CISCO SG300

WHITEPAPER

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JADConfig Setup

Concept

JADConfig setup uses a managed switch and the nature of VLANs to isolate video signals from each other and from the data network. Ports are set into General Mode to accommodate IP communication to all devices at all times regardless of their VLAN membership. To switch sources, port-VLAN membership is changed within the switch.

JADConfig setup provides basic matrix switching plus endpoint control of Just Add Power devices (video wall, CEC, RS232, IR, USB, OSD, etc.) This method **requires** an IP connection from the control system to the switch.

Attributes

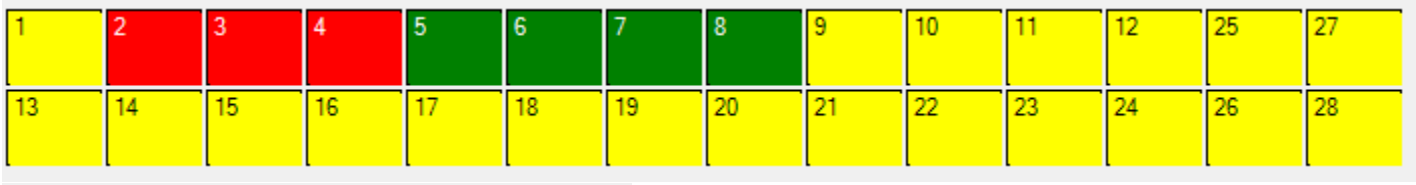A JADConfig-compatible setup has these benefits & features:

- Instant-seamless switching
- HDMI matrix switching
- Endpoint control via RS232, IR, or CEC
- Video Wall
- USB
- On-Screen Display
- Image Pull
- Tiling Transmitter layout control
- Video traffic separated from data network traffic
- Just Add Power devices do not need to be configured for HDMI matrix switching
- No practical source or display limitations

A JADConfig-compatible setup has these drawbacks:

- Requires a managed Ethernet switch
- Switching involves reconfiguring the managed Ethernet switch
- Switching commands are switch-specific

Switch Setup

The example set-up will include 3 Transmitters and 4 Receivers. Port 1 is used as a data network port so the IP-based control system can communicate with the switch. The 3 Transmitters are connected to ports 2-4. The 4 Receivers are connected to ports 5-8.

1	2	3	4	5	6	7	8	9	10	11	12	25	27
13	14	15	16	17	18	19	20	21	22	23	24	26	28

Key: | Control | | TX | | RX |

1. Connect to the switch with the included console cable and create a serial connection to the switch at a baud rate of `115200-8n1`.
2. Power on the switch and allow it to run through the boot sequence. When it finishes, the prompt will ask for a username and password. Both are `cisco`.
3. When it asks to change the password, type `N`. This will exit from the initial set-up dialog and go to the command line interface (CLI).

```
User Name:cisco
Password:*****

Please change your password from the default settings. Please change the passwor
d for better protection of your network. Do you want to change the password (Y/N
)[Y] ?
```

NOTE: All of the CLI commands below must be typed starting at the `switch#` prompt. Sending `end` as the last command returns to that prompt. If the switch gets into the `switch>` prompt, send `enable` and enter the switch password to return to the `switch#` prompt.

```
switch7aa1b3>enable
Password:*****
switch7aa1b3#
```

4. Enable router mode on the switch. If the switch prompts for a reboot, let it happen.

```
set system mode router
```

```
switchb471cc#set system mode router
```

5. Enable telnet and Jumbo Frames.

```
config
ip telnet server
port jumbo-frame
end
```

```
switch21c1de#config
switch21c1de(config)#ip telnet server
switch21c1de(config)#port jumbo-frame
This setting will take effect only after copying running configuration to startu
p configuration and resetting the device
switch21c1de(config)#end
```

6. Create and set the IP of the control VLAN (1). For this example, we will set the IP address for 192.168.1.200 and subnet mask for 255.255.255.0.

```
config
interface vlan 1
ip address 192.168.1.200 255.255.255.0
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#interface vlan 1
switch7aa1b3(config-if)#ip address 192.168.1.200 255.255.255.0
switch7aa1b3(config-if)#end
```

7. Set the default gateway of the switch. For this example, the router IP is 192.168.1.1.

```
config
ip default-gateway 192.168.1.1
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#ip default-gateway 192.168.1.1
switch7aa1b3(config)#end
```

8. Create VLANs for Transmitters and Receivers. One VLAN is needed to hold all devices, and one VLAN is needed **per** Transmitter.

```
config
vlan database
vlan 10-13
end
```


NOTE: JADConfig uses VLAN 10 for all devices and VLANs 11 and up for Transmitters. In a custom system, any VLAN number can be used.

