
RWL Tech Note

IRF Configuration



Prepared by
Richard Litchfield
HP Networking Solution Architect

Hewlett-Packard Australia Limited
410 Concord Road
Rhodes NSW 2138

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Please send comments or corrections to: Richard Litchfield, rw1@hp.com.

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1. Introduction

1.1. Purpose and Scope

HP Networking is the networking division of Hewlett Packard. The extensive product line-up includes products that range from high-end core network functionality down to small SMB unmanaged switches.

This document will focus on the A5820 and A5800 Comware switches that are ideally suited for linking together with Intelligent Resilient Framework (IRF) to form a single logical entity – a virtual switch. The information provided in this document is designed to assist a suitably skilled practitioner to understand and then design or implement a network environment based on the HP Networking Comware switches with IRF.

The majority of examples provided in this document can be applied to other Comware switches that also support IRF, such as the A7500 and A12500. Note that the current maximum number of IRF members on the chassis-based switches is typically 4.

1.2. Sample Configurations

HP Networking has developed one or more sample configurations to show possible configuration scenarios of IRF on the Comware switches. They are samples only, and do not take into account specific requirements or restrictions that may be present in a customer production environment.

1.3. Related Documents and References

Version/Date	Author	Document Name
Jul-2010	Richard Litchfield	RWL Tech Note – HPN A Series C-Class Connectivity
17-Nov-2010	Richard Litchfield	RWL Tech Note – A5500 IRF
2011	Jeff Dziedzic	IRF Config process for most devices



1.4. Public References

1.4.1. General Information

<http://www.hp.com/go/convergedinfrastructure>

HP Converged Infrastructure

<http://forums.itrc.hp.com/>

Support forums for all HP products

<http://www.visiocalfe.com/hp.htm>

Hewlett Packard Visio collection: HP's official Visio collection includes front and rear physical shapes as well as "logical" shapes and 3D Isometric Collection which are used for detailed design drawings.

1.4.2. HP Networking

<http://www.hp.com/go/networking>

The HP Networking starting point!

<http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp?lang=en&cc=us&prodTypeId=12883&prodSeriesId=4218345&task=&lang=en&cc=us>

HP A5820 Switch Series Support (firmware, support, etc)

<http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&lang=en&cc=us&docIndexId=64179&taskId=101&prodTypeId=12883&prodSeriesId=4218345>

Manuals for the A5820 Series switches

1.5. Definitions and Abbreviations

HP	Hewlett Packard
HPN	HP Networking
CLI	Command Line Interface
IRF	Intelligent Resilient Framework
HPGM	HP Global Method (Project Management)
NIC	Network Interface Card
OS	Operating System
STP	Spanning Tree Protocol
VLAN	Virtual Local Area Network

1.6. Conventions used in this Document

CLI switch output.

Specific CLI commands.

Key items to focus on.



2. Preparation

2.1. Equipment Used

2.1.1. A5820 – Number1

The first switch is an A5820 with 14x 10Gb SFP+ ports and 4x 1Gb RJ45 ports, labelled “Number1”.

```
[Number1]display version
H3C Comware Platform Software
Comware Software, Version 5.20, Release 1206
Copyright (c) 2004-2010 Hangzhou H3C Tech. Co., Ltd. All rights reserved.
H3C S5820X-28C uptime is 0 week, 0 day, 1 hour, 2 minutes
```

```
H3C S5820X-28C with 2 Processor
512M bytes SDRAM
4M bytes Nor Flash Memory
512M bytes Nand Flash Memory
Config Register points to Nand Flash
```

```
Hardware Version is Ver.B
CPLDA Version is 003, CPLDB Version is 003
BootRom Version is 205
[SubSlot 0] 14SFP Plus+4GE Hardware Version is Ver.B
[SubSlot 1] No Module
[SubSlot 2] No Module
[SubSlot 3] No Module
```

```
[Number1]display stp
Protocol Status      :disabled
Protocol Std.       :IEEE 802.1s
Version             :3
CIST Bridge-Prio.   :32768
MAC address         :0023-89ed-daca
Max age(s)         :20
Forward delay(s)    :15
Hello time(s)       :2
Max hops            :20
```



2.1.2. A5800 – Number2

The second switch is an A5800 with 4x 10Gb SFP+ ports and 48x 1Gb RJ45 ports, labelled “Number2”.





2.1.3. A5800 – Number3

The third switch is an A5800 with 4x 10Gb SFP+ ports and 24x 1Gb RJ45 ports, labelled “Number3”.

```
[Number3]display version
H3C Comware Platform Software
Comware Software, Version 5.20, Release 1206
Copyright (c) 2004-2010 Hangzhou H3C Tech. Co., Ltd. All rights reserved.
H3C S5800-32C uptime is 0 week, 0 day, 0 hour, 19 minutes
```

```
H3C S5800-32C with 2 Processor
512M bytes SDRAM
4M bytes Nor Flash Memory
512M bytes Nand Flash Memory
Config Register points to Nand Flash
```

```
Hardware Version is Ver.B
CPLD Version is 003
BootRom Version is 205
[SubSlot 0] 24GE+4SFP Plus Hardware Version is Ver.B
[SubSlot 1] No Module
```

```
[Number3]display stp
Protocol Status :disabled
Protocol Std. :IEEE 802.1s
Version :3
CIST Bridge-Prio. :32768
MAC address :3ce5-a610-7388
Max age(s) :20
Forward delay(s) :15
Hello time(s) :2
Max hops :20
```



2.2. Existing Configuration

IRF is not configured on any of the switches. Switches would show something similar to this output:

```
[Number3]display irf configuration
MemberID NewID IRF-Port1 IRF-Port2
1 1 disable disable
```

Any cables that will link the switches should be left disconnected until specified.



3. IRF Configuration

3.1. Switch 1 Config

3.1.1. Priority and Port Shutdown

The first switch will be given the highest priority (32) so that it will be the master switch. The higher the priority number, the more likely the switch is to become the master of the IRF group.

```
[Number1] irf member 1 priority 32
```

All ports that will be IRF ports need to be shutdown.

```
[Number1] int Ten-GigabitEthernet1/0/14  
[Number1-Ten-GigabitEthernet1/0/14] shutdown
```

Save the configuration and reboot!

3.1.2. IRF-ports

IRF-ports are used to define the IRF links between the switches. IRF-port 1 can only ever connect to IRF-port 2.

Configure IRF port 1:

```
[Number1] irf-port 1/1  
[Number1-irf-port1/1] port group interface Ten-GigabitEthernet 1/0/14 mode enhanced
```

Enable the interface:

```
[Number1] int Ten-GigabitEthernet 1/0/14  
[Number1-Ten-GigabitEthernet1/0/14] undo shutdown
```

Activate IRF:

```
[Number1] irf-port-configuration active  
[Number1] display irf configuration
```

MemberID	NewID	IRF-Port1	IRF-Port2
1	1	Ten-GigabitEthernet1/0/14	disable

Save the configuration!



3.2. Switch 2 Config

3.2.1. Member ID

Switch 2 needs to be renumbered from the default member ID of 1. Do the renumbering first, reboot, and then shutdown the ports.

```
[Number2] display irf configuration
MemberID NewID IRF-Port1 IRF-Port2
1 1 disable disable
```

```
[Number2] irf member 1 renumber 2
```

Warning: Renumbering the switch number may result in configuration change or loss.
Continue?[Y/N]y

```
[Number2] display irf configuration
MemberID NewID IRF-Port1 IRF-Port2
1 2 disable disable
```

Save the configuration and reboot!

3.2.2. Priority and Port Shutdown

The second switch will be given a lower priority than the master (eg 20) so that it will not be the master switch when all switches are online.

```
[Number2] irf member 2 priority 20
```

All ports that will be IRF ports need to be shutdown.

```
[Number2] int Ten-GigabitEthernet2/0/52
[Number2-Ten-GigabitEthernet2/0/52] shutdown
```

Save the configuration and reboot!

3.2.3. IRF-ports

Configure IRF port 2:

```
[Number2] irf-port 2/2
[Number2-irf-port2/2] port group interface Ten-GigabitEthernet 2/0/52 mode enhanced
```

Enable the interface:

```
[Number2] int Ten-GigabitEthernet 2/0/52
[Number2-Ten-GigabitEthernet2/0/52] undo shutdown
```

Activate IRF:

```
[Number2] irf-port-configuration active
[Number2] display irf configuration
MemberID NewID IRF-Port1 IRF-Port2
2 2 disable Ten-GigabitEthernet2/0/52
```

Save the configuration!



