64x	24x	12x	6x	
VSC7549	90Gb	64x	36x	18x	9x	
VSC7552	128Gb	64x	48x	24x	12x	4x
VSC7556	160Gb	64x	64x	32x	16x	6x
VSC7558	200Gb	64x	64x	32x	20x	8x

Note: up to 24x 100Base-FX ports available on all SKUs

- **Various Configurations Supported**
- **Supports IEEE Time Sensitive Networking (TSN) Protocols**
  - (See next slide)
- **Limiting Factors:**
  - Bandwidth
  - Number of SerDes

TSN Standards Supported in SparX-5i

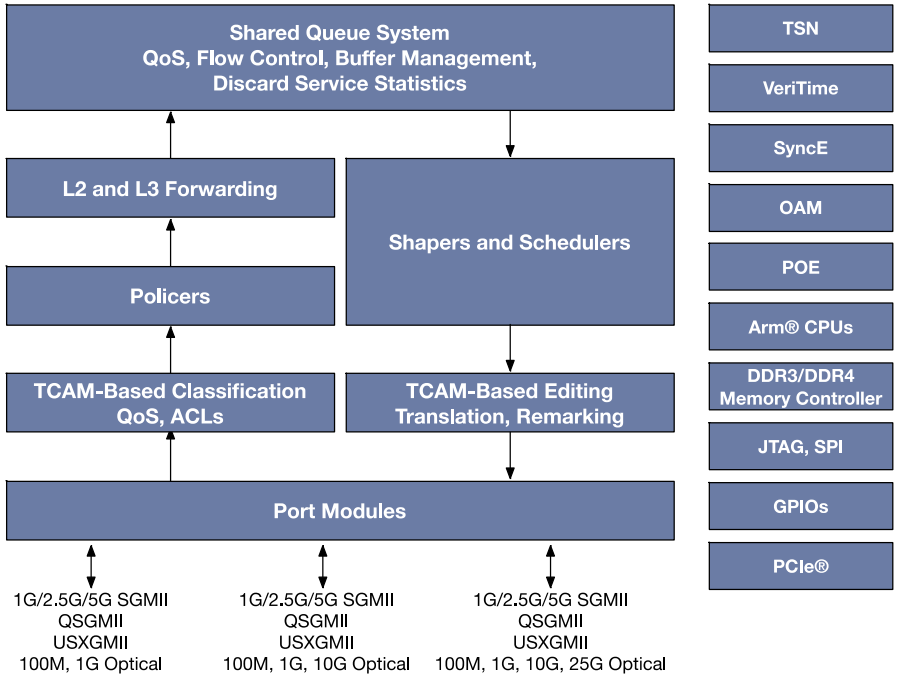
- **Shapers**
  - 802.1Qbv (time aware shaping)
- **TSN Stream Policing**
  - 802.1Qci (per stream filtering and policing)
- **High Precision Time Synchronization**
  - IEEE1588 (time stamping)
  - 802.1AS-Rev
- **Redundancy**
  - 802.1CB (seamless redundancy, frame replication and elimination for redundancy)
  - Standard linear and ring protection
- **Delay Reduction**
  - 802.1Qbu/802.3br (frame preemption)
  - Cut-through

