

Design a 144-port  
SDVoE system with  
M4300 switches

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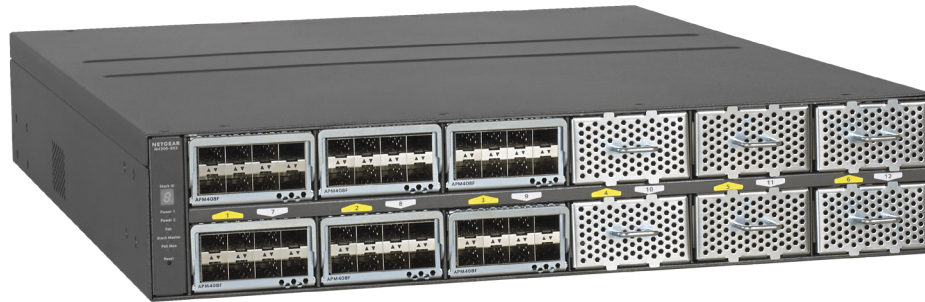


# M4300 Series Switches

Application Notes  
How to build a 144-port system

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## The 144-port switch concept

In many applications, a single Ethernet switch is sufficient to displace a single matrix switch. It makes a very compelling proposal when a 16x16 matrix switch, consuming 440 watts and seven rack units of space can be replaced by a 48-port Ethernet switch in a single rack unit, consuming only 161 watts.

But sometimes a single switch isn't enough - whether you're using matrix switching or AV over IP. In these cases, the scalability of Ethernet makes AV over IP shine. Plus, as systems grow larger and larger, the cost advantage of AV over IP compared to the traditional matrix switch grows quickly.

This document will provide a specific and easy to follow example of how to create a 144-port SDVoE AV over IP system using the NETGEAR M4300-96X switch as a base. The system we will create here is fully non-blocking (meaning any possible mapping of inputs to outputs may be deployed at any time). This table makes a simple comparison of the cost of this 144-port system. The SDVoE system is 36% cheaper and uses 75% less space in the rack.

"Brand C" 144 port matrix switch		
Quantity	Part	Cost
1	128x128 matrix chassis	\$ 72,000
9	8-input 1080p fiber blade	\$ 9,000
9	8-output 1080p fiber blade	\$ 9,000
72	1080p fiber transmitter	\$ 1,800
72	1080p fiber receiver with scaler	\$ 1,800
	Total cost	\$493,200
	Rack space consumed	24 RU
	End to end latency	Less than one millisecond

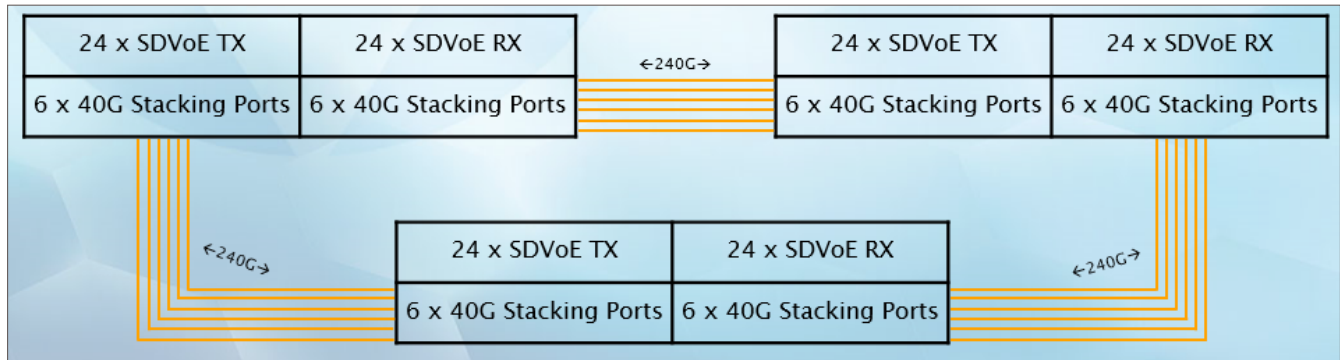
NETGEAR and ZeeVee 144-port SDVoE system		
Quantity	Part	Cost
3	NETGEAR M4300-96X 96-port fiber switch	\$ 9,599
72	ZeeVee Zyper 4K HDMI 2.0 Fiber Encoder with multiview (Z4KENC3)	\$ 1,800
72	ZeeVee Zyper 4K HDMI 2.0 Fiber Decoder with video wall (Z4KDEC3)	\$ 1,800
	Total cost	\$ 287,997
	Rack space consumed	6 RU
	End to end latency	Less than one millisecond

SDVoE cost savings vs matrix switch: 42%  
SDVoE space savings vs matrix switch: 75%