3.3. IRF Operational

3.3.1. Cable Connection

Now connect the two switches. In this example, a 10Gb SFP+ to SFP+ direct attach cable (DAC) is used between Ten-GigabitEthernet1/0/14 (switch 1) and Ten-GigabitEthernet2/0/52 (switch 2).

This should cause switch 2 to restart. The master switch (switch 1) will upload the configuration into switch 2 as it boots up, and a single IRF virtual switch will be created.

If switch 2 does not restart automatically, it is likely that one of the IRF ports is still shutdown, or there is a misconfiguration (see Section 6). Try a manual reboot.

3.3.2. IRF Virtual Switch Creation Successful

Now that the two switches are linked together with IRF as a virtual switch, a single entity based on the config in switch 1 applies to both switches. To avoid confusion, it is suggested that the IRF virtual switch be renamed.

```
[Number1] sysname A58-IRF
```

The IRF details can be viewed with the following commands.

```
[A58-IRF] display irf topology
```

Topology Info

```
-----
```

	IRF-Port1		IRF-Port2		
Switch	Link	neighbor	Link	neighbor	Belong To
2	DIS	--	UP	1	0023-89ed-dacb
1	UP	2	DIS	--	0023-89ed-dacb

```
[A58-IRF] display irf configuration
```

MemberID	NewID	IRF-Port1	IRF-Port2
1	1	Ten-GigabitEthernet1/0/14	disable
2	2	disable	Ten-GigabitEthernet2/0/52



4. Other Configuration Options

4.1. Adding an Additional Switch To the IRF Virtual Switch

In this example, a third switch will be added to an existing IRF virtual switch that has two members. The process is very similar to that described in Section 3.2 for the second switch.

4.1.1. Configuration

- Member ID
- Priority
- Save, reboot
- 10Gb ports shutdown
- IRF-port
- 10Gb ports up
- Save
- Activate

4.1.2. Cable Connection

Now connect switch 2 to switch 3. In this example, a 10Gb SFP+ to SFP+ direct attach cable (DAC) is used between Ten-GigabitEthernet2/0/49 (switch 2) and Ten-GigabitEthernet3/0/28 (switch 3).

This should cause switch 3 to restart. The master switch (switch 1) will upload the configuration into switch 3 as it boots up, and the single IRF virtual switch will be expanded to include 3 physical switches.

If switch 3 does not restart automatically, it is likely that one of the IRF ports is still shutdown, or there is a misconfiguration (see Section 6). Try a manual reboot.



4.1.3. Successful Addition of Third Switch

Now that the three switches are linked together with IRF as a virtual switch, a single entity based on the config in switch 1 applies to all switches.

The IRF details can be viewed with the following commands.

```
[IRF-58]dis irf
Switch  Role  Priority  CPU-Mac          Description
*+1    Master  32       0023-89ed-dacb   -----
      2    Slave  1        0023-8939-ab5b   -----
      3    Slave  15       3ce5-a610-7389   -----
```

* indicates the device is the master.
+ indicates the device through which the user logs in.

```
The Bridge MAC of the IRF is: 0023-89ed-daca
Auto upgrade           : yes
Mac persistent        : 6 min
Domain ID              : 0
```

```
[IRF-58]dis irf topology
```

Topology Info

```
-----
Switch      IRF-Port1      IRF-Port2
Link        neighbor      Link        neighbor      Belong To
3           DIS           --          UP            2            0023-89ed-dacb
2           UP            3           UP            1            0023-89ed-dacb
1           UP            2           DIS           --          0023-89ed-dacb
```

```
[IRF-58]dis irf configuration
```

```
MemberID  NewID  IRF-Port1      IRF-Port2
1         1      Ten-GigabitEthernet1/0/14  disable
2         2      Ten-GigabitEthernet2/0/49  Ten-GigabitEthernet2/0/52
3         3      disable         Ten-GigabitEthernet3/0/28
```



4.2. Extend the Chain into a Loop

Following on from Section 4.1, in this Section the chain will be converted into a loop.

4.2.1. Configuration

This completes the loop from switch 3 back to switch 1. These commands can now be done from any connection to the IRF switch.

```
[IRF-58]int Ten-GigabitEthernet 3/0/25
[IRF-58-Ten-GigabitEthernet3/0/25]shut
[IRF-58-Ten-GigabitEthernet3/0/25]int Ten-GigabitEthernet 1/0/11
[IRF-58-Ten-GigabitEthernet1/0/11]shut
[IRF-58-Ten-GigabitEthernet1/0/11]quit
[IRF-58]irf-port 3/1
[IRF-58-irf-port3/1]port group interface Ten-GigabitEthernet 3/0/25 mode enhanced
Info: You are recommended to save the configuration after completing your IRF
configuration; otherwise, it may be lost after system reboot.
[IRF-58-irf-port3/1]irf-port 1/2
[IRF-58-irf-port1/2]port group interface Ten-GigabitEthernet 1/0/11 mode enhanced
Info: You are recommended to save the configuration after completing your IRF
configuration; otherwise, it may be lost after system reboot.
[IRF-58-irf-port1/2]quit
[IRF-58]int Ten-GigabitEthernet 3/0/25
[IRF-58-Ten-GigabitEthernet3/0/25]un shut
[IRF-58-Ten-GigabitEthernet3/0/25]int Ten-GigabitEthernet 1/0/11
[IRF-58-Ten-GigabitEthernet1/0/11]un shut
[IRF-58-Ten-GigabitEthernet1/0/11]qu
[IRF-58]save
[IRF-58]irf-port-configuration active
```

Don't forget the "active" command! (Required after changes are made to the IRF configuration.)

4.2.2. Loop Successful

Connect the cable between switch 3 back to switch 1.

Note that nothing needs to be rebooted! (The switches are already part of the IRF virtual switch, and share the configuration.)

```
[IRF-58]display irf topology
Topology Info
-----
Switch      IRF-Port1      IRF-Port2      Belong To
Link        neighbor      Link           neighbor
1           2              UP             3           0023-89ed-dacb
2           3              UP             1           0023-89ed-dacb
3           1              UP             2           0023-89ed-dacb
```



4.3. Increasing the IRF Link Bandwidth Capacity

In this Section, the 10Gb IRF links created in previous Sections will be doubled in capacity to 20Gb.

4.3.1. Preparation

From the output below, you can see that there are 3 switches in the IRF config, each with a single 10Gb port that links to the next switch in the loop.

```
[IRF-58]display irf configuration
MemberID NewID      IRF-Port1                IRF-Port2
  1         1         Ten-GigabitEthernet1/0/14 Ten-GigabitEthernet1/0/11
  2         2         Ten-GigabitEthernet2/0/49 Ten-GigabitEthernet2/0/52
  3         3         Ten-GigabitEthernet3/0/25 Ten-GigabitEthernet3/0/28
```

Make sure all the new ports to be added are shutdown.

```
[IRF-58]int Ten-GigabitEthernet 1/0/12
[IRF-58-Ten-GigabitEthernet1/0/12]shutdown
[IRF-58-Ten-GigabitEthernet1/0/12]int Ten-GigabitEthernet 1/0/13
[IRF-58-Ten-GigabitEthernet1/0/13]shutdown
[IRF-58-Ten-GigabitEthernet1/0/13]int Ten-GigabitEthernet 2/0/50
[IRF-58-Ten-GigabitEthernet2/0/50]shutdown
[IRF-58-Ten-GigabitEthernet2/0/50]int Ten-GigabitEthernet 2/0/51
[IRF-58-Ten-GigabitEthernet2/0/51]shutdown
[IRF-58-Ten-GigabitEthernet2/0/51]int Ten-GigabitEthernet 3/0/26
[IRF-58-Ten-GigabitEthernet3/0/26]shutdown
[IRF-58-Ten-GigabitEthernet3/0/26]int Ten-GigabitEthernet 3/0/27
[IRF-58-Ten-GigabitEthernet3/0/27]shutdown
[IRF-58-Ten-GigabitEthernet3/0/27]quit
```