SparX-5i: VSC7546TSN

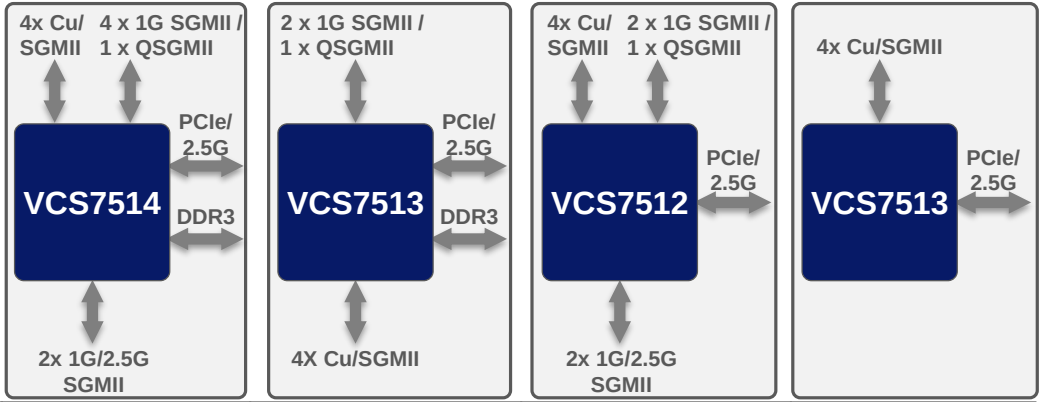
24x1G + 4x 10G L2/L3 TSN Switch

Features	Support
Bandwidth	100Base-FX, 1/2.5/5/10/25GbE
MAC Interface	SGMII / QSGMII / USXGMII
Precision Timing	IEEE1588 Precision Timing Protocol 802.1AS-Rev
Advanced Features	Integrated PoE Controller G.8032 Support Full TSN Support
TSN Features	802.1Qbv – Time Aware Scheduling 802.1Qch – Queueing/Forwarding 802.1Qci – Stream Policing 802.1Qbu – Frame Pre-emption / Cut-through 802.1CB – Seamless Redundancy
Power Management	Energy Efficient Ethernet (802.3az) Wake-on-LAN (WoL)
Temperature	-40 to 110°*
Packages	888-pin FCBGA (25x25mm)
Applications	Industrial, SMB, L2 switch, L3 Routing
Software	Comprehensive API Turn-key SDKs

**Junction Temperature*



Ocelot



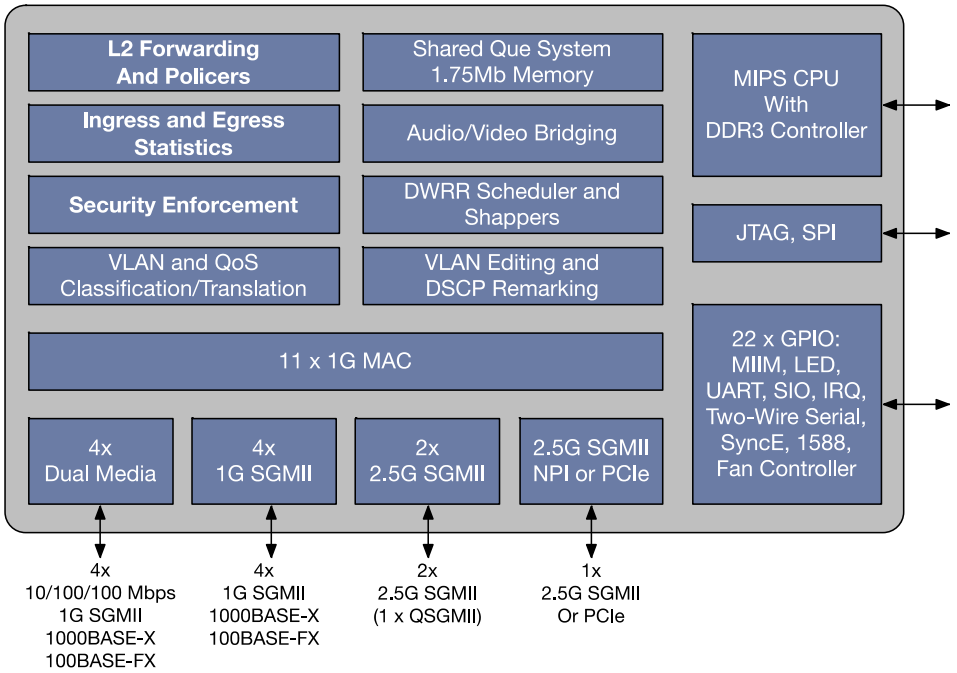
Industrial Switches	Ocelot VSC7514	Ocelot VSC7513	Ocelot VSC7512	Ocelot VSC7511
Processor	500MHz MIPS DDR2/3	500MHz MIPS DDR2/3	8051 MCU Integrated RAM	8051 MCU Integrated RAM
IEEE 1588v2	✓	✓	✓	✓
I-temp	✓	✓	✓	✓
Power	2.8W	2.8W	2.5W	2.5W
Package	17mm x 17mm CABGA	17mm x 17mm CABGA	13mm x 13mm DRQFN	13mm x 13mm DRQFN

