



# VERSA-4K DEPLOYMENT GUIDE

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## 1.0 Introduction

Integrators usually face problems while configuring network switches for AV over IP solutions as the terminology and steps to configure a switch not only varies with each manufacturer but also depends on number of Senders and Receivers in the system. This document provides guidelines to select and configure a Network Switch for VERSA-4K system for various small and large scale deployments with [Examples](#). We also suggested some Networks Switches that we tested and requires minimum configuration to achieve the system requirements. Also refer [Section 7.0- Common mistakes done while configuring switch](#) for more information.

### Note:

All the examples presented here uses absolute maximum bandwidth required by VERSA-4K, which means that each Sender is extending 4K Video at visually lossless, 4x USB 2.0 Devices; also keyboard and mouse. In general, number of senders can be doubled if the system is just extending video. Also, Video bandwidth usage on each Sender can be limited up to 25Mbps. Refer VERSA-4K [User manual](#) for more information.

### Examples:

1	<a href="#">6 Senders and 20 Receivers setup using SG350-28P</a>
2	<a href="#">8 Senders and 40 Receivers setup using SG350-52P</a>
3	<a href="#">10 Senders and 182 Receivers setup using SG350X-48P</a>
4	<a href="#">20 Senders and 172 Receivers setup using SG350X-48P</a>
5	<a href="#">40 Senders and 384 Receivers setup using SX550X-52</a>

## 2.0 VERSA-4K Bandwidth Requirements

To configure a network switch for VERSA-4K System (Senders and Receivers), one must be aware of the bandwidth requirements. For proper operation, one must use a Network Switch that can provide such bandwidth.

### VERSA-4K Bandwidth Requirements:

Typical 1080p Video	Up to 250Mbps
Video + USB2.0	850Mbps
Maximum Bandwidth	< 1Gbps

Bandwidth of VERSA-4K System depends on number of senders used in the system, which can be calculated using this simple formula:

$$\text{Bandwidth Required} = \text{Number of Senders} * 1\text{Gbps}$$

For example, if your system has 10 Senders (VERSA-4K-S), you need have a network switch with 10Gbps bandwidth (Also referred as Switch Bandwidth).

## 3.0 Network Switch Requirements

Network switch is the critical part of VERSA-4K system as the scalability and performance of the system depends on the switch configuration. We recommend an Isolated Managed Network Switch or a Dedicated VLAN on existing network. Jumbo Frame is required for 4K video, however in VERSA-4K it is enabled by default. So, network switches must support JUMBO Frame. IGMPV2 is always required if you have more than one sender. See [Section 6.0](#) - *General Switch Configuration Steps* for more information

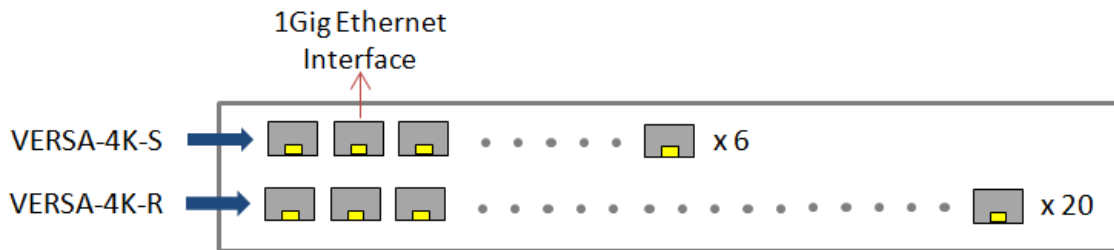
### Minimum Network Switch Requirements:

1. IGMPV2
2. JUMBO Frame (8K)
3. Gigabit Ethernet
4. DHCP Server (Optional as VERSA supports Auto IP)
5. PoE (Optional)
6. Stack and LAG Support (For Large Installations)

### 4.0 Single Switch configuration:

Single Switch Configuration is widely used in smaller installation where number of devices are less than or equal to number of available ports on the Network Switch. While using Single Switch configuration one must consider the Switch bandwidth (Sometimes referred as Switch Capacity or Switch Fabric Capacity). Secondly, IGMP and JUMBO frame must be enabled.