4.3.2. IRF Port Configuration

Each IRF port already configured needs an additional 10Gb interface assigned to it.

```
[IRF-58]irf-port 1/1
[IRF-58-irf-port1/1]port group interface Ten-GigabitEthernet 1/0/13 mode enhanced
[IRF-58-irf-port1/1]irf-port 1/2
[IRF-58-irf-port1/2]port group interface Ten-GigabitEthernet 1/0/12 mode enhanced
[IRF-58-irf-port1/2]irf-port 2/2
[IRF-58-irf-port2/2]port group interface Ten-GigabitEthernet 2/0/51 mode enhanced
[IRF-58-irf-port2/2]irf-port 2/1
[IRF-58-irf-port2/1]port group interface Ten-GigabitEthernet 2/0/50 mode enhanced
[IRF-58-irf-port2/1]irf-port 3/2
[IRF-58-irf-port3/2]port group interface Ten-GigabitEthernet 3/0/27 mode enhanced
[IRF-58-irf-port3/2]irf-port 3/1
[IRF-58-irf-port3/1]port group interface Ten-GigabitEthernet 3/0/26 mode enhanced
```



The configuration should now look like this:

```
[IRF-58-irf-port1/1]display this
#
irf-port 1/1
  port group interface Ten-GigabitEthernet1/0/13 mode enhanced
  port group interface Ten-GigabitEthernet1/0/14 mode enhanced
#
return

[IRF-58-irf-port1/2]dis this
#
irf-port 1/2
  port group interface Ten-GigabitEthernet1/0/11 mode enhanced
  port group interface Ten-GigabitEthernet1/0/12 mode enhanced
#
return
[IRF-58-irf-port1/2]qu
[IRF-58]dis irf configuration
MemberID NewID      IRF-Port1                IRF-Port2
  1         1      Ten-GigabitEthernet1/0/13  Ten-GigabitEthernet1/0/11
                Ten-GigabitEthernet1/0/14  Ten-GigabitEthernet1/0/12
  2         2      Ten-GigabitEthernet2/0/49  Ten-GigabitEthernet2/0/51
                Ten-GigabitEthernet2/0/50  Ten-GigabitEthernet2/0/52
  3         3      Ten-GigabitEthernet3/0/25  Ten-GigabitEthernet3/0/27
                Ten-GigabitEthernet3/0/26  Ten-GigabitEthernet3/0/28
```

4.3.3. Enable Interfaces and Activate

Enable the interfaces and save config.

```
[IRF-58]interface Ten-GigabitEthernet 1/0/12
[IRF-58-Ten-GigabitEthernet1/0/12]undo shutdown
[IRF-58-Ten-GigabitEthernet1/0/12]interface Ten-GigabitEthernet 1/0/13
[IRF-58-Ten-GigabitEthernet1/0/13]undo shutdown
[IRF-58-Ten-GigabitEthernet1/0/13]interface Ten-GigabitEthernet 2/0/50
[IRF-58-Ten-GigabitEthernet2/0/50]undo shutdown
[IRF-58-Ten-GigabitEthernet2/0/50]interface Ten-GigabitEthernet 2/0/51
[IRF-58-Ten-GigabitEthernet2/0/51]undo shutdown
[IRF-58-Ten-GigabitEthernet2/0/51]interface Ten-GigabitEthernet 3/0/26
[IRF-58-Ten-GigabitEthernet3/0/26]undo shutdown
[IRF-58-Ten-GigabitEthernet3/0/26]interface Ten-GigabitEthernet 3/0/27
[IRF-58-Ten-GigabitEthernet3/0/27]undo shutdown
[IRF-58-Ten-GigabitEthernet3/0/27]qu
[IRF-58]save
```

Activate the IRF config, and connect cables.



4.3.4. IRF Bandwidth Increase Successful

Each IRF link is now 20Gb, all links are active, there are no passive/standby links.

```
[IRF-58]dis int br
```

The brief information of interface(s) under bridge mode:

Link: ADM - administratively down; Stby - standby

Speed or Duplex: (a)/A - auto; H - half; F - full

Type: A - access; T - trunk; H - hybrid

Interface	Link	Speed	Duplex	Type	PVID	Description
XGE1/0/11	UP	--	--	--	--	
XGE1/0/12	UP	--	--	--	--	
XGE1/0/13	UP	--	--	--	--	
XGE1/0/14	UP	--	--	--	--	
XGE2/0/49	UP	--	--	--	--	
XGE2/0/50	UP	--	--	--	--	
XGE2/0/51	UP	--	--	--	--	
XGE2/0/52	UP	--	--	--	--	
XGE3/0/25	UP	--	--	--	--	
XGE3/0/26	UP	--	--	--	--	
XGE3/0/27	UP	--	--	--	--	
XGE3/0/28	UP	--	--	--	--	

```
[IRF-58]dis irf topology
```

Topology Info

Switch	IRF-Port1		IRF-Port2		Belong To
	Link	neighbor	Link	neighbor	
1	UP	2	UP	3	0023-89ed-dacb
2	UP	3	UP	1	0023-89ed-dacb
3	UP	1	UP	2	0023-89ed-dacb





4.4. Remove a Switch from IRF

In this example, there are three switches in the IRF virtual switch. Switch 3 will be removed.

4.4.1. Current Config

Three switches are linked in an IRF virtual switch. Each IRF port contain 2 x 10Gb ports to provide a 20Gb channel.

```
[IRF-58] dis irf topology
```

Topology Info

```
-----
```

Switch	IRF-Port1		IRF-Port2		Belong To
	Link	neighbor	Link	neighbor	
1	UP	2	UP	3	0023-89ed-dacb
2	UP	3	UP	1	0023-89ed-dacb
3	UP	1	UP	2	0023-89ed-dacb

```
[IRF-58] dis irf configuration
```

MemberID	NewID	IRF-Port1	IRF-Port2
1	1	Ten-GigabitEthernet1/0/13	Ten-GigabitEthernet1/0/11
		Ten-GigabitEthernet1/0/14	Ten-GigabitEthernet1/0/12
2	2	Ten-GigabitEthernet2/0/49	Ten-GigabitEthernet2/0/51
		Ten-GigabitEthernet2/0/50	Ten-GigabitEthernet2/0/52
3	3	Ten-GigabitEthernet3/0/25	Ten-GigabitEthernet3/0/27
		Ten-GigabitEthernet3/0/26	Ten-GigabitEthernet3/0/28

4.4.2. Process

Switch 3 is linked to switch 2 and switch 1 as part of the loop. Breaking the link to switch 1 (the master) has to be done from switch 1. The error condition that appears if this is not done is described in Section 6.3.

```
[IRF-58-Ten-GigabitEthernet3/0/26] int Ten-GigabitEthernet 1/0/11
[IRF-58-Ten-GigabitEthernet1/0/11] shutdown
[IRF-58-Ten-GigabitEthernet1/0/11] int Ten-GigabitEthernet 1/0/12
[IRF-58-Ten-GigabitEthernet1/0/12] shutdown
```

The IRF link between switch 1 and 3 is now shown as down (and the cables can be removed).

```
[IRF-58] dis irf topology
```

Topology Info

```
-----
```

Switch	IRF-Port1		IRF-Port2		Belong To
	Link	neighbor	Link	neighbor	
3	DOWN	--	UP	2	0023-89ed-dacb
2	UP	3	UP	1	0023-89ed-dacb
1	UP	2	DOWN	--	0023-89ed-dacb

Now shutdown the links from switch 2.

```
[IRF-58-Ten-GigabitEthernet2/0/49] int Ten-GigabitEthernet 2/0/50
[IRF-58-Ten-GigabitEthernet2/0/50] shutdown
[IRF-58-Ten-GigabitEthernet2/0/50] int Ten-GigabitEthernet 2/0/49
[IRF-58-Ten-GigabitEthernet2/0/49] shutdown
[IRF-58-Ten-GigabitEthernet2/0/49]
```



4.4.3. Switch Removal Successful

Now that switch 3 is removed, neither the switch, nor any of its ports, show up on the IRF config.

```
[IRF-58]dis irf
Switch Role Priority CPU-Mac Description
*+1 Master 32 0023-89ed-dacb -----
2 Slave 1 0023-8939-ab5b -----
```

* indicates the device is the master.
+ indicates the device through which the user logs in.

