

高可用性的N+1配置示例

目录

[简介](#)

[场景 1](#)

[场景 2](#)

[场景 3](#)

[场景 4](#)

[方案 5](#)

[相关信息](#)

简介

本文为几个N+1方案提供配置示例和信息。

注意： 记住那类似卡必须备份类似卡。

场景 1

配置示例高可用性(HA)用两RF交换机(3x10配置)在4+1模式，五VXR，二十MC28C线卡和三个VCom HD4040机箱，包含四十个模块。

物理布局在[1](#)显示参考的[表绑定对思科uBR7246VXR的Cisco RF交换机](#)。

图1 – 4+1用MC28C卡和2 RF交换机

此物理堆叠假设，与从192.168.1.2开始在顶部并且继续下来的IP分配。由于它在4+1模式，RF交换机1认为两交换机：a和b，a是slot 1至4和b是slot 5至8。RF交换机2也认为两交换机：a和b。

工作VXR1配置

```
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname "WorkingVXR1"
!
boot system disk0:ubr7200-ik8s-mz.BC.28July03
no logging console
enable secret 5 $1$5YHG$mquxabcqzFoUUKhp/c9WT4/
!
cab modem remote-query 10 public
cab modulation-prof 2 request 0 16 0 8 qpsk scrambler
152 no-diff 64 fixed uw8
cab modulation-prof 2 initial 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 2 station 5 34 0 48 qpsk scrambler
```

```

152 no-diff 128 fixed uw16
cab modulation-prof 2 short 4 76 6 8 qpsk scrambler
152 no-diff 72 short uw8
cab modulation-prof 2 long 8 220 0 8 qpsk scrambler
152 no-diff 80 short uw8
cab modulation-prof 3 request 0 16 0 8 qpsk scrambler
152 no-diff 64 fixed uw16
cab modulation-prof 3 initial 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 3 station 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 3 short 7 76 7 8 16qam scrambler
152 no-diff 144 short uw16
cab modulation-prof 3 long 9 220 0 8 16qam scrambler
152 no-diff 160 short uw16
no cable qos permission create
no cable qos permission update
cable qos permission modems
no cable clock source-midplane
no cable clock force primary
no cable clock force secondary
!
cable config-file docsis.cm
frequency 453000000
service-class 1 max-upstream 10000
service-class 1 max-downstream 10000
service-class 1 max-burst 1522
!
ip subnet-zero
ip cef
!
ip host protect 192.168.1.7
ip host work2 192.168.1.6
ip name-server 171.68.226.120
!
ip dhcp pool MODEMS1
network 192.168.3.0 255.255.255.0
bootfile docsis.cm
next-server 192.168.3.5
default-router 192.168.3.5
option 7 ip 192.168.3.5
option 4 ip 192.168.3.5
option 2 hex 0000.0000
lease 2 3 4
!
ip dhcp pool PC
network 10.11.12.0 255.255.255.0
default-router 10.11.12.1
dns-server 171.68.226.120
lease 10 1 11
!
packetcable element_id 35417
!
interface FastEthernet0/0
ip address 192.168.1.7 255.255.255.0
no keepalive
speed auto
full-duplex
!--- This interface is used for Hot Standby Connection-
to-Connection Protocol (HCCP) !--- traffic. ! interface
FastEthernet0/1 ip address 192.168.2.7 255.255.255.0
keepalive 1 !--- This is set to 1 second so that, if the
cable is disconnected, then this !--- interface will
failover within 3 seconds. speed auto full-duplex !