Ocelot: VSC7514

10-Port L2 10/100/1000/2500 Switch

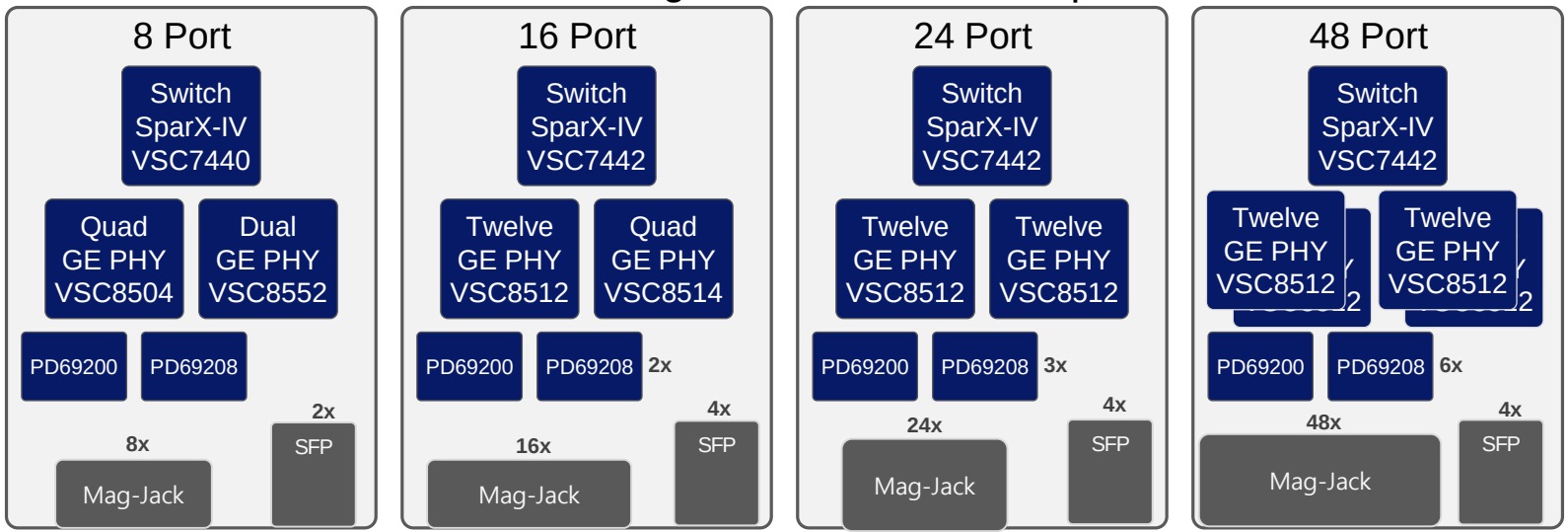
Features	Support
Bandwidth	10/100/1000/2500 Mbps
MAC Interface	SGMII/QSGMII or PCIe
Precision Timing	IEEE1588 Precision Timing Protocol
Advanced Features	TCAM-based VLAN and QoS Embedded 500MHz MIPS CPU
Power Management	Energy Efficient Ethernet (802.3az) Wake-on-LAN (WoL)
Temperature	-40 to 125°C*
Packages	256-pin BGA (17x17mm)
Applications	Industrial, SMB, fully managed L2 switch
Software	Comprehensive API Turn-key SDKs

**Junction Temperature*



Network System Example

L2/L3 Switching Solutions with GE Uplinks



- L3 routing
- Cost optimized

- L3 routing
- Same SparX-IV for 16, 24 & 48 ports

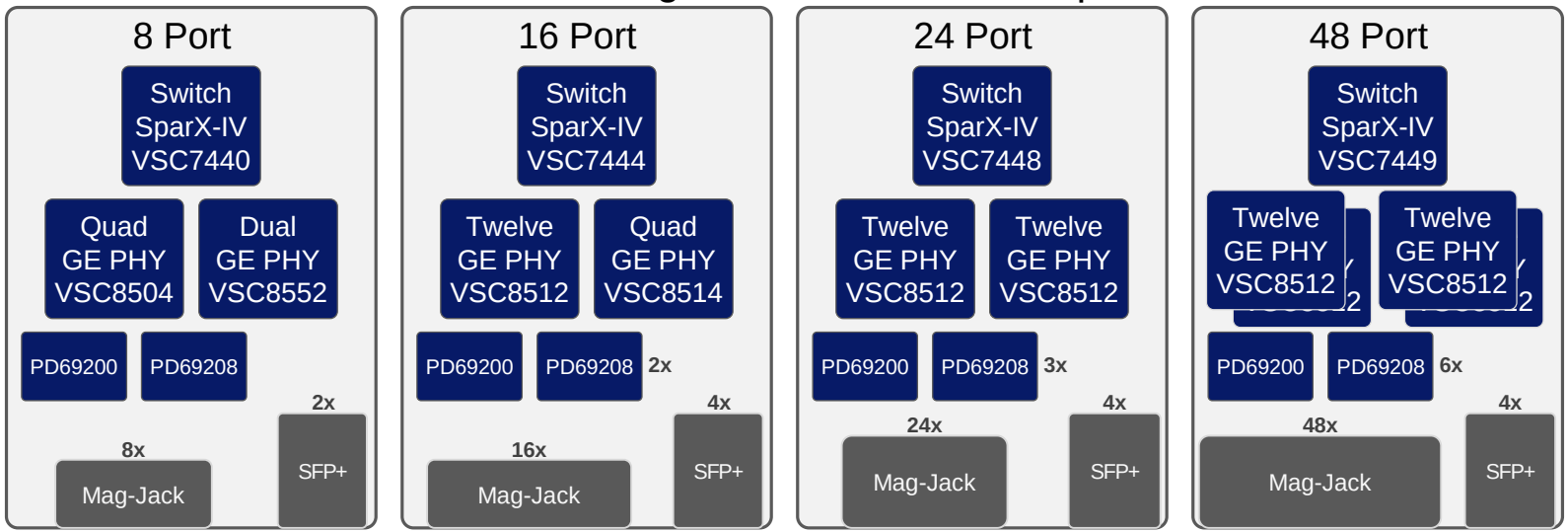
- L3 routing
- Same platform for 16, 24 & 48 ports