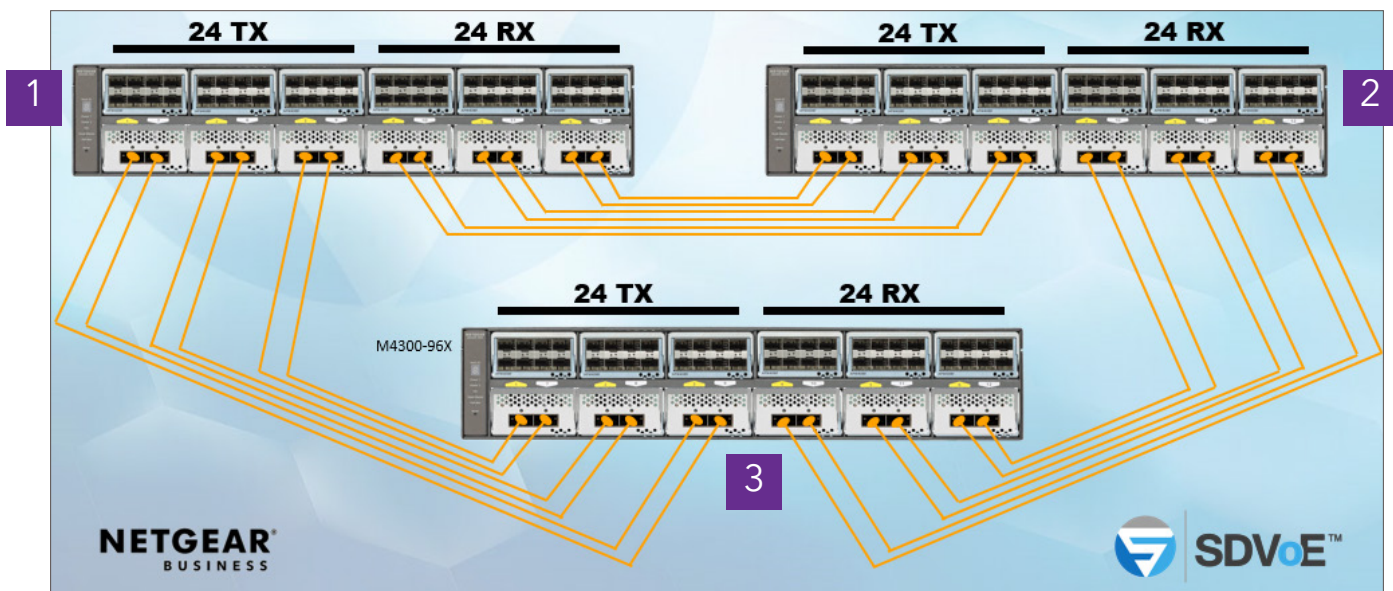
## Interconnecting three NETGEAR M4300-96X series switches

To create an even larger network system, three (3) M4300-96X switches can be interconnected in a stack for 144 x non-blocking 10G ports.

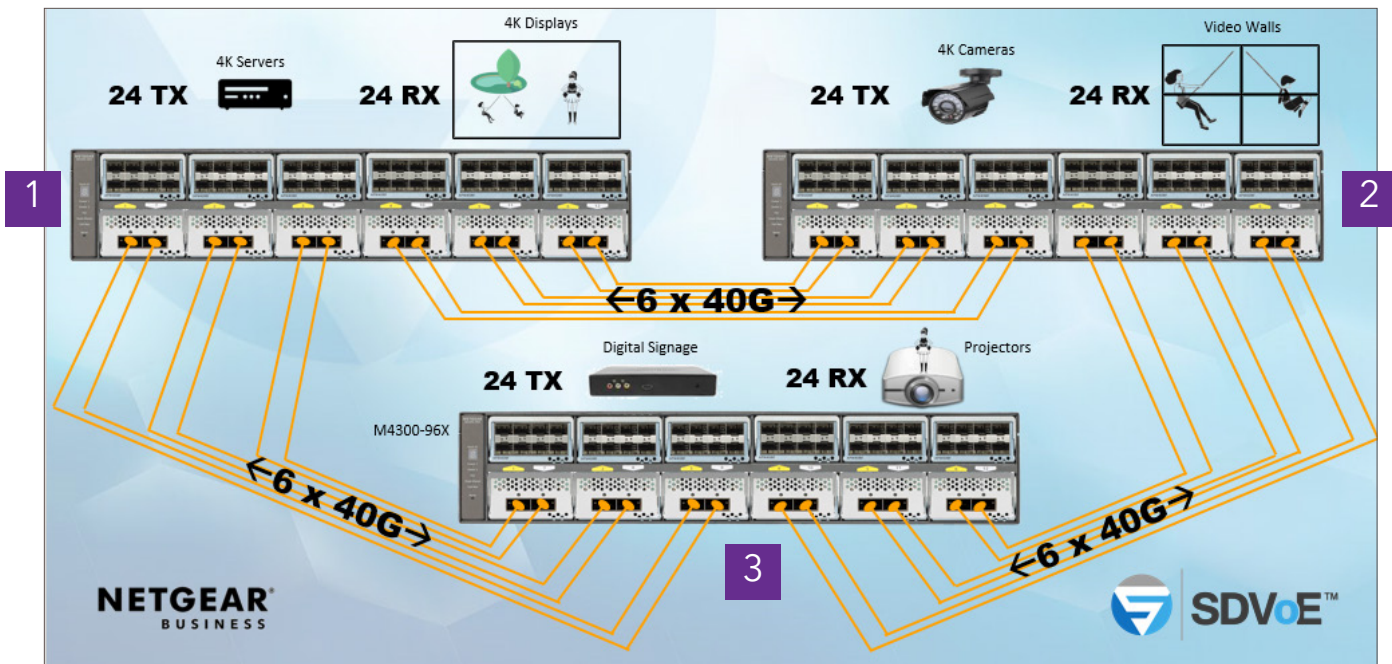
The figure below shows an example where six (6) 40G ports are used between switches for three times 240Gbps bi-directional bandwidth in a ring topology:



Switch 1 and Switch 2 are interconnected using total of six (6) 40G links  
 Switch 2 and Switch 3 are interconnected using total of six (6) 40G links  
 Switch 3 and Switch 1 are interconnected using total of six (6) 40G links



In each switch, bottom slots 7-12 are populated with APM402XL port cards (2-port 40G QSFP+ each). This results in a 144-port stack configuration with 8-port 10G port cards (copper, fiber, or PoE) in upper slots 1-6, each time. This topology is non-blocking when TX and RX devices are evenly distributed across the three switches.



For this example, you can refer to the application note called “M4300\_Series\_How to stack NETGEAR M4300 switches” to learn more about NETGEAR M4300 stacking. The same few things must be considered:

- Take note of which slots and which ports will be used for the interconnect
- Decide which switch will be the master, the backup management unit and the member unit
- Use switch CLI or Web GUI interfaces to configure each switch

## Create the 144-port stack using CLI

Step 1: Login to first switch, assign priority and configure stack ports in slots 7 to 12

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #config
(M4300-96X) (Config)#switch 1 priority 15
(M4300-96X) (Config)#stack
(M4300-96X) (Config-stack)#stack-port 1/7/1 stack
(M4300-96X) (Config-stack)#stack-port 1/7/5 stack
(M4300-96X) (Config-stack)#stack-port 1/8/1 stack
(M4300-96X) (Config-stack)#stack-port 1/8/5 stack
(M4300-96X) (Config-stack)#stack-port 1/9/1 stack
(M4300-96X) (Config-stack)#stack-port 1/9/5 stack
(M4300-96X) (Config-stack)#stack-port 1/10/1 stack
(M4300-96X) (Config-stack)#stack-port 1/10/5 stack
(M4300-96X) (Config-stack)#stack-port 1/11/1 stack
(M4300-96X) (Config-stack)#stack-port 1/11/5 stack
(M4300-96X) (Config-stack)#stack-port 1/12/1 stack
(M4300-96X) (Config-stack)#stack-port 1/12/5 stack
(M4300-96X) (Config-stack)#exit
(M4300-96X) (Config)#exit
(M4300-96X) #save
```

Step 2: Login to second switch, assign priority and configure stack ports in slots 7 to 12

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #config
(M4300-96X) (Config)#switch 1 priority 10
(M4300-96X) (Config)#stack
(M4300-96X) (Config-stack)#stack-port 1/7/1 stack
(M4300-96X) (Config-stack)#stack-port 1/7/5 stack
(M4300-96X) (Config-stack)#stack-port 1/8/1 stack
(M4300-96X) (Config-stack)#stack-port 1/8/5 stack
(M4300-96X) (Config-stack)#stack-port 1/9/1 stack
(M4300-96X) (Config-stack)#stack-port 1/9/5 stack
(M4300-96X) (Config-stack)#stack-port 1/10/1 stack
(M4300-96X) (Config-stack)#stack-port 1/10/5 stack
(M4300-96X) (Config-stack)#stack-port 1/11/1 stack
(M4300-96X) (Config-stack)#stack-port 1/11/5 stack
(M4300-96X) (Config-stack)#stack-port 1/12/1 stack
(M4300-96X) (Config-stack)#stack-port 1/12/5 stack
(M4300-96X) (Config-stack)#exit
(M4300-96X) (Config)#exit
(M4300-96X) #save
```

Step 3: Login to third switch, assign priority and configure stack ports in slots 7 to 12