```

```
interface Cable3/0 ip address 10.11.12.1 255.255.255.0
secondary ip address 192.168.3.5 255.255.255.0 load-
interval 30 keepalive 1 !--- The keepalive time is in
seconds, and the default is 10 seconds for HCCP code.
load-interval 30 cable downstream channel-id 0 cable
bundle 1 master !--- Interface bundling is supported, as
are subinterfaces. !--- Note: Bundles failover together.
cable downstream annex B cable downstream modulation
64qam cable downstream interleave-depth 32 cable
downstream frequency 453000000 !--- This is the
downstream (DS) frequency, which used to be
informational only when !--- you are using an external
UPx. This must be set when you are using the MC28U cards
!--- with internal UPxs or when you are doing N+1 with
MC28C cards, so that the Protect !--- UPx knows what
frequency to use. cable upstream 0 frequency 24000000 !-
-- If you are doing dense mode combining, the upstream
(US) frequencies must be !--- different. If no two US
ports are shared, then the same frequency can be used.
cable upstream 0 power-level 0 cable upstream 0 channel-
width 3200000 cable upstream 0 minislot-size 2 cable
upstream 0 data-backoff automatic cable upstream 0
modulation-profile 3 no cable upstream 0 shutdown cable
dhcp-giaddr policy !--- This tells the cable modems
(CMs) to get an IP address from the primary scope, and
!--- it tells the customer premises equipment (CPE) to
use the secondary scope. hccp 1 working 1 !--- This is
the Working first group, member 1. hccp 1 channel-switch
1 rfswwa rfswitch-group 192.168.1.5 44440400 1 !--- This
is the IP address of the Switch, and it is protecting
member 1 in the !--- left side of Switch slot 1. hccp 1
channel-switch 1 uc31 wavecom-hd 192.168.1.2 1
192.168.1.4 1 !--- This is the IP address of the
upconverter, and it is module 1 (A) that is backing !---
module 1 (A) of another upconverter. This shows that one
upconverter could have !--- a module that backs up a
module in a different chassis with a different IP
address, !--- if need be. If this statement is not
present when you are using Cisco IOS® Software !---
Release 15(BC2) or later, then IF-Muting is assumed, and
an external upconverter !--- with Simple Network
Management Protocol (SNMP) capability is not needed.
hccp 1 track FastEthernet0/1 !--- Tracking is enabled
for the egress port, in the event that the WAN-backhaul
is !--- disrupted. This cable interface will failover to
the Protect. hccp 1 reverttime 120 !--- This is the time
in minutes (plus a 2 minute suspend) for the card to
switch back !--- to normal mode, if the fault has
cleared. If there is a fault on the Protect card, !---
then it will revert back after the suspend time, and it
will not wait for the full !--- revert time. The default
setting is 30 minutes. ! interface Cable3/1 hccp 2