- Single switch chip
- Lower cost PHY

Leading industry PoE solutions

Network System Example

L2/L3 Switching Solutions with 10G uplinks



- L3 routing
- Cost optimized

- L3 routing
- Same SparX-IV for 16, 24 & 48 ports

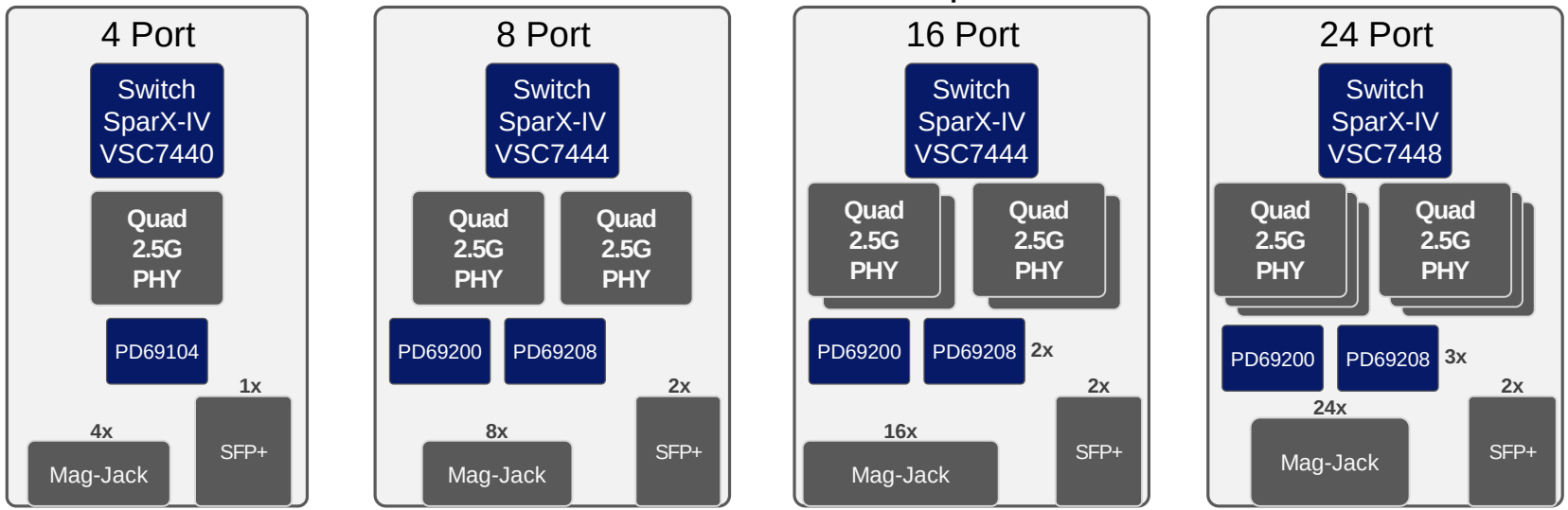
- L3 routing
- Same platform for 16, 24 & 48 ports