#### Example 1: 6 Senders and 20 Receivers setup using SG350-28P



#### VERSA-4K System Bandwidth Requirements:

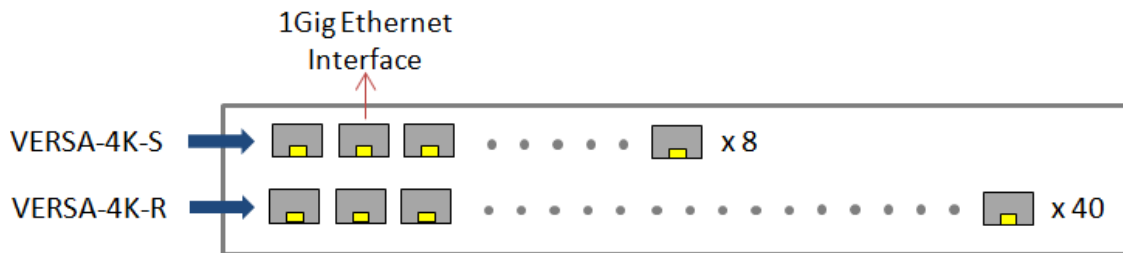
Bandwidth required for 6 Senders and 20 Receivers	6 Gbps
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From the [datasheet](#) of SG350-28P:

Switching Capacity in Gigabits per Second (Gbps)	56 Gbps
Number of PoE ports	26
Number of 1G Ethernet Interfaces	26
IGMP Querier	Yes
IGMPV2	Yes
IGMP Snooping	Yes
Jumbo Frame Support	Up to 9K
DHCP Server	Yes

This configuration shows 6 Sender and 20 Receivers. Even though the switch has enough bandwidth to server up to 50 Senders, however there are only 26 Ethernet Ports available on the switch.

**Example 2: 8 Senders and 40 Receivers setup using SG350-52P**



**VERSA-4K System Bandwidth Requirements:**

Bandwidth required for <b>8 Senders</b> and <b>40 Receivers</b>	8 Gbps
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From the [datasheet](#) of **SG350-52P**:

Switching Capacity in Gigabits per Second (Gbps)	104 Gbps
Number of PoE ports	48
Number of 1G Ethernet Interfaces	48
IGMP Querier	Yes
IGMPV2	Yes
IGMP Snooping	Yes
Jumbo Frame Support	Up to 9K
DHCP Server	Yes

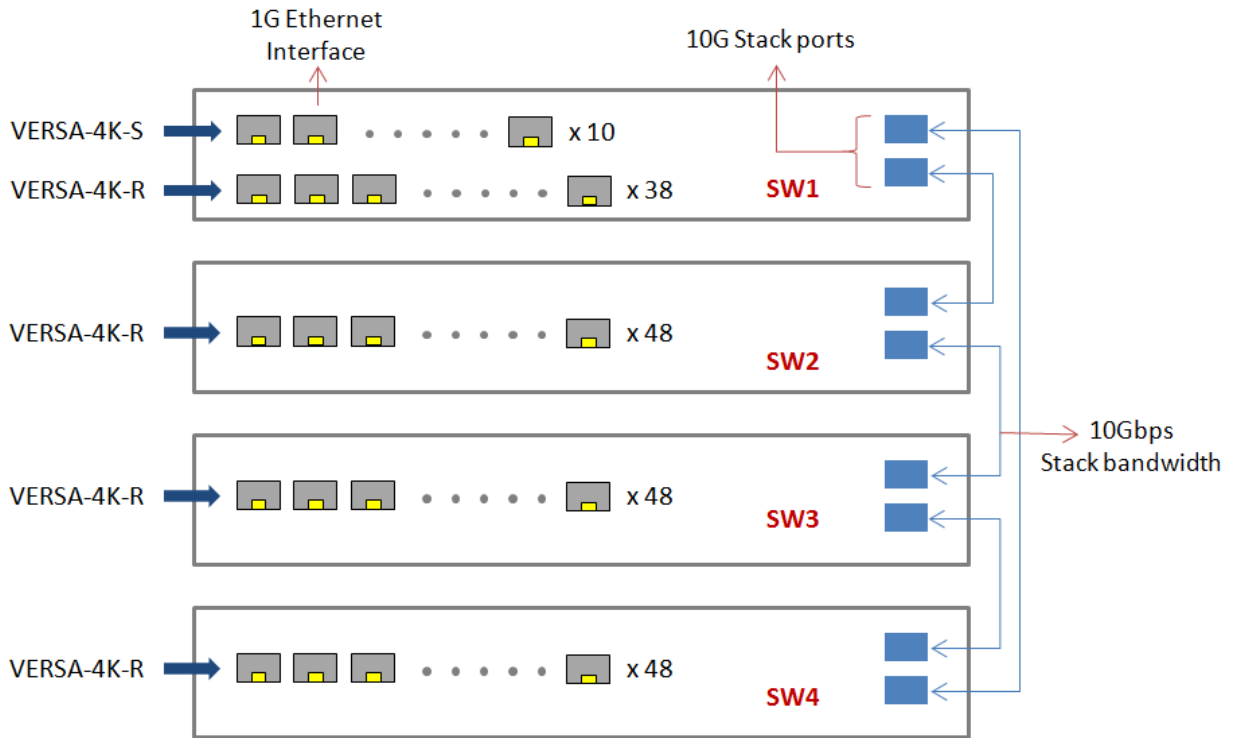
This configuration shows **8 Sender** and **40 Receivers**. Even though the switch has enough bandwidth to server up to **100 Senders**, however there are only 48 Ethernet Ports available on the switch.

