

## Ethernet Switches and ServSwitch™ Agility KVM-over-IP Extension

### Introduction

ServSwitch Agility is a KVM system that supports switching and extension of DVI, USB, and audio over an IP infrastructure. The flexible topology of the ServSwitch Agility gives you extension option applications that are brand new for KVM extenders. The Agility can be a KVM switch, a sharing portal, a DVI extender, and much, much more. It's up to you to decide how to configure it. It's also a very useful tool for multicasting video over an IP network, which makes the ServSwitch Agility ideal for digital signage and healthcare, education, and corporate applications where you need to share video content with distant users.

This application note discusses important interoperability considerations when choosing Ethernet switches for use with Agility systems. The note covers Ethernet switch performance requirements for IP multicasting and provides test topologies and results for several Black Box Ethernet switches.

### ServSwitch Agility™ Product Highlights

- Flexible topology for KVM extension.
- Delivers perfect digital video with no loss.
- No-loss compression minimizes bandwidth use while maximizing the user experience.
- Configurable: point-to-point, KVM switching, single-target sharing, or multicasting.
- Scalable to grow your network as needed.



### Switching Network

With the ServSwitch Agility, you can create a KVM switching system with as many users as you want—just keep adding receivers for every user console. With mixed channels, you can combine digital video, audio, and USB devices from different computers. When you change channels on the receiver, you'll switch DVI, audio, and USB to another source, while the transmitters not in use will continue to emulate the previously attached console.

### Multicasting

This unique feature enables the Agility to multicast video and audio content from a single computer over an IP network to several receiving units. Multicast content can be sent to as many receivers as you want with no distance limitations within the network. This is an ideal configuration for digital signage applications.

To prevent saturating the network, an installed network switch should feature Internet Group Management Protocol (IGMP) snooping. This prevents an IP switch from passing on multicast data onto ports that aren't part of the Agility system.

### Ethernet switch requirements for multicasting with ServSwitch Agility

You will need Ethernet switches with these minimum features:

- Gigabit (1000-Mbps) or faster Ethernet ports.
- Support for IGMP v2 (or v3) snooping.
- Support for jumbo frames (packets) up to 9216-byte size. You must also enable jumbo frames when configuring the switches.
- High-bandwidth connections between switches and Gigabit speed.

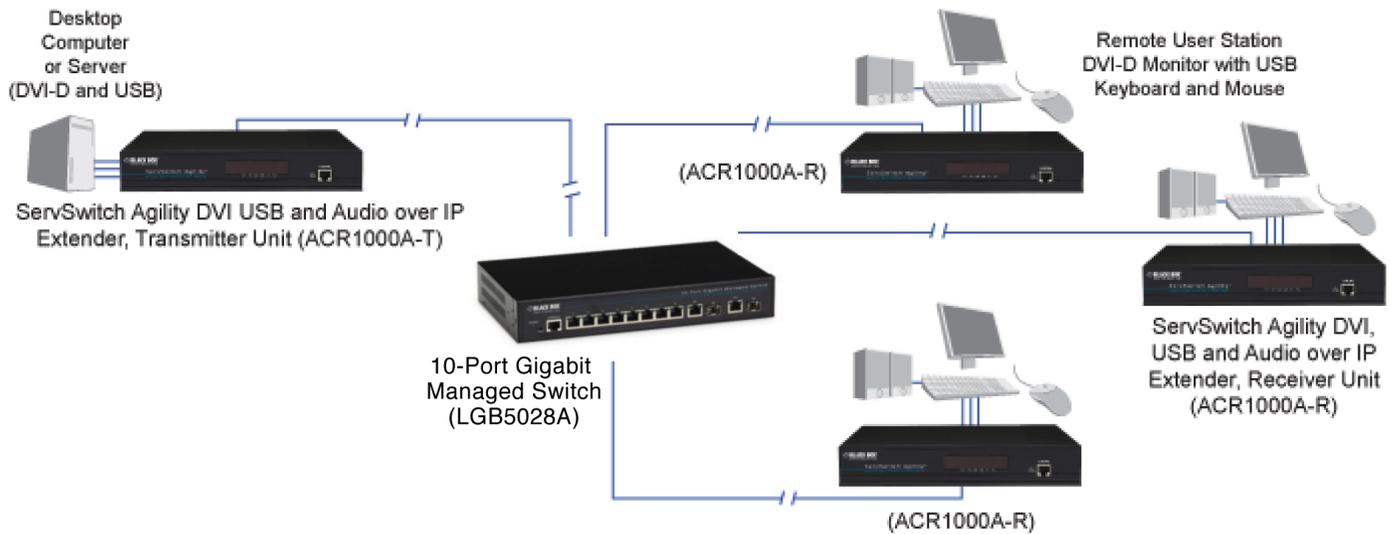
**You should also:**

- Look specifically for switches that perform their most difficult tasks (for example, IGMP snooping) using multiple dedicated processors. That is, the tasks are carried out in custom ASIC hardware rather than software routines on a general processor.
- Check the maximum number of concurrent “snoopable groups” each switch can handle and make sure they meet or exceed the number of Agility transmitters that you will use to create multicast groups.
- Check the throughput speeds of the switch. Make sure each port is full-duplex (providing bidirectional communications) and that the up- and downstream data speeds for each port are 1-Gbps.
- If possible, use the same switch manufacturer throughout a subnet and the same model of switch. This will simplify the configuration and reduce the chances of compatibility issues.
- When choosing Layer 3 switches for the network, at least one must be capable of operating as an IGMP querier.