- Single switch chip
- Lower cost PHY

Leading industry PoE solutions

Network System Example

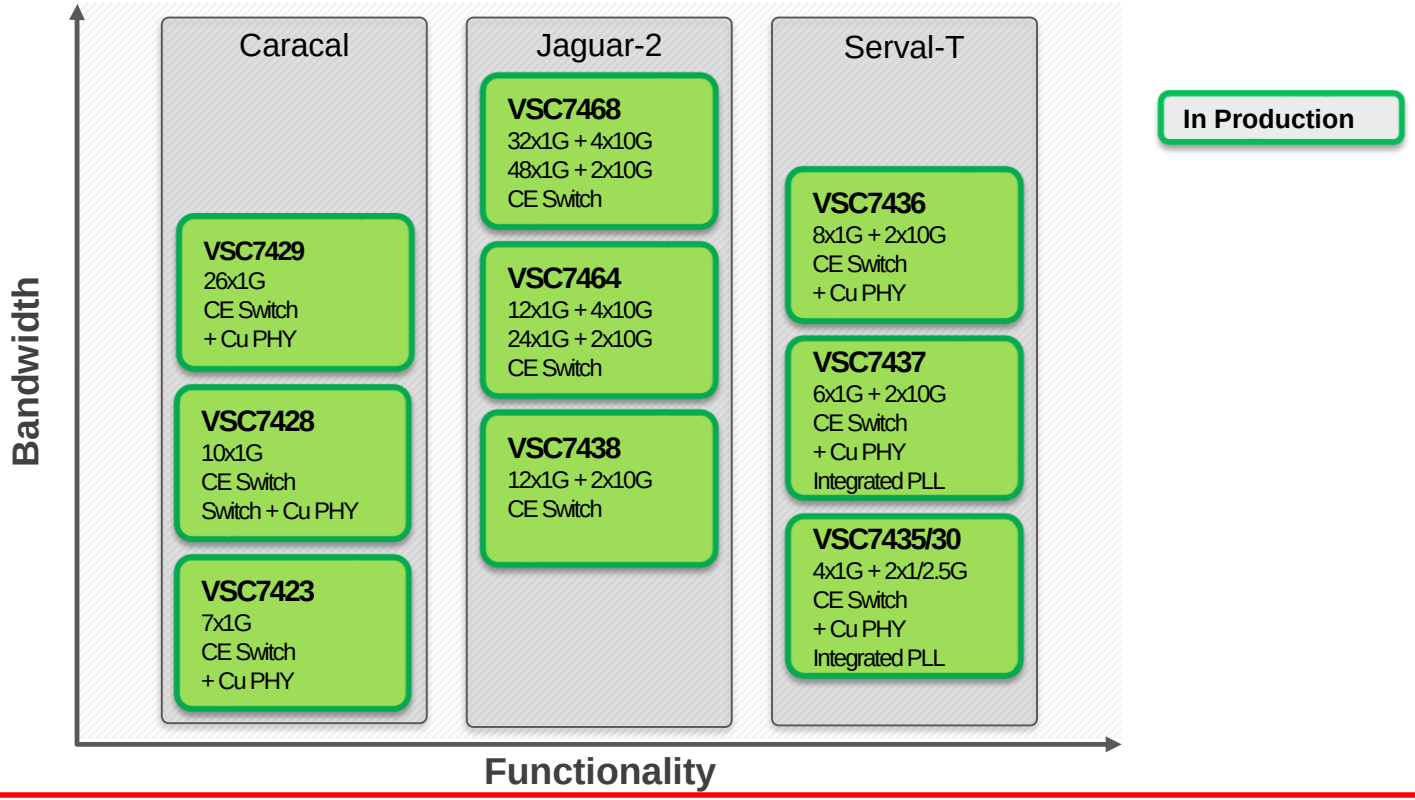
Multi-rate Solutions with 10G uplinks



- 4x2.5G + 10G Cu
- 8x2.5G + 2x10G Cu
- 16x2.5G + 2x10G Cu
- 24x2.5G + 2x10G SFP+