working 1 hccp 2 channel-switch 1 rfswwa rfswitch-group
192.168.1.5 11110100 1 !--- This is the IP address of
the Switch, and it is protecting member 1 in the !---
right side of Switch slot 1. hccp 2 channel-switch 1
uc31 wavecom-hd 192.168.1.2 2 192.168.1.4 2 hccp 2
reverttime 120 ! interface Cable4/0 hccp 3 working 1
hccp 3 channel-switch 1 rfswwb rfswitch-group
192.168.1.5 88880800 1 !--- This is the IP address of
the Switch, and it is protecting member 1 in the !---
left side of Switch slot 5. Because the RF Switch is in
4+1 mode, slot 5 is !--- considered to be slot 1 again.
hccp 3 channel-switch 1 uc31 wavecom-hd 192.168.1.2 3
```

```

192.168.1.4 3 hccp 3 reverttime 120 ! interface Cable
4/1 hccp 4 working 1 hccp 4 channel-switch 1 rfswlb
rfswitch-group 192.168.1.5 22220200 1 !--- This is the
IP address of the Switch, and it is protecting member 1
in the !--- right side of Switch slot 5. Because the RF
Switch is in 4+1 mode, slot 5 is !--- considered to be
slot 1 again. hccp 4 channel-switch 1 uc31 wavecom-hd
192.168.1.2 4 192.168.1.4 4 hccp 4 reverttime 120 !
interface Cable5/0 hccp 5 working 1 hccp 5 channel-
switch 1 rfsw2a rfswitch-group 192.168.1.6 44440400 1
hccp 5 channel-switch 1 uc31 wavecom-hd 192.168.1.2 5
192.168.1.4 5 hccp 5 reverttime 120 ! interface Cable
5/1 hccp 6 working 1 hccp 6 channel-switch 1 rfsw2a
rfswitch-group 192.168.1.6 11110100 1 hccp 6 channel-
switch 1 uc31 wavecom-hd 192.168.1.2 6 192.168.1.4 6
hccp 6 reverttime 120 ! interface Cable 6/0 hccp 7
working 1 hccp 7 channel-switch 1 rfsw2b rfswitch-group
192.168.1.6 88880800 1 hccp 7 channel-switch 1 uc31
wavecom-hd 192.168.1.2 7 192.168.1.4 7 hccp 7 reverttime
120 ! interface Cable 6/1 hccp 8 working 1 hccp 8
channel-switch 1 rfsw2b rfswitch-group 192.168.1.6
22220200 1 hccp 8 channel-switch 1 uc31 wavecom-hd
192.168.1.2 8 192.168.1.4 8 hccp 8 reverttime 120 !
router eigrp 2500 network 10.11.12.0 0.0.0.255 network
192.168.1.0 network 192.168.3.0 no auto-summary no eigrp
log-neighbor-changes ! ip classless ip route 0.0.0.0
0.0.0.0 192.168.1.254 ip route 192.168.1.0 255.255.255.0
FastEthernet0/0 ip route 192.168.2.0 255.255.255.0
FastEthernet0/1 no ip http server ! cdp run ! snmp-
server community private RW !--- Unless it is deleted,
this does not affect the HCCP communications between !--
- the upconverter, the Switch, and the 7200. snmp-server
community public R0 snmp-server enable traps tty snmp-
server manager tftp-server disk0: tftp-server disk1:
alias exec shb show hccp brief alias exec shd show hccp
detail alias exec scm show cable modem alias exec scr
show cable modem remote alias exec sm show cab modu
alias exec sch show cab hop alias exec sc300 show cont
c3/0 u0 alias exec sint300 show int c3/0 u0 alias exec
scs show cable spec