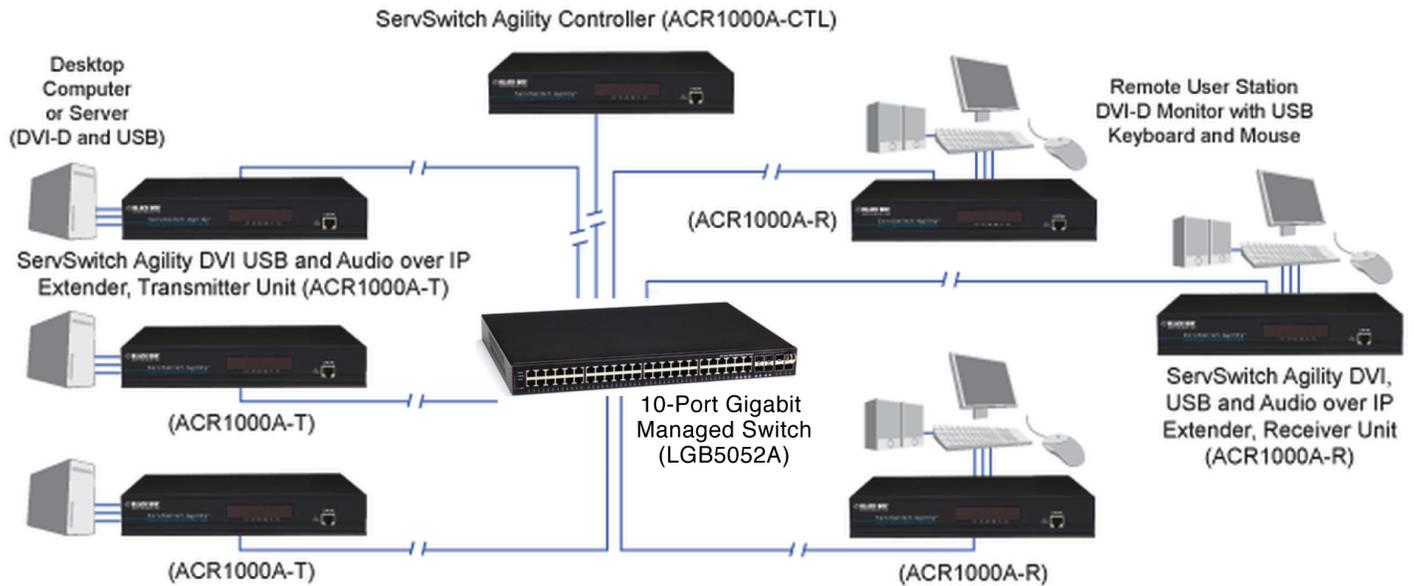
**Recommended Black Box Ethernet Switches**

We tested our Layer 2 Ethernet switches with the ServSwitch Agility in different configurations to provide these recommendations.

**1. One transmitter to many receivers.**



## 2. Many transmitters to many receivers.



All tests were done with ACR1000A Units (single-head) with a full-HD resolution. For these tests, the average bandwidth per Rx stream is about 500 Mbps.

We used 24-AWG CAT5e/6 cables to connect the ServSwitch Agility units to the switches, for the connection between the switches over the configured trunk ports, and over the fiber ports.

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## Tested Products

Product Number	Tech Specs:
Gigabit Managed Switch, 10-Port (LGB1108A)	<b>Connectors</b> — (8) 10-/100-/1000-Mbps RJ-45; (2) dual-media ports each with (1) 10-/100-/1000-Mbps RJ-45 and (1) SFP, (1) RJ-45 (serial console connection) <b>Switch Capacity</b> — 20 Gbps; Throughput: 14.88 Mpps
Gigabit Ethernet Managed Switch, 24+4-Port (LGB5028A)	<b>Connectors</b> — (20) 10-/100-/1000-Mbps RJ-45; (4) dual-media ports, each with (1) 10-/100-/1000-Mbps RJ-45 and (1) SFP;(4) 1-/10-Gbps SFP+ <b>Switch Capacity</b> —128 Gbps; Throughput: 95.2 Mpps
Gigabit Ethernet Managed Switch, 48+4-Port (LGB5052A)	<b>Connectors</b> — (44) 10-/100-/1000-Mbps RJ-45; (4) dual-media ports, each with (1) 10-/100-/1000-Mbps RJ-45 and (1) SFP; (4) 1-/10-Gbps SFP+ <b>Switch Capacity</b> — 176 Gbps; Throughput: 130.95 Mpps

## Summary

Regarding the test setups, here are the results in a Pass/Fail table.