- L3 Wire-Speed Routing
- Leading industry PoE solutions

Industrial/Carrier Switch Roadmap



Industrial/Carrier Switch Portfolio

Feature	Caracal Lite/ -1/-2 VSC7423/28/29	Serval-2 Lite VSC7436	Serval-2 VSC7438	Lynx-2, Jaguar-2 VSC7464/68	Serval-TE VSC7435	Serval-TE10 VSC7437
I/O Bandwidth	10/13Gbps 29Gbps	34 Gbps	32 Gbps	52/80 Gbps	9 Gbps	29 Gbps
Port Configurations	7 to 26 GE port with12xCu	4x1G (2Cu) + 4x1/2.5G + 2x 10G SFI	12x 1G + 2x 10G SFI/XAUI	12/24/48x1G + 4x10G SFI/XAUI	4x1G (2Cu) + 2x 1/2.5G + DPLL	4x1G (2Cu)+ 2x1/2.5G+2x10G DPLL
8-COS EVCs	16	64	256	512	64	64
Memory	4Mbit	1MByte	2MByte	4MByte	1MByte	1MByte
QoS	8Qs/port	1K+ H-QoS	6K+ H-QoS	12K+ H-QoS	1K+ H-QoS	1K+ H-QoS
Layer-2	Q-Q	Q-Q-Q	Q-Q-Q	Q-Q-Q	Q-Q-Q	Q-Q-Q
Layer-3	-	1K IPv4 256 IPv6	4K IPv4 1K IPv6	Up to 16K IPv4 Up to 4K IPv6	1K IPv4 256 IPv6	1K IPv4 256 IPv6
MPLS-TP	-	LSR,PWE	LSR, PWE	LSR, PWE	LSR, PWE	LSR, PWE
Ethernet OAM HW	CC/RDI	CC/LB/LM/DM	CC/LB/LM/DM	CC/LB/LM/DM	CC/LB/LM/DM	CC/LB/LM/DM
MPLS-TP OAM HW -G.8113.1 (ITU-T) -G.8113.2 (IETF)	-	ACH/VCCV CC/LB/LM/DM BFD	ACH/VCCV CC/LB/LM/DM BFD	ACH/VCCV CC/LB/LM/DM BFD	ACH/VCCV CC/LB/LM/DM BFD	ACH/VCCV CC/LB/LM/DM BFD
1588v2 timestamp resolution	6.4 nS	1 nS	1 nS	1 nS	1 nS	1 nS
I-temp	✓	✓	✓	✓	✓	✓
Power	3.9/4.4W 6.3W typ	4W typ	6.8W typ	7.8W typ	4W typ	4.1W typ

Trends Driving Our Roadmap

- **Service Provider Network**
  - 5G network – sync and latency requirements – front haul and backhaul
  - Location based service sync requirements
  - Ethernet service delivery – 1G transitioning to 10G
- **Enterprise Network**
  - Fixed managed L2/3 switch applications
  - More 10G port and L3 support at lower cost
  - Management, monitoring and security
  - In 2020,1GE and 10GE still accounts for 80% of the port shipment
- **Industrial Network**
  - Ethernet replacing legacy protocols
  - Need for predictable max latency – e.g. motion control – in the presence of other traffic
  - High availability/ low probability of loss
  - Guarding network against failing/ misconfigured sources
  - Continuous monitoring of network and services for early warning/preventive maintenance

Timing Accuracy in Switches

Location Services

Location Accuracy	End-to-end Timing Accuracy
30–40m	100 ns

Source: ITU G.8271.1, ITU G.8273.2

Wireless Services

Network	End-to-end Timing Accuracy
LTE	1500 ns
4G/LTE-A	130 ns
5G	65 ns

Equipment: 4 ns

Silicon: <1 ns

Device	Prediction / Compensation Resolution	Timestamping Accuracy	Resulting 1588 Accuracy (Residence time)
Serval-T Family VSC7415/10, 35/30 VSC7436/37/40	1.0 ns	~2.0 ns	~4.0 ns
Ocelot Family VSC7511/12, VSC7513/14	1.0 ns	~3.2 ns	~6.4 ns
Jaguar-2 Family VSC7438/64/68 VSC7442/44/48/49	1.0 ns	~2.0 ns	~4.0 ns
SparX-5i Family VSC7546/49/52/56/58TSN	4.0 ps	~0.8 ns	~1.6 ns

ETHERNET SOFTWARE SOLUTIONS

Ethernet Software Solutions Overview

- **Simplifies Development and Speeds Up**
  - **Turnkey Solution**: Shorten development cycles and reduce costs
- **Standard-based Solutions**
  - **Enterprise**: Certified at UNH-IoL, EANTC*
  - **Industrial**: TSN (APPL-2019.12 release)
  - **Carrier**: IETF, MEF standards
- **Mature and Fully Supported**
  - Shipping to many enterprise, industrial and carrier customers
  - >1M lines of code / 500+ licenses
- **Flexibility**
  - Various maintenance options