```

保护VXR配置

```

version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname "ProtectVXR"
!
boot system disk0:ubr7200-ik8s-mz.BC.28July03
no logging console
enable secret 5 $1$5YHG$mquxabcqzFoUUKhp/c9WT4/
!
cab modem remote-query 10 public
cab modulation-prof 2 request 0 16 0 8 qpsk scrambler
152 no-diff 64 fixed uw8
cab modulation-prof 2 initial 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 2 station 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 2 short 4 76 6 8 qpsk scrambler
152 no-diff 72 short uw8
cab modulation-prof 2 long 8 220 0 8 qpsk scrambler
152 no-diff 80 short uw8

```

```
cab modulation-prof 3 request 0 16 0 8 qpsk scrambler
152 no-diff 64 fixed uw16
cab modulation-prof 3 initial 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 3 station 5 34 0 48 qpsk scrambler
152 no-diff 128 fixed uw16
cab modulation-prof 3 short 7 76 7 8 16qam scrambler
152 no-diff 144 short uw16
cab modulation-prof 3 long 9 220 0 8 16qam scrambler
152 no-diff 160 short uw16
```

```
!--- Be sure to pre-configure all global configurations
on the Protect, such as !--- modulation profiles,
spectrum groups, load balancing, and so forth. no cable
qos permission create no cable qos permission update
cable qos permission modems no cable clock source-
midplane no cable clock force primary no cable clock
force secondary ! cable config-file docsis.cm frequency
453000000 service-class 1 max-upstream 10000 service-
class 1 max-downstream 10000 service-class 1 max-burst
1522 ! ip subnet-zero ip cef ! ip host protect
192.168.1.7 ip host work2 192.168.1.6 ip name-server
171.68.226.120 ! ip dhcp pool MODEMS1 network
192.168.3.0 255.255.255.0 bootfile docsis.cm next-server
192.168.3.5 default-router 192.168.3.5 option 7 ip
192.168.3.5 option 4 ip 192.168.3.5 option 2 hex
0000.0000 lease 2 3 4 ! ip dhcp pool PC network
10.11.12.0 255.255.255.0 default-router 10.11.12.1 dns-
server 171.68.226.120 lease 10 1 11 ! packetcable
element_id 35417 ! interface FastEthernet0/0 ip address
192.168.1.11 255.255.255.0 no keepalive speed auto full-
duplex no cdp enable ! interface FastEthernet0/1 ip
address 192.168.2.11 255.255.255.0 keepalive 1 speed
auto full-duplex no cdp enable ! interface Cable3/0 no
ip address !--- There is no need to set the IP address,
because it will come from the Working card !--- via
SNMP. no keepalive !--- This defaults to 10 seconds with
the N+1 Cisco IOS code, but it is recommended that !---
you disable it on the Protect interface or set it to a
relatively high value. cable downstream annex B cable
downstream modulation 64qam cable downstream interleave-
depth 32 !--- The DS modulation, annex mode, and
interleave must be same on the Protect and on !--- the
Working of the same group. no shut !--- The interface
must be activated to start HCCP functionality. Do this
last. cable upstream 0 shutdown !--- This will
automatically become "no shut" when a failover occurs.
hccp 1 protect 1 192.168.1.7 !--- This is the Protect
for the first group. Remember to configure the Protect
!--- interface(s) last, after the Working interfaces are
configured. This is the HCCP !--- first group and it is
protecting member 1 with member 1's FastEthernet (FE) IP
!--- address. hccp 1 channel-switch 1 rfs1a rfs1a-
group 192.168.1.5 44440400 1 !--- This is the IP address
of the Switch, and it is protecting member 1, which has
a !--- bitmap of 44440400 in Switch slot 1. hccp 1