**5.0 Stacked Switch configuration:**

In Stacked Switch configuration, multiple switches operate as one logical unit. This greatly simplifies the network management. Stacked switches are connected using **Stack Ports**, which can be an **Ethernet** or **SFP**, which typically operated at **10G** Speed. The stack ports must be configured in each switch, as by default they operated as regular Network Interfaces. The Example shown below uses **Ring Topology** to add more redundancy to the system. When using more than 10 Senders, multiple Stack links are needed to push the 10G barrier. This achieved

using **LAG** (Link Aggregate Group) protocol. LAG grouping multiplies various stack bandwidths configured to the switch as show in [Example 4](#).

**Example 3: 10 Senders and 182 Receivers setup using SG350X-48P**



Where:

SW1, SW2, SW3, SW4	Cisco SG350X-48P
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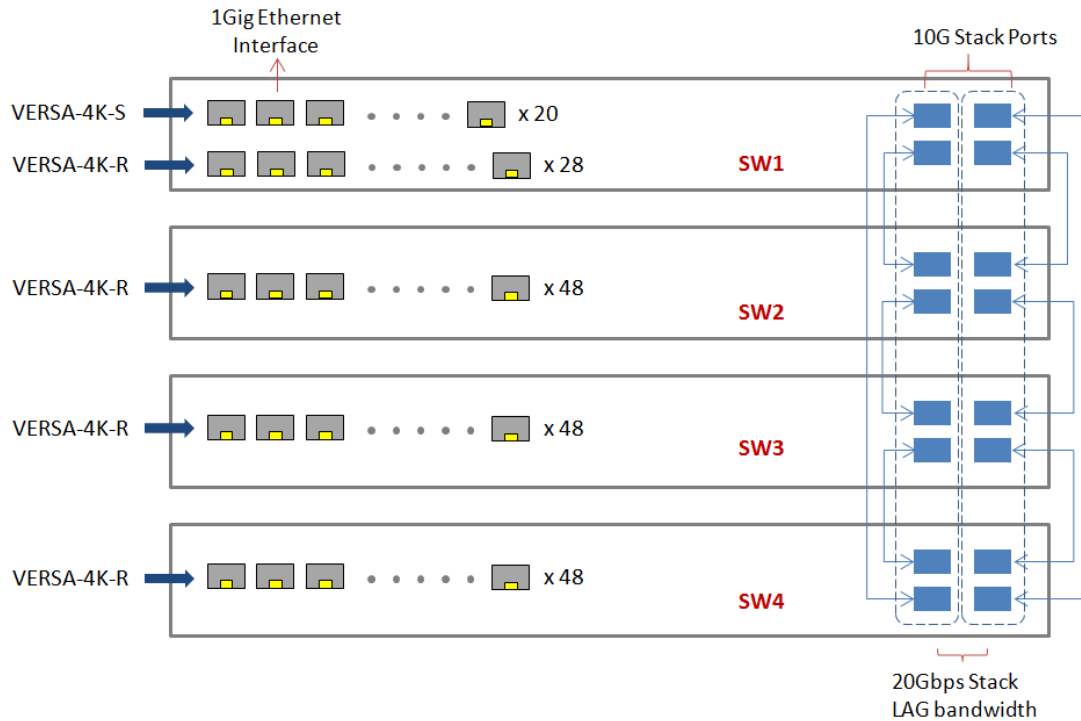
**VERSA-4K System Bandwidth Requirements:**