9. Put the Transmitter ports in general mode and assign VLANs. Transmitter ports have membership in VLAN 10 and their unique VLAN, with the Primary VLAN ID (PVID) being their unique VLAN.

```
config
interface gi2
switchport mode general
switchport general allowed vlan add 10,11 untag
switchport general pvid 11
interface gi3
switchport mode general
switchport general allowed vlan add 10,12 untag
switchport general pvid 12
interface gi4
switchport mode general
switchport general allowed vlan add 10,13 untag
switchport general pvid 13
end
```


10. Put the Receiver ports in general mode and assign VLANs. Receiver ports have membership in VLAN 10 and the VLAN of the Transmitter they are watching, with the Primary VLAN ID (PVID) being the VLAN for all devices (VLAN 10). In this example, Receiver ports are set to watch the VLAN 11 Transmitter.

```
config
interface range gi5-8
switchport mode general
switchport general allowed vlan add 10,11 untag
switchport general pvid 10
end
```


11. Turn on *spanning-tree portfast* for all Just Add Power ports. This enables instant-seamless switching.

```
config
interface range gi2-8
spanning-tree portfast
end
```

12. **<u>Optional:</u>** Set the console and telnet session to stay open indefinitely.

```
config
line console
exec-timeout 0
line telnet
exec-timeout 0
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#line console
switch7aa1b3(config-line)#exec-timeout 0
switch7aa1b3(config-line)#line telnet
switch7aa1b3(config-line)#exec-timeout 0
switch7aa1b3(config-line)#end
```

13. **<u>Optional:</u>** Turn off username and password checking when logging into the switch. This is useful for custom-written control system drivers if navigating the username/password prompts cause issues.

```
config
aaa authentication enable default none
aaa authentication login default none
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#aaa authentication enable default none
switch7aa1b3(config)#aaa authentication login default none
switch7aa1b3(config)#end
```

14. Save the current configuration.

```
copy running-config startup-config
y
```

```
switch7aa1b3#copy running-config startup-config
Overwrite file [startup-config].... (Y/N)[N] ?
```

DANGER: Do NOT change the file name when saving. The only file the switch looks for is `startup-config`.

Congratulations! The SG300 switch is configured to work with Just Add Power Transmitters and Receivers.
Matrix switching will work immediately.

HDMI Matrix Switching Commands

To switch sources, the control system will access the Cisco SG300 CLI via telnet.

A Receiver is always watching the Transmitter that it shares a VLAN with. There cannot be two Transmitters in the same VLAN, so changing the VLAN membership of the Receiver port changes the source the Receiver is watching.

Example: The Receiver in **port X** needs to watch the Transmitter in **VLAN Y**.

```
enable
config
interface giX
switchport general allowed vlan remove 11-410
switchport general allowed vlan add Y untag
end
```

(Each line ends in a carriage return)

NOTE: "remove 11-410" assumes that the Just Add Power Transmitter VLANs are between 11-410 and will work for any installation with fewer than 400 Transmitters. If there are more Transmitters, the remove value needs to include all Just Add Power Transmitter VLANs.

Example Running Configuration

Once the switch is configured, view the full details with the command:

```
show running-config
```