channel-switch 1 uc31 wavecom-hd 192.168.1.2 1
192.168.1.4 1 !--- This is the IP address of the
upconverter, and it is module 1 (A) that is backing !---
module 1 (A) of another upconverter. This shows that one
upconverter could have !--- a module that backs up a
module in a different chassis with a different IP
address, !--- if need be. If this statement is not
present when you are using Cisco IOS Software !---
Release 15(BC2) or later, then IF-Muting is assumed, and
```

```
an external upconverter !--- with SNMP capability is not
needed. hccp 1 protect 2 192.168.1.8 !--- This is the
HCCP first group, and it is protecting member 2 with its
IP address. hccp 1 channel-switch 2 rfswwa rfswwa-
group 192.168.1.5 44440400 2 hccp 1 channel-switch 2
uc31 wavecom-hd 192.168.1.2 1 192.168.1.4 9 hccp 1
protect 3 192.168.1.9 hccp 1 channel-switch 3 rfswwa
rfswwa-group 192.168.1.5 44440400 3 hccp 1 channel-
switch 3 uc32 wavecom-hd 192.168.1.2 1 192.168.1.3 1
hccp 1 protect 4 192.168.1.10 hccp 1 channel-switch 4
rfswwa rfswwa-group 192.168.1.5 44440400 4 hccp 1
channel-switch 4 uc32 wavecom-hd 192.168.1.2 1
192.168.1.3 9 hccp 1 timers 666 2000 !--- hccp 1 timers
<hellotime> <holdtime> !--- This is for inter-chassis
communication. ! interface Cable3/1 hccp 2 protect 1
192.168.1.7 hccp 2 channel-switch 1 rfswwa rfswwa-
group 192.168.1.5 11110100 1 hccp 2 channel-switch 1
uc31 wavecom-hd 192.168.1.2 2 192.168.1.4 2 hccp 2
protect 2 192.168.1.8 hccp 2 channel-switch 2 rfswwa
rfswwa-group 192.168.1.5 11110100 2 hccp 2 channel-
switch 2 uc31 wavecom-hd 192.168.1.2 2 192.168.1.4 10
hccp 2 protect 3 192.168.1.9 hccp 2 channel-switch 3
rfswwa rfswwa-group 192.168.1.5 11110100 3 hccp 2
channel-switch 3 uc32 wavecom-hd 192.168.1.2 2
192.168.1.3 2 hccp 2 protect 4 192.168.1.10 hccp 2
channel-switch 4 rfswwa rfswwa-group 192.168.1.5
11110100 4 hccp 2 channel-switch 4 uc32 wavecom-hd
192.168.1.2 2 192.168.1.3 10 hccp 2 timers 666 2000 !
interface Cable4/0 hccp 3 protect 1 192.168.1.7 hccp 3
channel-switch 1 rfswwb rfswwb-group 192.168.1.5
88880800 1 hccp 3 channel-switch 1 uc31 wavecom-hd
192.168.1.2 3 192.168.1.4 3 hccp 3 protect 2 192.168.1.8
hccp 3 channel-switch 2 rfswwb rfswwb-group
192.168.1.5 88880800 2 hccp 3 channel-switch 2 uc31
wavecom-hd 192.168.1.2 3 192.168.1.4 11 hccp 3 protect 3
192.168.1.9 hccp 3 channel-switch 3 rfswwb rfswwb-
group 192.168.1.5 88880800 3 hccp 3 channel-switch 3
uc32 wavecom-hd 192.168.1.2 3 192.168.1.3 3 hccp 3
protect 4 192.168.1.10 hccp 3 channel-switch 4 rfswwb
rfswwb-group 192.168.1.5 88880800 4 hccp 3 channel-
switch 4 uc32 wavecom-hd 192.168.1.2 3 192.168.1.3 11
hccp 3 timers 666 2000 ! interface Cable4/1 hccp 4
protect 1 192.168.1.7 hccp 4 channel-switch 1 rfswwb
rfswwb-group 192.168.1.5 22220200 1 hccp 4 channel-
switch 1 uc31 wavecom-hd 192.168.1.2 4 192.168.1.4 4
hccp 4 protect 2 192.168.1.8 hccp 4 channel-switch 2
rfswwb rfswwb-group 192.168.1.5 22220200 2 hccp 4
channel-switch 2 uc31 wavecom-hd 192.168.1.2 4
192.168.1.4 12 hccp 4 protect 3 192.168.1.9 hccp 4
channel-switch 3 rfswwb rfswwb-group 192.168.1.5
22220200 3 hccp 4 channel-switch 3 uc32 wavecom-hd
192.168.1.2 4 192.168.1.3 4 hccp 4 protect 4
192.168.1.10 hccp 4 channel-switch 4 rfswwb rfswwb-
group 192.168.1.5 22220200 4 hccp 4 channel-switch 4
uc32 wavecom-hd 192.168.1.2 4 192.168.1.3 12 hccp 4
timers 666 2000 ! interface Cable5/0 hccp 5 protect 1