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #config
(M4300-96X) (Config)#switch 1 priority 1
(M4300-96X) (Config)#stack
(M4300-96X) (Config-stack)#stack-port 1/7/1 stack
(M4300-96X) (Config-stack)#stack-port 1/7/5 stack
(M4300-96X) (Config-stack)#stack-port 1/8/1 stack
(M4300-96X) (Config-stack)#stack-port 1/8/5 stack
(M4300-96X) (Config-stack)#stack-port 1/9/1 stack
(M4300-96X) (Config-stack)#stack-port 1/9/5 stack
(M4300-96X) (Config-stack)#stack-port 1/10/1 stack
(M4300-96X) (Config-stack)#stack-port 1/10/5 stack
(M4300-96X) (Config-stack)#stack-port 1/11/1 stack
(M4300-96X) (Config-stack)#stack-port 1/11/5 stack
(M4300-96X) (Config-stack)#stack-port 1/12/1 stack
(M4300-96X) (Config-stack)#stack-port 1/12/5 stack
(M4300-96X) (Config-stack)#exit
(M4300-96X) (Config)#exit
(M4300-96X) #save
```

Step 4: Reload (reboot) the first switch

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #reload
```

Step 5: While the first switch is booting, connect the stacking cables (in this case, 40GBASE-CR4 QSFP+ to QSFP+ DAC cables, or fiber 40GBASE-SR4 MMF, or 40GBASE-LR4 SMF QSFP+ transceivers) in between the three switches

Step 6: While the first switch is still booting, reload (reboot) the second switch

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #reload
```

Step 7: While the second switch is still booting, reload (reboot) the third switch

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #reload
```

Step 8: Check the stack, after third switch has started, connecting to the console via the first switch:

```
User:admin
Password:
(M4300-96X) >enable
(M4300-96X) #show switch
```

SW	Management Switch	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		M4300-96X	M4300-96X	OK	12.x.x.x
2	Stack Mbr	Oper Stby	M4300-96X	M4300-96X	OK	12.x.x.x
3	Stack Mbr		M4300-96X	M4300-96X	OK	12.x.x.x

## Conclusion: Cost-effective M4300 switches for SDVoE installations

As a proud founding member of the SDVoE Alliance, NETGEAR has designed the M4300 switches for true AV-over-IP, enabling cost-effective integration and Zero-Touch install of SDVoE systems. IGMP is pre-configured for you, and all M4300 models stack together for scale and convenience.

10G Models	M4300-8X8F	M4300-12X12F	M4300-24X	M4300-24X24F	M4300-48X	M4300-96X
Model Number	XSM4316S	XSM4324S	XSM4324CS	XSM4348S	XSM4348CS	XSM4396K0 (empty) XSM4396K1 (starter kit)
10GBASE-T RJ45	8 ports	12 ports	24 ports	24 ports	48 ports	Up to 96 ports (Up to 48xPoE+)
1G/10G SFP+	8 ports	12 ports	4 shared ports	24 ports	4 shared ports	Up to 96 ports
40G QSFP+	-					Up to 24 ports
Form Factor	Half-width			Full width		Modular
Rack Mount	1-unit in 1U or 2-unit in 1U			1-unit in 1U		1-unit in 2U
Power Supply	Modular 1 bay			Modular 2 bays		
Included PSU	(1) APS250W					XSM4396K0...no PSU XSM4396K1... (1) APS600W
Fans	Front-to-back					
Max Noise @25°C	36.9dB	36.9dB	37dB	35.8dB	40.3dB	Without PoE.... 35.8dB Max PoE load....66.8dB
Max Power Consumption	49 Watts	97 Watts	125 Watts	161 Watts	237 Watts	Without PoE...566 Watts With 1,440W PoE 2,006 W
Management	Ethernet: Out-of-band 1G port Console: RJ45 RS232 and Mini-USB				Storage: USB	

Indicative pricing and warranty:

10G Models	M4300-8X8F	M4300-12X12F	M4300-24X	M4300-24X24F	M4300-48X	M4300-96X
SDVoE Systems	16 ports	24 ports	24 ports	48 ports	48 ports	Up to 96 ports
Suggested Price (US MSRP)	\$1,729	\$2,369	\$2,569	\$4,489	\$4,819	\$3,999 (empty switch) \$9,599 (96-port fiber)
Warranty and Support	NETGEAR backs the M4300 Managed Switches by the industry-leading ProSAFE® Lifetime Limited Warranty, Lifetime Next Business Day shipping for part replacement, and Lifetime Technical Support options.					

To configure your M4300-96X, check out [www.netgear.com/96x-config](http://www.netgear.com/96x-config)  
To learn more, check out [www.netgear.com/sdvoe](http://www.netgear.com/sdvoe) and [www.sdvoe.org](http://www.sdvoe.org)