Number of Senders on SW1	10
Number of Receivers on SW1	38
Number of receivers on each switch (SW2, SW3, SW4)	48
Bandwidth Required for 10 Senders	10Gbps
Stack Bandwidth Required	10Gbps

From the [datasheet](#) of **SG350X-48P**

Number of 1GE Interfaces	48
Maximum number of switches that can be stacked	4
Number of <b>10G</b> Stack Port	4 (2x10GE + 2xSFP)
Total Stack Bandwidth achieved in Chain configuration	10Gbps

**Example 4: 20 Senders and 172 Receivers setup using SG350X-48P**



**Where:**

SW1, SW2, SW3, SW4	Cisco SG350X-48P
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**VERSA-4K System Bandwidth Requirements:**

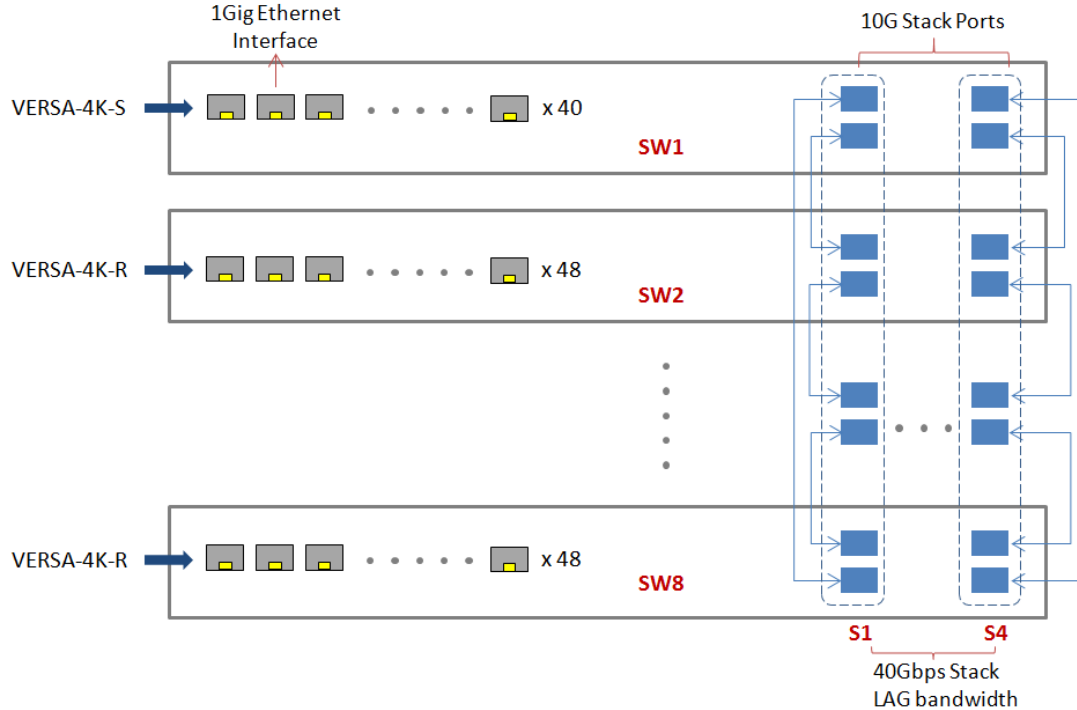
Number of Senders on SW1	20
Number of Receivers on SW1	28
Number of receivers on each switch (SW2, SW3, SW4)	48
Bandwidth Required for 20 Senders	20Gbps
LAG Stack Bandwidth Required	20Gbps

From the [datasheet](#) of **SG350X-48P**

Number of 1GE Interfaces available	48
Maximum number of switches that can be stacked	4
Number of <b>10G</b> Stack Port	4 (2x10GE + 2xSFP)
Total LAG Stack Bandwidth achieved in Chain configuration	20Gbps

The number of senders on SW1 is limited to 20 because of limited **10G stack ports** on the switch. The stack bandwidth can be extended using LAG grouping (Refer [Example 5](#)).