** EANTC: European Advanced Networking Test Center*

Ethernet Software Product Family

Applications for Managed Switches with Internal Processor

WebStaX Linux: VSC6819	SMBStaX Linux: VSC6816	IStaX Linux: VSC6817	CEServices Linux: VSC6818
Basic Layer 2 Enterprise Managed Switching for • SMB • Enterprise • Commercial	Advanced Layer 2+ Enterprise Managed Switching for • SMB, SME • Large Enterprise • Commercial	Industrial Ethernet Switching for • Industrial Automation • Smart Grid • Intelligent Transportation	Carrier Ethernet Switching for • Tier 1/2/3 Telco • Multiple-system Operators (MSOs) • Wireless Backhaul
Applications for 8051-based Switches	API for All Switches/PHYs	Support for Switches	**For All Switches/PHYs**
WebConfig/Unmanaged VSC6811 For VSC7420/1/2 Switches Click-through licensed	**Unified API VSC6802** Click-through licensed	**Board BSP** LINUX Open Source Board Support Package	**Maintenance VSC9990-xxxx** Software maintenance
Ocelot Unmanaged VSC6825 For VSC7511/2 Switches Click-through licensed	**ETH API VSC6803** Click-through licensed		

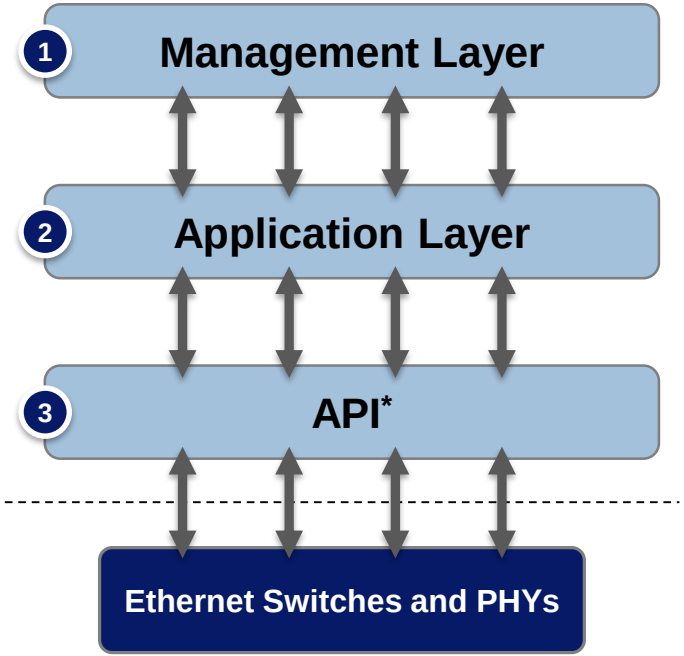
Linux Managed Ethernet Software Applications

		Enterprise		IoT	Service Provider
Category	**Feature**	**WebStaX**	**SMBStaX**	**IStaX**	**CEServices**
Port Control	Speed, mode, flow control, frame size, status, statistics, SFP type, PoE	✓	✓	✓	✓
Management	WebGUI, DHCP client, industry-standard CLI and configuration, HTTP server, HTTPS	✓	✓	✓	✓
L2 Switching	VLAN trunking, IEEE-802.1D bridging, IEEE-802.1Q VLANs, IEEE-802.1AD (QinQ), loop guard, IEEE 802.1Q RSTP, IEEE 802.3AD (LAG), IGMPv2 snooping, port mirroring	✓	✓	✓	✓
QoS	Traffic classes, priority, storm control, port policing, shaping, ACLs	✓	✓	✓	✓
Power Management	EcoEthernet™ (ActiPHY™, PerfectReach™, Energy Efficient Ethernet, LED power management, thermal protection and adaptive fan control)	✓	✓	✓	✓
Advanced Management	iCLI Telnet, JSON-RPC, SNMP/Private MIBS DHCP IPv6 client, DHCP server, DNS client, SSHv2, IPv6 management, Radius client, RMON, sFlow		✓	✓	✓
Advanced L2 Switching	MAC, Protocol and IP subnet VLANs, GVRP, MSTP, IGMP v3 snooping, MLDv1/2 snooping, MVR, DHCP snooping, Flow mirroring/Rmirror		✓	✓	✓
L3 Switching	L3 Forwarding, DHCP opt 82, uPnP		✓	✓	✓
Security	Single & Multiple 802.1X, RADIUS Accounting, MAC Limit, IP/MAC binding, TACACS+, IP source guard		✓	✓	✓
Advanced QoS	Queue Policers, DiffServ, tag remarking Service Policers, H-QoS		✓	✓	✓ ✓
Synchronization	IEEE 1588.v2, Microsemi Servo compatibility SyncE			✓	✓ ✓
Protection	1+1, 1:1, 1:N port protection, G.8032 ERPS			✓	✓
Carrier Ethernet	E-LINE, E-LAN, E-TREE, E-ACCESS				✓
OAM	IEEE 802.3ah, IEEE 802.1ag, Y.1731, RFC2544, Performance Monitoring, Y.1564 (SAT)			(✓)	✓
Transport	MPLS-TP (Serval-1 family only with latest release)				✓