The Bridge MAC of the IRF is: 0023-89ed-daca
Auto upgrade : yes
Mac persistent : 6 min
Domain ID : 0

```
[IRF-58]dis irf topology
```

Topology Info

```
-----
Switch IRF-Port1 IRF-Port2
Link neighbor Link neighbor Belong To
2 DOWN -- UP 1 0023-89ed-dacb
1 UP 2 DOWN -- 0023-89ed-dacb
```

```
[IRF-58]dis irf configuration
```

```
MemberID NewID IRF-Port1 IRF-Port2
1 1 Ten-GigabitEthernet1/0/13 Ten-GigabitEthernet1/0/11
Ten-GigabitEthernet1/0/14 Ten-GigabitEthernet1/0/12
2 2 Ten-GigabitEthernet2/0/49 Ten-GigabitEthernet2/0/51
Ten-GigabitEthernet2/0/50 Ten-GigabitEthernet2/0/52
```



4.5. Replace a Failed Switch

4.5.1. Current Config

Two switches are linked in an IRF virtual switch. Each IRF port contain 2 x 10Gb ports to provide a 20Gb channel.

```
[IRF-58]display irf
Switch  Role  Priority  CPU-Mac          Description
*+1    Master  32       0023-89ed-dacb   -----
  2     Slave  25       0023-8939-ab5b   -----
```

* indicates the device is the master.
+ indicates the device through which the user logs in.

```
The Bridge MAC of the IRF is: 0023-89ed-daca
Auto upgrade           : yes
Mac persistent         : 6 min
Domain ID              : 0
```

```
[IRF-58]display irf topology
```

Topology Info

```
-----
Switch  IRF-Port1  IRF-Port2  Belong To
Link    neighbor  Link       neighbor
2       DIS      --         UP        1         0023-89ed-dacb
1       UP      2         DIS      --         0023-89ed-dacb
```

4.5.2. Switch 2 Fails

To simulate a failure, switch 2 is powered off; it now needs to be replaced.

```
[IRF-58]display interface brief
System is busy with VIU configuration recovery, please wait a moment...
```

The interface list will no longer have any ports that were in switch 2 listed (ie no 2/0/n entries). The IRF commands only show a single device.

4.5.3. Replace Failed Switch

Follow the process as specified in Section 3.2 to configure the replacement switch for IRF. The replacement switch should be the same model as the failed switch, however in this example, a 48 port switch is being replaced with a 24 port switch.

- Member ID
- Priority
- Save, reboot
- 10Gb ports shutdown
- IRF-port
- 10Gb ports up
- Save
- Activate
- Connect cables (replacement switch will reboot).



Note the different IRF port configuration because the replacement is a 24 port instead of 48 port switch.

```
[H3C-irf-port2/2] display this
#
irf-port 2/2
  port group interface Ten-GigabitEthernet2/0/27 mode enhanced
  port group interface Ten-GigabitEthernet2/0/28 mode enhanced
#
Return
```

4.5.4. Successful Replacement

Everything is now back to normal.

```
[IRF-58] display irf
Switch  Role  Priority  CPU-Mac          Description
*+1    Master  32       0023-89ed-dacb   -----
  2    Slave  25       3ce5-a610-7389   -----
-----
```

* indicates the device is the master.
+ indicates the device through which the user logs in.

```
The Bridge MAC of the IRF is: 0023-89ed-daca
Auto upgrade           : yes
Mac persistent         : 6 min
Domain ID              : 0
```

```
[IRF-58] display irf configuration
MemberID NewID      IRF-Port1                IRF-Port2
  1       1       Ten-GigabitEthernet1/0/13  disable
  2       2       disable                  Ten-GigabitEthernet2/0/27
                                      Ten-GigabitEthernet2/0/28
```

```
[IRF-58] display irf topology
```

Topology Info

```
-----
Switch  Link      IRF-Port1 neighbor  IRF-Port2 neighbor  Belong To
  2     DIS      --          --         UP          1          0023-89ed-dacb
  1     UP       2          2         DIS         --         0023-89ed-dacb
```



5. Multi-Active Detection (MAD)

5.1. MAD Overview

Multi-Active Detection (MAD) is an IRF specific function that ensures a split-brain condition does not occur. For example, if a two-member IRF virtual switch lost all connectivity between each other (if the IRF cables were disconnected for instance):

- then the master would continue to be the master
- the slave would elect itself master (because there was no communication from the master)
- that would result in a split-brain condition, with all the attendant issues that entails.

MAD provides for an additional communication mechanism (effectively a heart-beat) that prevents the split-brain condition from occurring by shutting down the ports on the disconnected slave device(s).

5.2. Config before MAD

The configuration examples used in this Section came from a slightly configuration than the examples from most of the rest of this document. Two A5820 switches (A5820-14XG and A5820-24XG switches were used.)

```
[IRF-58]dis mad verbose
Current MAD status: Detect
Excluded ports(configurable):
Excluded ports(can not be configured):
  Ten-GigabitEthernet1/0/13
  Ten-GigabitEthernet1/0/14
  Ten-GigabitEthernet2/0/13
  Ten-GigabitEthernet2/0/14
MAD ARP disabled.
MAD LACP disabled.
MAD BFD disabled.
```

```
[IRF-58]dis irf configuration
MemberID NewID   IRF-Port1           IRF-Port2
  1        1      Ten-GigabitEthernet1/0/13  disable
          2      Ten-GigabitEthernet1/0/14
  2        2      disable                Ten-GigabitEthernet2/0/13
                                     Ten-GigabitEthernet2/0/14
```

```
[IRF-58]dis irf topology
Topology Info
-----
Switch  IRF-Port1  Link  IRF-Port2  Link  neighbor  Belong To
2       DIS      --    1          UP    1          0023-89ed-dacb
1       UP       2     2          DIS   --         0023-89ed-dacb
```



5.3. MAD Configuration

There are three different ways of enabling MAD – LACP, ARP, BFD. In this example BFD is used. Extracts from the running configuration are used.

Create a dedicated VLAN:

```
vlan 66  
description Multi-Active Detection
```

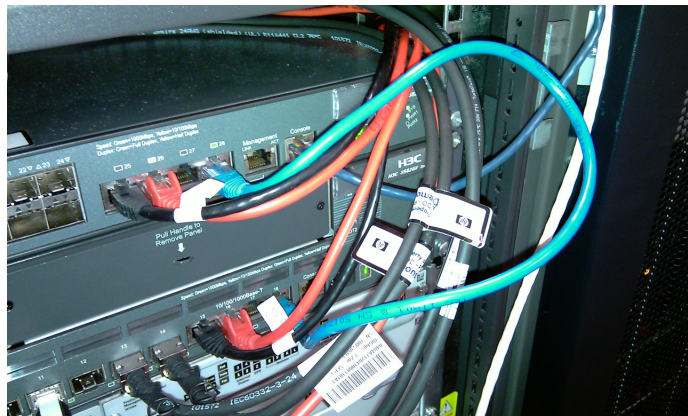
Enable MAD BFD and assign IP addresses to each member switch.

```
interface Vlan-interface66  
mad bfd enable  
mad ip address 192.168.66.1 255.255.255.0 member 1  
mad ip address 192.168.66.2 255.255.255.0 member 2
```

Assign the VLAN (untagged) to the relevant ports.

```
interface GigabitEthernet1/0/18  
port link-mode bridge  
description Switch 1 MAD  
port access vlan 66  
interface GigabitEthernet2/0/28  
port link-mode bridge  
description Switch 2 MAD  
port access vlan 66
```

The MAD link in the photo below is the aqua coloured cable directly linking the two switches.



This images shows how MAD is displayed within IMC – note the loop.





5.4. Testing

After MAD is configured, the two DACs that were linking the two switches in IRF were disconnected.