The resulting output (after hitting the Space Bar a couple of times) will look like what is shown below if all instructions are followed for a 3-source, 5-display switch configuration.

```
Switch7aa1b3#show running-config
config-file-header
switch7aa1b3
v1.4.8.6 / R800_NIK_1_4_202_008
CLI v1.0
set system mode router

file SSD indicator encrypted
@
ssd-control-start
ssd config
ssd file passphrase control unrestricted
no ssd file integrity control
ssd-control-end cb0a3fdb1f3a1af4e4430033719968c0
!
port jumbo-frame
vlan database
vlan 10-13
exit
voice vlan oui-table add 0001e3 Siemens_AG_phone_____
voice vlan oui-table add 00036b Cisco_phone_____
voice vlan oui-table add 00096e Avaya_____
voice vlan oui-table add 000fe2 H3C_Aolynk_____
voice vlan oui-table add 0060b9 Philips_and_NEC_AG_phone
voice vlan oui-table add 00d01e Pingtel_phone_____
voice vlan oui-table add 00e075 Polycom/Veritel_phone___
voice vlan oui-table add 00e0bb 3Com_phone_____
bonjour interface range vlan 1
hostname switch7aa1b3
line console
exec-timeout 0
exit
line telnet
exec-timeout 0
exit
ip telnet server
!
interface vlan 1
 ip address 192.168.1.200 255.255.255.0
 no ip address dhcp
!
interface gigabitethernet2
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10-11 untagged
 switchport general pvid 11
!
interface gigabitethernet3
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10,12 untagged
 switchport general pvid 12
!
interface gigabitethernet4
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10,13 untagged
```

```
 switchport general pvid 13
!
interface gigabitethernet5
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10-11 untagged
 switchport general pvid 10
!
interface gigabitethernet6
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10-11 untagged
 switchport general pvid 10
!
interface gigabitethernet7
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10-11 untagged
 switchport general pvid 10
!
interface gigabitethernet8
 spanning-tree portfast
 switchport mode general
 switchport general allowed vlan add 10-11 untagged
 switchport general pvid 10
!
exit
ip default-gateway 192.168.1.1
```

Multicast Switching Setup

Concept

Multicast Switching is only available on 3G devices on **Firmware A7.x** and later

Multicast switching uses an unmanaged switch – or a managed switch in which all Just Add Power devices are part of the same VLAN – and the nature of multicast subscriptions to direct video and audio to specific devices. Each Transmitter is assigned a unique Multicast IP. To switch sources, the Receiver's Multicast IP is set to the Multicast IP of the Transmitter it will view.

Multicast switching setup provides basic matrix switching plus endpoint control of Just Add Power devices (video wall, CEC, RS232, IR, USB, OSD, etc.) This method **requires** an IP connection from the control system to the switch.

Attributes

Multicast switching setup has these benefits & features:

- HDMI matrix switching
- Endpoint control via RS232, IR, or CEC
- Video Wall
- USB
- On-Screen Display
- Image Pull
- Tiling Transmitter layout control
- Switch configuration never changes
- Managed Ethernet switch not needed if isolated

Multicast switching setup has these drawbacks:

- Loss of instant-seamless switching; fast but not instant
- All Just Add Power devices must be configured with static IPs
- Cannot share data traffic and video traffic on same switch without some switch configuration

Switch Setup

If the switch will have only Just Add Power devices and the control system attached, no switch setup is necessary aside from enabling jumbo frames. See step 4 below.

If the switch will have other devices attached, management is necessary to separate Just Add Power devices from the standard network. The example set-up will include 3 Transmitters and 4 Receivers: Transmitters are connected to ports 2-4 and Receivers are connected to ports 5-8.

1	2	3	4	5	6	7	8	9	10	11	12	25	27
13	14	15	16	17	18	19	20	21	22	23	24	26	28

1. Connect to the switch with the included console cable and create a serial connection to the switch at a baud rate of `115200-8n1`.
2. Power on the switch and allow it to run through the boot sequence. When it finishes, the prompt will ask for a username and password. Both are `cisco`.
3. When it asks to change the password, type `N`. This will exit from the initial set-up dialog and go to the command line interface (CLI).

```
User Name:cisco
Password:*****

Please change your password from the default settings. Please change the passwor
d for better protection of your network. Do you want to change the password (Y/N
)[Y] ?
```

NOTE: All of the CLI commands below must be typed starting at the `switch#` prompt. Sending `end` as the last command returns to that prompt. If the switch gets into the `switch>` prompt, send `enable` and enter the switch password to return to the `switch#` prompt.

```
switch7aa1b3>enable
Password:*****
switch7aa1b3#
```

4. Enable Jumbo Frames to increase the allowed packet size.

```
config
port jumbo-frame
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#port jumbo-frame
This setting will take effect only after copying running configuration
 to startup configuration and resetting the device
switch7aa1b3(config)#end
```

5. Create one VLAN to hold all Just Add Power ports. For this example we'll use VLAN 2.

```
config
vlan database
vlan 2
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#vlan database
switch7aa1b3(config-vlan)#vlan 2
switch7aa1b3(config-vlan)#end
```