192.168.1.7 hccp 5 channel-switch 1 rfswwa rfswwa-
group 192.168.1.6 44440400 1 hccp 5 channel-switch 1
uc31 wavecom-hd 192.168.1.2 5 192.168.1.4 5 hccp 5
protect 2 192.168.1.8 hccp 5 channel-switch 2 rfswwa
rfswwa-group 192.168.1.6 44440400 2 hccp 5 channel-
switch 2 uc31 wavecom-hd 192.168.1.2 5 192.168.1.4 13
hccp 5 protect 3 192.168.1.9 hccp 5 channel-switch 3
rfswwa rfswwa-group 192.168.1.6 44440400 3 hccp 5
```

```

channel-switch 3 uc32 wavecom-hd 192.168.1.2 5
192.168.1.3 5 hccp 5 protect 4 192.168.1.10 hccp 5
channel-switch 4 rfs2a rfs2a-group 192.168.1.6
44440400 4 hccp 5 channel-switch 4 uc32 wavecom-hd
192.168.1.2 5 192.168.1.3 13 hccp 5 timers 666 2000 !
interface Cable5/1 hccp 6 protect 1 192.168.1.7 hccp 6
channel-switch 1 rfs2a rfs2a-group 192.168.1.6
11110100 1 hccp 6 channel-switch 1 uc31 wavecom-hd
192.168.1.2 6 192.168.1.4 6 hccp 6 protect 2 192.168.1.8
hccp 6 channel-switch 2 rfs2a rfs2a-group
192.168.1.6 11110100 2 hccp 6 channel-switch 2 uc31
wavecom-hd 192.168.1.2 6 192.168.1.4 14 hccp 6 protect 3
192.168.1.9 hccp 6 channel-switch 3 rfs2a rfs2a-
group 192.168.1.6 11110100 3 hccp 6 channel-switch 3
uc32 wavecom-hd 192.168.1.2 6 192.168.1.3 6 hccp 6
protect 4 192.168.1.10 hccp 6 channel-switch 4 rfs2a
rfs2a-group 192.168.1.6 11110100 4 hccp 6 channel-
switch 4 uc32 wavecom-hd 192.168.1.2 6 192.168.1.3 14
hccp 6 timers 666 2000 ! interface Cable6/0 hccp 7
protect 1 192.168.1.7 hccp 7 channel-switch 1 rfs2b
rfs2a-group 192.168.1.6 88880800 1 hccp 7 channel-
switch 1 uc31 wavecom-hd 192.168.1.2 7 192.168.1.4 7
hccp 7 protect 2 192.168.1.8 hccp 7 channel-switch 2
rfs2b rfs2a-group 192.168.1.6 88880800 2 hccp 7
channel-switch 2 uc31 wavecom-hd 192.168.1.2 7
192.168.1.4 15 hccp 7 protect 3 192.168.1.9 hccp 7
channel-switch 3 rfs2b rfs2a-group 192.168.1.6
88880800 3 hccp 7 channel-switch 3 uc32 wavecom-hd
192.168.1.2 7 192.168.1.3 7 hccp 7 protect 4
192.168.1.10 hccp 7 channel-switch 4 rfs2b rfs2a-
group 192.168.1.6 88880800 4 hccp 7 channel-switch 4
uc32 wavecom-hd 192.168.1.2 7 192.168.1.3 15 hccp 7
timers 666 2000 ! interface Cable6/1 hccp 8 protect 1
192.168.1.7 hccp 8 channel-switch 1 rfs2b rfs2a-
group 192.168.1.6 22220200 1 hccp 8 channel-switch 1
uc31 wavecom-hd 192.168.1.2 8 192.168.1.4 8 hccp 8
protect 2 192.168.1.8 hccp 8 channel-switch 2 rfs2b
rfs2a-group 192.168.1.6 22220200 2 hccp 8 channel-
switch 2 uc31 wavecom-hd 192.168.1.2 8 192.168.1.4 16
hccp 8 protect 3 192.168.1.9 hccp 8 channel-switch 3
rfs2b rfs2a-group 192.168.1.6 22220200 3 hccp 8
channel-switch 3 uc32 wavecom-hd 192.168.1.2 8
192.168.1.3 8 hccp 8 protect 4 192.168.1.10 hccp 8
channel-switch 4 rfs2b rfs2a-group 192.168.1.6
22220200 4 hccp 8 channel-switch 4 uc32 wavecom-hd
192.168.1.2 8 192.168.1.3 16 hccp 8 timers 666 2000 !
router eigrp 2500 network 10.11.12.0 0.0.0.255 network
10.11.13.0 0.0.0.255 network 192.168.1.0 network
192.168.3.0 network 192.168.5.0 no auto-summary no eigrp
log-neighbor-changes ! ip classless ip route 0.0.0.0
0.0.0.0 192.168.1.254 ip route 192.168.1.0 255.255.255.0
FastEthernet0/0 ip route 192.168.2.0 255.255.255.0
FastEthernet0/1 no ip http server ! cdp run ! snmp-
server community private RW snmp-server community public
RO snmp-server enable traps tty snmp-server enable traps
cable snmp-server manager alias exec shb show hccp brief
alias exec shd show hccp detail alias exec scm show
cable modem alias exec scr show cable modem remote