- All non-IRF ports on the slave switch are deactivated.
- After plugging the IRF cables back in, the slave switch restarts, and comes back online with the config downloaded from the IRF master.
- All links come back on-line as normal.

```
System is busy with warm backup, please wait ...
System is busy with warm backup, please wait ...
%May  2 22:01:26:087 2000 IRF-58 HA/5/HA_BATCHBACKUP_FINISHED: Batch backup of
slave board in slot 2 is finished.
#May  2 22:01:29:107 2000 IRF-58 IFNET/4/INTERFACE UPDOWN:
Trap 1.3.6.1.6.3.1.1.5.4<linkUp>: Interface 20185095 is Up, ifAdminStatus is 1,
ifOperStatus is 1
#May  2 22:01:29:308 2000 IRF-58 IFNET/4/INTERFACE UPDOWN:
Trap 1.3.6.1.6.3.1.1.5.4<linkUp>: Interface 20185094 is Up, ifAdminStatus is 1,
ifOperStatus is 1
%May  2 22:01:29:508 2000 IRF-58 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet2/0/8
link status is UP.
%May  2 22:01:29:629 2000 IRF-58 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet2/0/7
link status is UP.
%May  2 22:01:30:047 2000 IRF-58 LLDP/6/LLDP_CREATE_NEIGHBOUR: -Slot=2; New
neighbor created on Port Ten-GigabitEthernet2/0/7 (IfIndex 20185094), Chassis ID
is 78ac-c072-f391, Port ID is X4.
#May  2 22:01:30:472 2000 IRF-58 LAGG/1/AggPortRecoverActive:
Trap 1.3.6.1.4.1.25506.8.25.2.4<hh3cAggPortActiveNotification>: Aggregation Group
8: port member 20185095 becomes ACTIVE!
```

5.5. Exclude interfaces

One of the options for MAD is which interfaces on the IRF slave switches to shut down. By default, all ports except IRF are shut down.

5.5.1. Configuration

An extra port was added to the excluded list so it would not be shut down if the IRF slave switch interfaces were disabled by MAD. However, more than one port may need to be excluded if any useful traffic is to flow...

```
[IRF-58]mad exclude interface g2/0/26
[IRF-58]dis mad verbose
Current MAD status: Detect
Excluded ports (configurable):
  GigabitEthernet2/0/26
Excluded ports (can not be configured):
  Ten-GigabitEthernet1/0/13
  Ten-GigabitEthernet1/0/14
  Ten-GigabitEthernet2/0/13
  Ten-GigabitEthernet2/0/14
MAD ARP disabled.
MAD LACP disabled.
MAD BFD enabled interface:
  Vlan-interface66
    mad ip address 192.168.66.1 255.255.255.0 member 1
    mad ip address 192.168.66.2 255.255.255.0 member 2
```




5.5.2. Testing

The two DACs that were linking the two switches in IRF were disconnected.

- All non-IRF ports on the slave switch are deactivated, except g2/0/26.
- After plugging the IRF cables back in, the slave switch restarts, and comes back online with the config downloaded from the IRF master.
- All links come back on-line as normal.

The left photo shows the links up on a normally running IRF virtual switch; the right hand photo shows the ports down except for the excluded port g2/0/26 after MAD shut down the interfaces.



```
[IRF-58]
#May 2 22:05:52:024 2000 IRF-58 IFNET/4/INTERFACE UPDOWN:
Trap 1.3.6.1.6.3.1.1.5.3<linkDown>: Interface 11796492 is Down, ifAdminStatus is
1, ifOperStatus is 2
#May 2 22:05:52:234 2000 IRF-58 IFNET/4/INTERFACE UPDOWN:
Trap 1.3.6.1.6.3.1.1.5.3<linkDown>: Interface 20185100 is Down, ifAdminStatus is
1, ifOperStatus is 2
%May 2 22:05:52:435 2000 IRF-58 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet1/0/13
link status is DOWN.
%May 2 22:05:52:555 2000 IRF-58 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet2/0/13
link status is DOWN.
%May 2 22:05:52:676 2000 IRF-58 OPTMOD/4/MODULE_OUT:
Ten-GigabitEthernet1/0/13: The transceiver is absent.

#May 2 22:05:53:839 2000 IRF-58 STM/4/LINK STATUS CHANGE:
Trap 1.3.6.1.4.1.25506.2.91.6.0.1<hh3cStackPortLinkStatusChange>: Physical index
of the member is 2, member ID is 1. Link status of the IRF port with port index 1
and member ID 1 turned to 2.
#May 2 22:05:54:155 2000 IRF-58 DEVM/1/BOARD REMOVED:
Trap 1.3.6.1.4.1.25506.8.35.12.1.8<hh3cBoardRemoved>: chassisIndex is 0,
slotIndex 0.2

#May 2 22:05:54:336 2000 IRF-58 IFNET/4/INTERFACE UPDOWN:
Trap 1.3.6.1.6.3.1.1.5.3<linkDown>: Interface 11796493 is Down, ifAdminStatus is
1, ifOperStatus is 2
%May 2 22:05:54:629 2000 IRF-58 STM/3/STM_LINK_STATUS_DOWN:
IRF port 1 is down.
%May 2 22:05:54:749 2000 IRF-58 DEVM/3/BOARD_REMOVED: Board is removed from
Chassis 0 Slot 2, type is MAIN_BOARD_TYPE_28S.
%May 2 22:05:54:900 2000 IRF-58 HA/5/HA_SLAVE_REMOVED: Slave board in slot 2 is
removed.
```



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```
%May  2 22:05:55:021 2000 IRF-58 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet1/0/14
link status is DOWN.
%May      2      22:05:55:220      2000      IRF-58      BFD/5/BFD_CHANGE_FSM:
Sess[192.168.66.1/192.168.66.2,33/33,Vlan66,Ctrl], Sta: DOWN->INIT, Diag: 0
%May      2      22:05:55:386      2000      IRF-58      BFD/5/BFD_CHANGE_FSM:
Sess[192.168.66.1/192.168.66.2,33/33,Vlan66,Ctrl], Sta: INIT->UP, Diag: 0
%May  2 22:05:55:546 2000 IRF-58 MAD/1/MAD_COLLISION_DETECTED: Multi-active
devices detected, please fix it.
%May  2 22:05:55:677 2000 IRF-58 OPTMOD/4/MODULE_OUT:
Ten-GigabitEthernet1/0/14: The transceiver is absent.
```

```
[IRF-58]dis mad verbose
Current MAD status: Detect
Excluded ports(configurable):
Excluded ports(can not be configured):
  Ten-GigabitEthernet1/0/13
  Ten-GigabitEthernet1/0/14
MAD ARP disabled.
MAD LACP disabled.
MAD BFD enabled interface:
  Vlan-interface66
    mad ip address 192.168.66.1 255.255.255.0 member 1
    mad ip address 192.168.66.2 255.255.255.0 member 2
```



6. Appendix A: Error Conditions and Notes

A number of error conditions and relevant observations have been documented in this Section for future reference.

6.1. Config not Saved

Don't forget to save the config! Otherwise you may end up with an error similar to this:

```
[Number1]dis irf topology
Topology Info
-----
Switch      IRF-Port1      IRF-Port2
Link        neighbor      Link        neighbor      Belong To
1           TIMEOUT      --          DIS           --          0023-89ed-dacb
```

6.2. IRF Ports

6.2.1. Physical 10Gb Interfaces

Interfaces that will become part of an IRF port group need to be shutdown before first to avoid errors similar to the following:

```
[Number1-irf-port1/1]port group interface Ten-GigabitEthernet 1/0/1 mode enhanced
ERROR: Please shutdown the current interface first.
```

6.2.2. 10Gb Transceivers

The Comware switches will work with any standard 10Gb SFP+ transceiver, including optics, DACs and DWDM/CWDM transceivers. However, an information message is generated as shown below (from an HP ProCurve DAC).

```
%Apr 26 12:39:01:714 2000 Number3 OPTMOD/5/IO_ERR:
Ten-GigabitEthernet2/0/28: The transceiver information I/O failed!

%Apr 26 12:39:01:864 2000 Number3 OPTMOD/4/MODULE_IN:
Ten-GigabitEthernet2/0/28: The transceiver is UNKNOWN.
```

6.2.3. IRF Port and Interface Numbers

It is only possible to connect IRF-port 1 to IRF-port 2. It is impossible to connect IRF-port 1 to IRF-port 1, or IRF-port 2 to IRF-port 2.

Only the IRF-port numbers are relevant, and the physical interface numbers are completely unimportant. So long as the IRF ports are configured correctly for 1→2, it makes no difference what the underlying interface numbers are.

For the A58xx switches (and most other Comware switches with IRF support), only 10Gb or faster ports can be used for IRF.



6.3. IRF Port Shutdown

IRF topology will determine if an IRF port can be shut down. In the example below, the 20Gb link between switch 1 and 3 was to be removed.