**Example 5: 40 Senders and 384 Receivers setup using SX550X-52**



**Where:**

SW1, SW2, SW3, SW4	Cisco SX550X-52
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**VERSA-4K System Bandwidth Requirements:**

Number of Senders on SW1	40
Number of receivers on each switch (SW2, SW3, SW4)	48
Number of	
Bandwidth Required for 40 Senders	40Gbps
LAG Stack Bandwidth Required	40Gbps

From the datasheet of **Cisco SX550X-52**

Number of 1GE Interfaces available	48
Maximum number of switches that can be stacked	8
Number of <b>10G</b> Stack Port	48
Total LAG Stack Bandwidth achieved in Chain configuration	40Gbps



## 6.0 Common mistakes done while configuring switch

1. A network switch rated as Gigabit does not mean all the ports supports **Gigabit Ethernet**.
2. A network switch with all Gigabit Ethernet ports doesn't mean that it can switch 1G data on all the ports simultaneously. A switch should have enough bandwidth to switch the packets coming from all the ports. This is also referred as **Switch Fabric Capacity / Switch Bandwidth**.
3. **IGMPV2** requires at least one **IGMP querier**, which is also called as **Multicast Router** in the network. IGMP will not work without IGMP Querier. Lack of IGMP will cause the multicast traffic to **flood** on all the ports. Lack of IGMP not only makes the Network inefficient but also degrades the performance of the senders, which is not meant to receive any Video traffic.
4. When switches are stacked, each switch in the chain should support **IGMP Snooping** and should include one **IGMP querier** in the network. In general, both managed and unmanaged switches support IGMP Snooping. Many managed switches have inbuilt querier and supports snooping capability. So, using only managed switches would be easier option. Some older switches that only support IGMP Snooping required static configuration to IGMP querier port as they cannot auto detect the querier.
5. **IGMP Proxy** is not IGMP querier, it is used to relay the IGMP messages to the IGMP querier on different network.
6. If switch has multiple **VLANs**, IGMPV2 must be enabled in each VLAN.
7. When stacking switches, your must have enough **Stack Bandwidth** to support all the Senders in the network.
8. Not all the ports can be used as **stack ports** and there a limit on number switches that stacked. Please refer the switch manufacturer datasheet before installing the Stacked Switch Configuration.
9. In stacked configuration each member in the stack should have unique **Stack ID**.
10. Note that you cannot **stack different brands** of switches together. Please refer the switch manufacturer datasheet before installing the Stacked Switch Configuration.

## 7.0 Reference:

1. VERSA-4K User Manual  
<http://www.hallresearch.com/page/products/VERSA-4K>
2. Cisco 350 Series Managed Switches Datasheet  
<https://www.cisco.com/c/en/us/products/collateral/switches/small-business-smart-switches/data-sheet-c78-737359.html>
3. Cisco 350X Series Stackable Managed Switches Datasheet  
<https://www.cisco.com/c/en/us/products/collateral/switches/350x-series-stackable-managed-switches/datasheet-c78-735986.html>
4. Cisco 550X Series Stackable Managed Switches Datasheet  
<https://www.cisco.com/c/en/us/products/collateral/switches/550x-series-stackable-managed-switches/datasheet-c78-735874.html>
5. IGMP configuration on the SG350 and SG550  
<https://www.cisco.com/c/en/us/support/docs/smb/switches/cisco-350-series-managed-switches/smb5292-igmp-snooping-on-the-sg350-and-sg550.html>
6. Configure Stack Settings on an SG350X Switch  
<https://www.cisco.com/c/en/us/support/docs/smb/switches/cisco-350x-series-stackable-managed-switches/smb5408-configure-stack-settings-on-an-sg350x-switch.html>
7. Configuring Link Aggregation Groups on the SG350XG and SG550XG  
<https://www.cisco.com/c/en/us/support/docs/smb/switches/cisco-350x-series-stackable-managed-switches/smb5098-configuring-link-aggregation-groups-on-the-sg350xg-and-sg550.html>



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