```

场景 2

高可用性配置示例用两RF交换机(3x10配置)在4+1模式，五VXRs和二十MC28U线卡。

物理布局在图1显示，但是忽略在上面的升频器。参考[缚住Cisco RF交换机对使用28C线卡的布线文档的思科uBR7246VXR](#)。MC28U线卡的布线包括从每线卡去RF交换机的每个报头的套件十个电缆。参考适合于对此N+1解决方案的HA文档。

此物理堆叠假设，与从192.168.1.5开始在顶部并且继续下来的IP分配。由于它在4+1模式，RF交换机1认为两交换机：a和b，a是slot 1至4和b是slot 5至8。RF交换机2也认为两交换机：a和b。

工作VXR1配置

```
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname "WorkingVXR1"
!
boot system disk0:ubr7200-ik8s-mz.BC...
no logging console
enable secret 5 $1$5YHG$mquxabcqzFoUUKhp/c9WT4/
!
cab modem remote-query 10 public
  !--- This is an easy way to track modem transmit and
  receive levels, especially after a !--- failover. You
  might want to increase the time period or remove this
  command, after !--- you have confirmed that everything
  is OK. cable modulation-profile 41 request 0 16 0 8 qpsk
scrambler 152 no-diff 64 fixed cable modulation-profile
41 initial 5 34 0 48 qpsk scrambler 152 no-diff 128
fixed cable modulation-profile 41 station 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed cable modulation-profile
41 short 3 78 35 25 qpsk scrambler 152 no-diff 100 short
cable modulation-profile 41 long 9 232 0 137 qpsk
scrambler 152 no-diff 80 short cable modulation-profile
42 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fixed
cable modulation-profile 42 initial 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed cable modulation-profile
42 station 5 34 0 48 qpsk scrambler 152 no-diff 128
fixed cable modulation-profile 42 short 3 78 17 10 16qam
scrambler 152 no-diff 136 short cable modulation-profile
42 long 9 232 0 77 16qam scrambler 152 no-diff 216 short
no cable qos permission create no cable qos permission
update cable qos permission modems no cable clock
source-midplane no cable clock force primary no cable
clock force secondary ! cable config-file docsis.cm
frequency 453000000 service-class 1 max-upstream 10000
service-class 1 max-downstream 10000 service-class 1
max-burst 1522 ! ip subnet-zero ip cef ! ip name-server
171.68.226.120 ! ip dhcp pool MODEMS1 network
192.168.3.0 255.255.255.0 bootfile docsis.cm next-server
192.168.3.5 default-router 192.168.3.5 option 7 ip
192.168.3.5 option 4 ip 192.168.3.5 option 2 hex
0000.0000 lease 2 3 4 ! ip dhcp pool PC network
10.11.12.0 255.255.255.0 default-router 10.11.12.1 dns-
server 171.68.226.120 lease 10 1 11 ! packetcable
element_id 35417 ! interface FastEthernet0/0 ip address
192.168.1.7 255.255.255.0 no keepalive speed auto full-
duplex !--- This interface is used for HCCP traffic. !
interface FastEthernet0/1 ip address 192.168.2.7
255.255.255.0 keepalive 1 !--- This is set to 1 second
so that, if the cable is disconnected, this interface !-
-- will failover within 3 seconds. speed auto full-
duplex ! interface Cable3/0 ip address 10.11.12.1
255.255.255.0 secondary ip address 192.168.3.5
```



```
255.255.255.0 load-interval 30 cable dynamic-secret mark
nocrypt cable map-advance dynamic 500 1000 keepalive 1
!--- The keepalive time is in seconds, and the default
is 10 seconds for HCCP code. cable downstream channel-id
0 cable bundle 1 master !--- Interface bundling is