```
[IRF-58]int Ten-GigabitEthernet 3/0/25
[IRF-58-Ten-GigabitEthernet3/0/25]shutdown
[IRF-58-Ten-GigabitEthernet3/0/25]int Ten-GigabitEthernet 3/0/26
[IRF-58-Ten-GigabitEthernet3/0/26]shutdown
```

Operation not supported on the last active physical port bound to IRF port which connected to the master!Please shutdown the other end of the link.

Performing the same action from the master switch was successful, and the link was shut down.

6.4. Reboot/Restart

6.4.1. Requirement

If a change is made to switch relating to it joining or leaving an IRF virtual switch, that switch should be restarted with the reboot command. Changes to IRF configuration (eg adding interfaces to an IRF port, adding an additional switch), do not require a restart.

6.4.2. Whole IRF Virtual Switch

Caution! Using the reboot command at the <user> prompt will cause the entire IRF virtual switch to restart!

6.4.3. Switchto

Use the switchto command to get to a specific console.

```
[irf]irf switch-to 2
<irf-Slave#2>
```

Note that the Reboot command doesn't work from the #n prompt. Removing and reinserting the power cable is generally required to restart an individual switch.



6.5. Removing Old Configurations

It is important to remove old IRF configuration components before trying to join switches into an IRF virtual switch. Failure to do so may make the IRF process difficult or impossible, or may lead to unexpected results.

A normal config reset will only clear the config items that are shown in the config files. That does not include the majority of the IRF configuration. To reset the additional IRF configuration, commands similar to the following need to be used, followed by a restart (as per Section 6.4).

6.5.1. Shutdown IRF port interfaces

```
[IRF-58]int Ten-GigabitEthernet 3/0/28
[IRF-58-Ten-GigabitEthernet3/0/28]shutdown
[IRF-58-Ten-GigabitEthernet3/0/28]quit
```

6.5.2. Remove the IRF Ports

```
[IRF-58]undo irf-port 3/1
[IRF-58]undo irf-port 3/2
[IRF-58]dis irf topology
```

Topology Info

```
-----
Switch      IRF-Port1      IRF-Port2
Link        neighbor      Link        neighbor      Belong To
3           DIS           --           DIS           --           3ce5-a610-7389
```

```
[IRF-58]irf member 3 renumber 1
```

Warning: Renumbering the switch number may result in configuration change or loss.
Continue?[Y/N]y

```
[IRF-58]dis irf configuration
```

```
MemberID  NewID      IRF-Port1      IRF-Port2
3         1          disable        disable
```

```
[IRF-58]save
```

The current configuration will be written to the device. Are you sure? [Y/N]:y

Please input the file name(*.cfg)[flash:/config.cfg]

(To leave the existing filename unchanged, press the enter key):

flash:/config.cfg exists, overwrite? [Y/N]:y

Validating file. Please wait....

Saved the current configuration to mainboard device successfully.

Configuration is saved to device successfully.

The following command may also be useful to reset the IRF member ID:

```
[Number2]undo irf member 2 renumber
```



6.5.3. Reset Config

```
[IRF-58]quit
```

```
<IRF-58>
```

```
<IRF-58>reset saved-configuration
```

```
The saved configuration file will be erased. Are you sure? [Y/N]:y  
Configuration file in flash is being cleared.  
Please wait ...
```

```
MainBoard:
```

```
Configuration file is cleared.
```

```
<IRF-58>reboot
```

```
Start to check configuration with next startup configuration file, please  
wait.....DONE!
```

```
This command will reboot the device. Current configuration will be lost, save  
current configuration? [Y/N]:n
```

```
This command will reboot the device. Continue? [Y/N]:y
```

If you remove all the IRF-ports, and restart, the switch will show "c" on the front panel (for candidate).





6.6. Duplicate IRF Member IDs

This example shows what happens when a switch attempts to join the IRF virtual switch with an IRF member ID that exists already. This could occur if an additional switch was not restarted after issuing an IRF renumber command, or the member IDs were not verified.

6.6.1. Existing Config

Note the existing member ID 2 (IRF-58) and the new member ID 2 (Number3).

```
[IRF-58]dis irf configuration
MemberID NewID      IRF-Port1          IRF-Port2
  1         1         Ten-GigabitEthernet1/0/14  disable
  2         2         disable              Ten-GigabitEthernet2/0/52

[Number3]dis irf configuration
MemberID NewID      IRF-Port1          IRF-Port2
  2         2         disable              disable
```

6.6.2. Configuration

Some of the relevant config steps are shown to highlight how the error was generated. Switch Number3 still has an IRF member ID of 2 – this will clash with the existing IF member 2 in the IRF virtual switch.

```
[IRF-58]irf-port 2/1
[IRF-58-irf-port2/1]port group interface Ten-GigabitEthernet 2/0/49 mode enhanced

[Number3]irf-port 2/2
[Number3-irf-port2/2]port group interface Ten-GigabitEthernet 2/0/28 mode enhanced
```



6.6.3. Errors

Now connect the cable, Switch 2, port 49 to Switch 3, port 28.

```
[Number3]
%Apr 26 12:39:02:028 2000 Number3 IFNET/3/LINK_UPDOWN: Ten-GigabitEthernet2/0/28
link status is UP.
%Apr 26 12:39:02:160 2000 Number3 STM/6/STM_LINK_STATUS_UP:
  IRF port 2 is up.
#Apr 26 12:39:02:261 2000 Number3 STM/4/LINK STATUS CHANGE:
  Trap 1.3.6.1.4.1.25506.2.91.6.0.1<hh3cStackPortLinkStatusChange>: Physical index
of the member is 3, member ID is 2. Link status of the IRF port with port index 2
and member ID 2 turned to 1.
#Apr 26 12:39:22:283 2000 Number3 STM/4/LINK STATUS CHANGE:
  Trap 1.3.6.1.4.1.25506.2.91.6.0.1<hh3cStackPortLinkStatusChange>: Physical index
of the member is 3, member ID is 2. Link status of the IRF port with port index 2
and member ID 2 turned to 3.
#Apr 26 12:39:22:604 2000 Number3 STM/4/LINK STATUS CHANGE:
  Trap 1.3.6.1.4.1.25506.2.91.6.0.1<hh3cStackPortLinkStatusChange>: Physical index
of the member is 3, member ID is 2. Link status of the IRF port with port index 2
and member ID 2 turned to 2.
%Apr 26 12:39:22:925 2000 Number3 STM/2/STM_LINK_STATUS_TIMEOUT:
  IRF port 2 is down because heartbeat timed out.
%Apr 26 12:39:23:065 2000 Number3 STM/3/STM_LINK_STATUS_DOWN:
  IRF port 2 is down.
[Number3]
[Number3]dis irf topology
```

Topology Info

```
-----
Switch      IRF-Port1      IRF-Port2
Link        neighbor      Link        neighbor      Belong To
2           DIS           --           TIMEOUT       3ce5-a610-7389
```

```
[IRF-58]dis irf topology
```

Topology Info

```
-----
Switch      IRF-Port1      IRF-Port2
Link        neighbor      Link        neighbor      Belong To
2           DOWN          --           UP            0023-89ed-dacb
1           UP            2           DIS           0023-89ed-dacb
```

No automatic renumbering occurs, and the additional switch (Number3) remains separate from the IRF virtual switch (IRF-58).

Other than the errors on Number3, no other errors or problems occur, and neither switch restarts or changes any other configuration.



7. Appendix B: Configs

7.1. Default Switch Configuration – A5800-48G

```
#
version 5.20, Release 1206
#
sysname H3C
#
irf mac-address persistent timer
irf auto-update enable
undo irf link-delay
#
domain default enable system
#
telnet server enable
#
vlan 1
#
radius scheme system
server-type extended
primary authentication 127.0.0.1 1645
primary accounting 127.0.0.1 1646
user-name-format without-domain
#
domain system
access-limit disable
state active
idle-cut disable
self-service-url disable
#
user-group system
#
interface NULL0
#
interface GigabitEthernet2/0/1
port link-mode bridge
#
interface GigabitEthernet2/0/2
port link-mode bridge
#
interface GigabitEthernet2/0/3
port link-mode bridge
#
interface GigabitEthernet2/0/4
port link-mode bridge
#
interface GigabitEthernet2/0/5
port link-mode bridge
#
interface GigabitEthernet2/0/6
port link-mode bridge
#
interface GigabitEthernet2/0/7
port link-mode bridge
#
interface GigabitEthernet2/0/8
```