Interfacing with Ethernet Switches

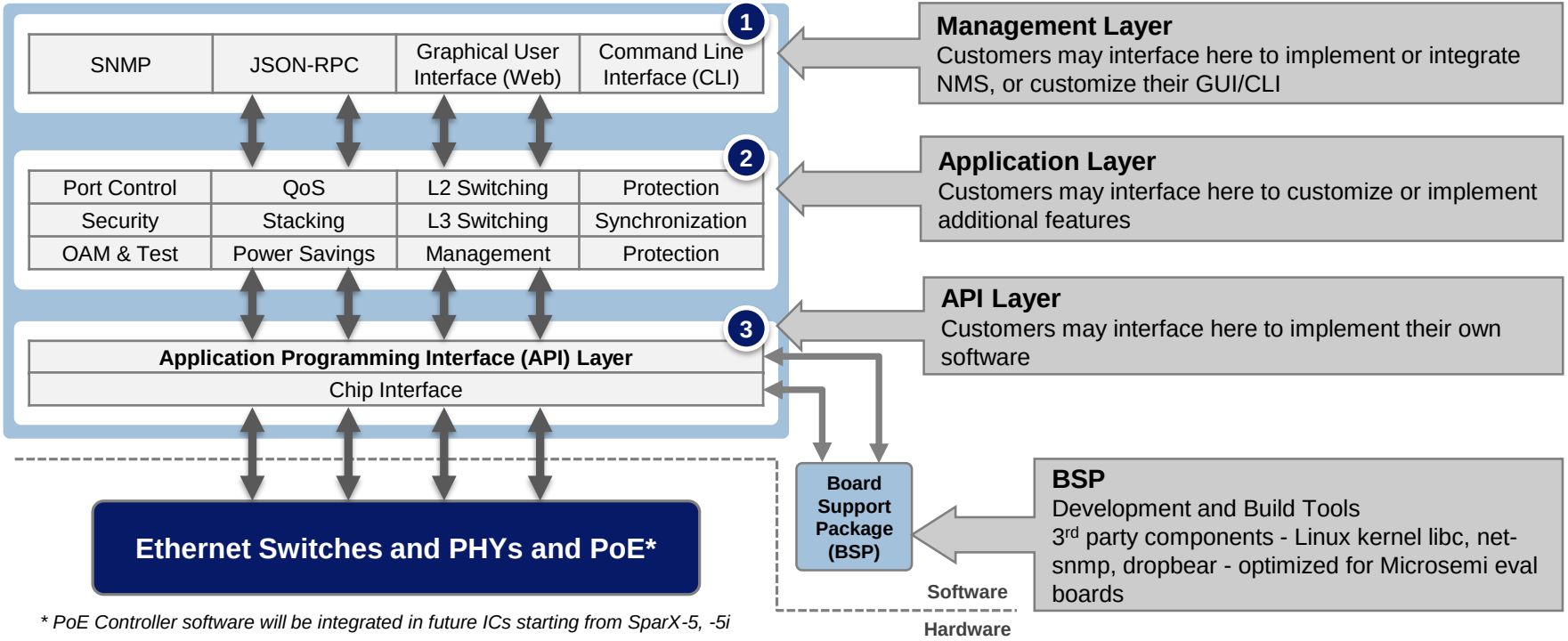
- **Interface with Ethernet Switches at 3 layers**
  1) Management Layer
  2) Application Layer
  3) API (Driver) Layer

- **Direct register access not supported**



** API: Application Programming Interface*

Ethernet Software Layers



Making the Complex Accessible

- **Comprehensive Ethernet Ecosystem**
  - Software, Drivers, Tools
- **Rigorously Tested and Robust**
  - UNH-IOP Certifications, Industrial/Automotive Temp.
- **Complete Portfolio**
  - PHYs, Bridges, Controllers, Switches

THANK YOU

Visit below for more information on Microchip's Ethernet Solutions

https://www.microchip.com/design-centers/ethernet