Ethernet Switches	up to Tx and Rx	1 Tx x 5 Rx	1 Tx x 10 Rx	5 Tx x 5 Rx	5 Tx x 10 Rx	10 Tx x 10 Rx	20 Tx x 20 Rx
LGB5052A	Pass	Pass	Pass	Pass	Pass	Pass	Pass
LGB5028A	Pass	Pass	Pass	Pass	Pass	Fail	—
LGB1108A	Pass	—	—	—	—	—	—

## Switch Configuration Example

1. Setup for the trunk ports if you use two Ethernet switches.

### LACP Port Configuration

Port	LACP Enabled	Key	Role
*	<input type="checkbox"/>	<>	<>
1	<input type="checkbox"/>	Auto	Active
2	<input type="checkbox"/>	Auto	Active
3	<input type="checkbox"/>	Auto	Active
4	<input type="checkbox"/>	Auto	Active
5	<input type="checkbox"/>	Auto	Active
6	<input type="checkbox"/>	Auto	Active
7	<input type="checkbox"/>	Auto	Active
8	<input type="checkbox"/>	Auto	Active
9	<input type="checkbox"/>	Auto	Active
10	<input type="checkbox"/>	Auto	Active
11	<input type="checkbox"/>	Auto	Active
12	<input type="checkbox"/>	Auto	Active
13	<input type="checkbox"/>	Auto	Active
14	<input type="checkbox"/>	Auto	Active
15	<input type="checkbox"/>	Auto	Active
16	<input type="checkbox"/>	Auto	Active
17	<input type="checkbox"/>	Auto	Active
18	<input type="checkbox"/>	Auto	Active
19	<input type="checkbox"/>	Auto	Active
20	<input type="checkbox"/>	Auto	Active
21	<input type="checkbox"/>	Auto	Active
22	<input type="checkbox"/>	Auto	Active
23	<input checked="" type="checkbox"/>	Auto	Active
24	<input checked="" type="checkbox"/>	Auto	Active
25	<input type="checkbox"/>	Auto	Active
26	<input type="checkbox"/>	Auto	Active

Enable LACP on the ports you want. Role must be active on switch one and passive on switch two.

## 2. Add VLANs.

The screenshot shows the 'VLAN Membership Configuration' interface. It features a table with columns for 'Delete', 'VLAN ID', 'VLAN Name', and 'Port Members' (ports 1-48). The 'default' VLAN is selected. Below the table are buttons for 'Add New VLAN', 'Apply', and 'Reset'. A green callout box with a pointer to the 'Add New VLAN' button contains the text: 'Add VLANs and define which ports they should be connected to.'

## 3. Define your port types for the VLAN ports.

The screenshot shows the 'VLAN Port Configuration' interface for 'Ethertype for Custom S-ports 0x36A8'. It displays a table with columns for 'Port', 'Port Type', 'Ingress Filtering', 'Frame Type', 'Egress Rule', and 'PVID'. A dropdown menu is open for port 5, showing options: 'Unaware', 'C-port', 'S-port', and 'S-custom-port'. A green callout box with a pointer to the 'S-custom-port' option contains the text: 'Define your port types, etc.'

4. Enable IGMP snooping.

**IGMP Snooping Configuration**

**Global Configuration**

Snooping Enabled	<input checked="" type="checkbox"/>
Unregistered IP/MCv4 Flooding Enabled	<input type="checkbox"/>
IGMP SSM Range	232.0.0.0 / 8
Proxy Enabled	<input type="checkbox"/>

**Port Related Configuration**

Port	Router Port	Fast Leave	Throttling
*	<input type="checkbox"/>	<input type="checkbox"/>	<>
1	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
2	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
3	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
4	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
5	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
6	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
7	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
8	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
9	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
10	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
11	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
12	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
13	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
14	<input type="checkbox"/>	<input type="checkbox"/>	unlimited
15	<input type="checkbox"/>	<input type="checkbox"/>	unlimited

Enable IGMP snooping on the global level.

5. Enable IGMP snooping on the VLAN level.

**IGMP Snooping VLAN Configuration**

Start from VLAN 1 with 20 entries per page.

VLAN ID	Snooping Enabled	IGMP Querier	Compatibility	RV	QI (sec)	QRI (0.1 sec)	LLQI (0.1 sec)	URI (sec)
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IGMP-Auto	2	125	100	10	1
100	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	-	-	-	-
101	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	-	-	-	-

Apply Reset

Make the settings for each VLAN. For example, using two switches, set ONLY one switch as IGMP querier.

6. Save everything in "Save Start."

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## About Black Box

Black Box provides an extensive range of networking and infrastructure products. You'll find everything from cabinets and racks and power and surge protection products to media converters and Ethernet switches all supported by free, live 24/7 Tech support available in 60 seconds or less.

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