```
port link-mode bridge
#
interface GigabitEthernet2/0/9
  port link-mode bridge
#
interface GigabitEthernet2/0/10
  port link-mode bridge
#
interface GigabitEthernet2/0/11
  port link-mode bridge
#
interface GigabitEthernet2/0/12
  port link-mode bridge
#
interface GigabitEthernet2/0/13
  port link-mode bridge
#
interface GigabitEthernet2/0/14
  port link-mode bridge
#
interface GigabitEthernet2/0/15
  port link-mode bridge
#
interface GigabitEthernet2/0/16
  port link-mode bridge
#
interface GigabitEthernet2/0/17
  port link-mode bridge
#
interface GigabitEthernet2/0/18
  port link-mode bridge
#
interface GigabitEthernet2/0/19
  port link-mode bridge
#
interface GigabitEthernet2/0/20
  port link-mode bridge
#
interface GigabitEthernet2/0/21
  port link-mode bridge
#
interface GigabitEthernet2/0/22
  port link-mode bridge
#
interface GigabitEthernet2/0/23
  port link-mode bridge
#
interface GigabitEthernet2/0/24
  port link-mode bridge
#
interface GigabitEthernet2/0/25
  port link-mode bridge
#
interface GigabitEthernet2/0/26
  port link-mode bridge
#
interface GigabitEthernet2/0/27
  port link-mode bridge
#
```



```
interface GigabitEthernet2/0/28
  port link-mode bridge
#
interface GigabitEthernet2/0/29
  port link-mode bridge
#
interface GigabitEthernet2/0/30
  port link-mode bridge
#
interface GigabitEthernet2/0/31
  port link-mode bridge
#
interface GigabitEthernet2/0/32
  port link-mode bridge
#
interface GigabitEthernet2/0/33
  port link-mode bridge
#
interface GigabitEthernet2/0/34
  port link-mode bridge
#
interface GigabitEthernet2/0/35
  port link-mode bridge
#
interface GigabitEthernet2/0/36
  port link-mode bridge
#
interface GigabitEthernet2/0/37
  port link-mode bridge
#
interface GigabitEthernet2/0/38
  port link-mode bridge
#
interface GigabitEthernet2/0/39
  port link-mode bridge
#
interface GigabitEthernet2/0/40
  port link-mode bridge
#
interface GigabitEthernet2/0/41
  port link-mode bridge
#
interface GigabitEthernet2/0/42
  port link-mode bridge
#
interface GigabitEthernet2/0/43
  port link-mode bridge
#
interface GigabitEthernet2/0/44
  port link-mode bridge
#
interface GigabitEthernet2/0/45
  port link-mode bridge
#
interface GigabitEthernet2/0/46
  port link-mode bridge
#
interface GigabitEthernet2/0/47
  port link-mode bridge
```



RWL Tech Note IRF Configuration

```
#
interface GigabitEthernet2/0/48
  port link-mode bridge
#
interface Ten-GigabitEthernet2/0/49
  port link-mode bridge
#
interface Ten-GigabitEthernet2/0/50
  port link-mode bridge
#
interface Ten-GigabitEthernet2/0/51
  port link-mode bridge
#
interface Ten-GigabitEthernet2/0/52
  port link-mode bridge
#
  load xml-configuration
#
user-interface aux 1
user-interface vty 0 15
#
return
```



8. Appendix C: Sample Demo Script

The following is a very basic demo script that uses ping to multiple hosts when various aspects of IRF are demonstrated. So long as the devices are either dual connected to each IRF member switch, or are connected to another switch or device (eg blade chassis) that is dual connected, there should be minimum interruption (eg drops a single ping packet).

Copy the following text into a windows .CMD file – eg irftest.cmd. When run, it will launch multiple windows labelled with the text in quotes, each pinging the specified target host.

```
rem Launch IRF Test Displays
rem RWL 29-Jun-11
@start "IRF Virtual Switch" ping 10.2.3.254 -t
@start "Device off A12500" ping 10.2.3.41 -t
@start "Wireless controller in E5406" ping 10.20.30.7 -t
@start "Blade Server Onboard Administrator 1" ping 10.2.3.14 -t
@start "Blade Server Onboard Administrator 2" ping 10.2.3.15 -t
@start "Third party switch" ping 10.2.10.29 -t
@start "Blade Server" ping 10.2.3.44 -t
```



9. Appendix D: IRF Config Steps for Most Devices

This is a reproduction of the relevant parts of Jeff Dziedzic's document that covers most Comware switches, along with some of the older firmware versions.

9.1. IRF on A12500, A9500 Switches

Step 1. Assign a unit number to each Chassis.

For unit 1:

```
irf member 1
```

For unit 2:

```
irf member 2
```

Step 2. Set the Chassis to operate in IRF mode. Reboot the switch when prompted

```
chassis convert mode irf
```

Step 3. Set the switches to force the slave switch to check the boot file against the master.

For unit 1:

```
irf auto-update enable
```

For unit 2:

```
irf auto-update enable
```

Step 4. Save the configuration and reboot the switches

```
quit
```

```
save
```

```
startup saved-configuration xxx.cfg
```

```
reboot
```

Step 5. Assign IRF priority for each Chassis.

For unit 1:

```
irf member 1 priority 20
```

For unit 2:

```
irf member 1 renumber 2
```

```
reboot
```

Wait for reboot

```
irf member 2 priority 10
```

Step 6. Shutdown the 10 Gbps ports that will form the IRF

For Unit 1:

```
int TenGigabitEthernet 1/2/0/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 1/2/0/2
```

```
shutdown
```

```
quit
```



For Unit 2:

```
int TenGigabitEthernet 2/2/0/1
 shutdown
 quit
```

```
int TenGigabitEthernet 2/2/0/2
 shutdown
 quit
```

Step 7. Assign the 10 Gbps ports to an IRF port group

On Unit 1:

```
irf-port 1/1
 port group interface ten-gigabitethetnet 1/2/0/1 mode enhanced
 port group interface ten-gigabitethetnet 1/2/0/2 mode enhanced
 quit
```

On Unit 2:

```
irf-port 2/2
 port group interface ten-gigabitethetnet 2/2/0/1 mode enhanced
 port group interface ten-gigabitethetnet 2/2/0/2 mode enhanced
 quit
```

Step 8. Enable the 10 Gbps ports that will form the IRF

For Unit 1:

```
int Ten-GigabitEthernet 1/2/0/1
 undo shutdown
int Ten-GigabitEthernet 1/2/0/2
 undo shutdown
```

For Unit 2:

```
int Ten-GigabitEthernet 2/2/0/1
 undo shutdown
int Ten-GigabitEthernet 2/2/0/2
 undo shutdown
```

Step 9. Save the configuration

```
quit
save
```

Step 10. Cable the IRF ports of the two switches. The secondary switch will now request to reboot.

Save the configuration

```
reboot
```

The IRF stack should now be formed. Verify IRF operation

```
display irf
display irf configuration
display irf topology
```



9.2. IRF on A7500 Switches

Step 1. Assign a unit number to each Chassis.

For unit 1:

```
irf member 1
```

For unit 2:

```
irf member 2
```

Step 2. Set the Chassis to operate in IRF mode. Reboot the switch when prompted

```
chassis convert mode irf
```

Step 3. Set the switches to disable the line cards if both management modules die and to force the slave switch to check the boot file against the master.