6. Make all Just Add Power ports a member of VLAN 2.

```
config
interface range gi2-8
switchport mode access
switchport access vlan 2
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#interface range gi2-8
switch7aa1b3(config-if-range)#switchport mode access
switch7aa1b3(config-if-range)#switchport access vlan 2
switch7aa1b3(config-if-range)#end
```

7. Give an IP address to VLAN 2 that is in the same subnet as the Just Add Power devices. We recommend using the first available IP: 10.0.0.1 for this example

```
config
interface vlan 2
ip address 10.0.0.1 255.0.0.0
end
```

```
switch7aa1b3#config
switch7aa1b3(config)#interface vlan 2
switch7aa1b3(config-if)#ip address 10.0.0.1 255.0.0.0
switch7aa1b3(config-if)#end
```

8. Enable IGMP Snooping on the VLAN with Just Add Power devices.

```
config
ip igmp snooping
ip igmp snooping vlan 2
ip igmp snooping vlan 2 immediate-leave
end
```

```
switch21c1de#config
switch21c1de(config)#ip igmp snooping
switch21c1de(config)#ip igmp snooping vlan 2
switch21c1de(config)#ip igmp snooping vlan 2 immediate-leave
switch21c1de(config)#end
```

9. Save the current configuration.

```
copy running-config startup-config
y
```

```
switch7aa1b3#copy running-config startup-config
Overwrite file [startup-config].... (Y/N)[N] ?
```

Congratulations! The SG300 switch is configured to work with multicast switching.

HDMI Matrix Switching Commands

To switch sources, the control system will access the Just Add Power Receiver via telnet or API. Then set the Multicast IP of the Receiver to match the Multicast IP of the Transmitter using the commands below.

See Multicast Switching documentation for more information.

Example Running Configuration

Once the switch is configured, view the full details with the command:

```
show running-config
```

The resulting output (after hitting the Space Bar a couple of times) will look like what is shown below if all instructions are followed for a 3-source, 5-display switch configuration.

```
switch7aa1b3#show running-config
config-file-header
switch7aa1b3
v1.4.8.6 / R800_NIK_1_4_202_008
CLI v1.0
set system mode router

file SSD indicator encrypted
@
ssd-control-start
ssd config
ssd file passphrase control unrestricted
no ssd file integrity control
ssd-control-end cb0a3fdb1f3a1af4e4430033719968c0
!
vlan database
vlan 2
exit
voice vlan oui-table add 0001e3 Siemens_AG_phone_____
voice vlan oui-table add 00036b Cisco_phone_____
voice vlan oui-table add 00096e Avaya_____
voice vlan oui-table add 000fe2 H3C_Aolynk_____
voice vlan oui-table add 0060b9 Philips_and_NEC_AG_phone
voice vlan oui-table add 00d01e Pingtel_phone_____
voice vlan oui-table add 00e075 Polycom/Veritel_phone___
voice vlan oui-table add 00e0bb 3Com_phone_____
bonjour interface range vlan 1
hostname switch7aa1b3
!
interface vlan 1
 ip address 192.168.1.252 255.255.255.0
 no ip address dhcp
!
interface vlan 2
 ip address 10.0.0.1 255.0.0.0
!
interface gigabitethernet2
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet3
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet4
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet5
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet6
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet7
```

```
 switchport mode access
 switchport access vlan 2
!
interface gigabitethernet8
 switchport mode access
 switchport access vlan 2
!
exit
ip igmp snooping
ip igmp snooping vlan 2
ip igmp snooping vlan 2 immediate-leave
```

Troubleshooting

1. The switch lost power in the middle of configuration

   None of the commands that were entered were saved. Restart the configuration at the beginning.

2. The switch needs to be reset to default

   On the front left side of the switch is a small opening labeled *Reset*. Holding that button down (use a paperclip or pin) for more than 20 seconds will reset the switch to factory default settings.

   Alternatively, enter the following CLI commands to reset the switch to the default settings:

   ```
   delete startup-config
   y
   reload
   y
   ```

   ```
   switch7aa1b3#delete startup-config
   Delete startup-config? (Y/N)[N] Y
   switch7aa1b3#reload
   You haven't saved your changes. Are you sure you want to
   continue ? (Y/N)[N] Y
   ```