```
monitor handshake-timeout disable-port (only necessary on the A7500)
```

```
irf auto-update enable
```

```
monitor handshake-timeout disable-port (only necessary on the A7500)
```

```
irf auto-update enable
```

Step 4. Save the configuration and reboot the switches

```
quit
```

```
save xxx.cfg
```

```
reboot
```

Step 5. Assign IRF priority for each Chassis.

For unit 1:

```
irf member 1 priority 20
```

For unit 2:

```
irf member 1 renumber 2
```

```
reboot
```

Wait for reboot

```
irf member 2 priority 10
```

Step 6. Shutdown the 10 Gbps ports that will form the IRF

For Unit 1:

```
int TenGigabitEthernet 1/2/0/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 1/2/0/2
```

```
shutdown
```

```
quit
```

For Unit 2:

```
int TenGigabitEthernet 2/2/0/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 2/2/0/2
```

```
shutdown
```




quit

Step 7. Assign the 10 Gbps ports to an IRF port group

On Unit 1:

irf-port 1/1

port group interface ten-gigabitethernet 1/2/0/1 mode enhanced

port group interface ten-gigabitethernet 1/2/0/2 mode enhanced

quit

On Unit 2:

irf-port 2/2

port group interface ten-gigabitethernet 2/2/0/1 mode enhanced

port group interface ten-gigabitethernet 2/2/0/2 mode enhanced

quit

Step 8. Enable the 10 Gbps ports that will form the IRF

For Unit 1:

int Ten-GigabitEthernet 1/2/0/1

undo shutdown

int Ten-GigabitEthernet 1/2/0/2

undo shutdown

For Unit 2:

int Ten-GigabitEthernet 2/2/0/1

undo shutdown

int Ten-GigabitEthernet 2/2/0/2

undo shutdown

Step 9. Save the configuration

quit

save

Step 10. Cable the IRF ports of the two switches. The secondary switch will now request to reboot.

Save the configuration

reboot

The IRF stack should now be formed. Verify IRF operation

display irf

display irf configuration

display irf topology



9.3. IRF on A5820, A5800 Switches (and new A5500Ei)

Step 1. Assign a unit number to each Chassis.

For unit 1:

```
irf member 1
```

For unit 2:

```
irf member 1 renumber 2
```

For unit 3:

```
irf member 1 renumber 3
```

For unit 4:

```
irf member 1 renumber 4
```

Step 2. Assign IRF priority for each Chassis.

For unit 1:

```
irf member 1 priority 25
```

```
irf member 2 priority 20
```

```
irf member 3 priority 15
```

```
irf member 4 priority 10
```

```
reboot
```

Wait for reboot

Step 3. Save the configuration and reboot the switches

```
quit
```

```
save
```

```
reboot
```

Step 4. Shutdown the 10 Gbps ports that will form the IRF

For Unit 1:

```
int TenGigabitEthernet 1/1/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 1/1/2
```

```
shutdown
```

```
quit
```

For Unit 2:

```
int TenGigabitEthernet 2/1/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 2/1/2
```

```
shutdown
```

```
quit
```

For Unit 3:

```
int TenGigabitEthernet 3/1/1
```

```
shutdown
```

```
quit
```

```
int TenGigabitEthernet 3/1/2
```

```
shutdown
```

```
quit
```



For Unit 4:

```
int TenGigabitEthernet 4/1/1
    shutdown
    quit
int TenGigabitEthernet 4/1/2
    shutdown
quit
```

Step 5. Assign the 10 Gbps ports to an IRF port group

On Unit 1:

```
irf-port 1/1
    port group interface ten-gigabitethetnet 1/1/1 mode enhanced
irf-port 1/2
    port group interface ten-gigabitethetnet 1/1/2 mode enhanced
quit
```

On Unit 2:

```
irf-port 2/1
    port group interface ten-gigabitethetnet 2/1/1 mode enhanced
irf-port 2/2
    port group interface ten-gigabitethetnet 2/1/2 mode enhanced
quit
```

On Unit 3:

```
irf-port 3/1
    port group interface ten-gigabitethetnet 3/0/51 mode enhanced
irf-port 3/2
    port group interface ten-gigabitethetnet 3/0/52 mode enhanced
quit
```

On Unit 4:

```
irf-port 4/1
    port group interface ten-gigabitethetnet 4/0/51 mode enhanced
irf-port 4/2
    port group interface ten-gigabitethetnet 4/0/52 mode enhanced
quit
```

Step 6. Enable the 10 Gbps ports that will form the IRF

For Unit 1:

```
int Ten-GigabitEthernet 1/1/1
    undo shutdown
int Ten-GigabitEthernet 1/1/2
    undo shutdown
```

For Unit 2:

```
int Ten-GigabitEthernet 2/0/1
    undo shutdown
int Ten-GigabitEthernet 2/0/2
    undo shutdown
```

For Unit 3:

```
int Ten-GigabitEthernet 3/0/1
```



```
undo shutdown  
int Ten-GigabitEthernet 3/0/2  
undo shutdown
```

For Unit 4:

```
int Ten-GigabitEthernet 4/0/1  
undo shutdown  
int Ten-GigabitEthernet 4/0/2  
undo shutdown
```

Step 8. Activate the IRF Port Configuration

```
irf-port-configuration active
```

Step 9. Save the configuration

```
quit  
save
```

Step 10. Cable the IRF ports of the two switches. The secondary switch will now request to reboot.

Save the configuration

```
reboot
```

The IRF stack should now be formed. Verify IRF operation

```
display irf  
display irf configuration  
display irf topology
```



9.4. IRF on A5500Ei, A5120Ei Switches – Old Method

Start with the switches not cabled together.

Step 1. Assign a unit number to each Chassis.

For unit 1:

```
irf member 1
```

For unit 2:

```
irf member 1 renumber 2
```

For unit 3:

```
irf member 1 renumber 3
```

For unit 4:

```
irf member 1 renumber 4
```

Step 2. Assign IRF priority for each Chassis.

For unit 1:

```
irf member 1 priority 25
```

```
irf member 2 priority 20
```

```
irf member 3 priority 15
```

```
irf member 4 priority 10
```

Step 3. Save the configuration and reboot the switches

```
quit
```

```
save
```

```
reboot
```

Step 4. Assign the 10 Gbps ports to an IRF port group

```
irf member member-id irf-port irf-port-id port port-list
```

For unit 1:

```
irf member 1 irf-port 1 port 1
```

For unit 2:

```
irf member 1 irf-port 2 port 2
```

For unit 3:

```
irf member 1 irf-port 3 port 3
```

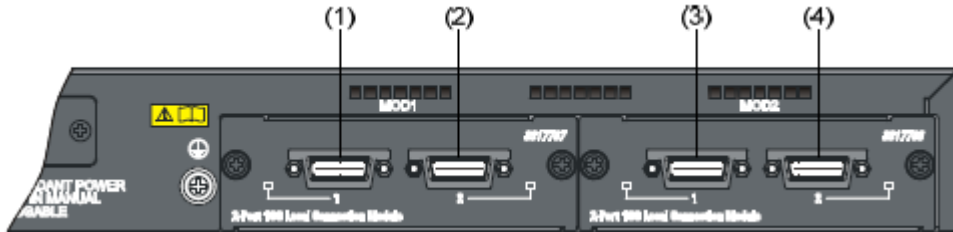
For unit 4:

```
irf member 1 irf-port 4 port 4
```



RWL Tech Note IRF Configuration

This step that is different from other IRF configurations. The physical 10GbE ports used to make the IRF ports can be either the SFP+ or CX4 ports on the back. Looking at the back of the switch, the ports are numbered for IRF purposes as 1 and 2 for the module on the left and 3 and 4 for the module on the right.



The 5500 supports up to two 10GbE ports per IRF port (remember in the recommended ring IRF topology there will be 2 IRF ports). There are two rules for assigning the 10GbE ports to each IRF port:

- 1) The 10GbE ports that make up an IRF port must reside on the same module (1 & 2 or 3 & 4), but different IRF ports can, but are not required to, reside in different modules.
- 2) IRF port 1 must be physically to the left of IRF port 2.

This means there are 4 possible valid IRF port configurations:

- 1) Using only the left module – 10GbE port 1 will be IRF port 1 and 10GbE port 2 will be IRF port 2.
- 2) Using only the right module – 10GbE port 3 will be IRF port 1 and 10GbE port 4 will be IRF port 2.
- 3) Using both modules with only one 10GbE port per IRF port – 10GbE port 1 or 2 will be IRF port 1 and 10GbE port 3 or 4 will be IRF port 2.
- 4) Using two 10GbE ports per IRF port (This is only possible if there are only 2 switches in the IRF stack) – 10GbE ports 1 & 2 will be IRF port 1 and 10GbE ports 3 & 4 will be IRF port 2.

The most common and most simple configurations are option 1 or 2.

Step 5. Cable the switches