supported, as are subinterfaces. !--- Note: Bundles
failover together. cable downstream annex B cable
downstream modulation 256qam cable downstream
interleave-depth 32 no cable downstream rf-shutdown
cable downstream frequency 453000000 !--- This is the DS
frequency, which used to be informational only when you
are using !--- an external UPx. This must be set when
using the MC28U cards with internal UPxs. cable upstream
0 frequency 24000000 !--- If you are doing dense mode
combining, the US frequencies must be different. !--- If
no two US ports are shared, the same frequency can be
used. cable upstream 0 ingress-noise-cancellation 200
cable upstream 0 power-level 0 cable upstream 0 channel-
width 3200000 3200000 cable upstream 0 minislots-size 4
cable upstream 0 fragment-force 3500 3 cable upstream 0
range-backoff 2 6 cable upstream 0 data-backoff 3 5
cable upstream 0 modulation-profile 42 no cable upstream
0 shutdown cable dhcp-giaddr policy !--- This tells the
CMs to get an IP address from the primary scope, and it
tells the !--- CPE to use the secondary scope. hccp 1
working 1 !--- This is the Working first group, member
1. hccp 1 channel-switch 1 rfsw1a rfswitch-group
192.168.1.5 44440400 1 !--- This is the IP address of
the Switch, and it is protecting member 1 in the !---
left side of Switch slot 1. hccp 1 track FastEthernet0/1
!--- Tracking is enabled for the egress port, in the
event that the WAN-backhaul is !--- disrupted. This
cable interface will failover to the Protect. hccp 1
reverttime 120 !--- This is the time in minutes (plus a
2 minute suspend) for the card to switch back !--- to
normal mode, if the fault has cleared. If there is a
fault on the Protect card, !--- then it will revert back
after the suspend time, and it will not wait for the
full !--- revert time. ! interface Cable3/1 hccp 2
working 1 hccp 2 channel-switch 1 rfsw1a rfswitch-group
192.168.1.5 11110100 1 !--- This is the IP address of
the Switch, and it is protecting member 1 in the !---
right side of Switch slot 1. hccp 2 reverttime 120 !
interface Cable4/0 hccp 3 working 1 hccp 3 channel-
switch 1 rfsw1b rfswitch-group 192.168.1.5 88880800 1 !-
-- This is the IP address of the Switch, and it is
protecting member 1 in the !--- left side of Switch slot
5. Because the RF Switch is in 4+1 mode, slot 5 is !---
considered to be slot 1 again. hccp 3 reverttime 120 !
interface Cable 4/1 hccp 4 working 1 hccp 4 channel-
switch 1 rfsw1b rfswitch-group 192.168.1.5 22220200 1 !-
-- This is the IP address of the Switch, and it is
protecting member 1 in the !--- right side of Switch
slot 5. Because the RF Switch is in 4+1 mode, slot 5 is
!--- considered to be slot 1 again. hccp 4 reverttime
120 ! interface Cable5/0 hccp 5 working 1 hccp 5
channel-switch 1 rfsw2a rfswitch-group 192.168.1.6
44440400 1 hccp 5 reverttime 120 ! interface Cable 5/1
hccp 6 working 1 hccp 6 channel-switch 1 rfsw2a
rfswitch-group 192.168.1.6 11110100 1 hccp 6 reverttime
120 ! interface Cable 6/0 hccp 7 working 1 hccp 7
channel-switch 1 rfsw2b rfswitch-group 192.168.1.6
88880800 1 hccp 7 reverttime 120 ! interface Cable 6/1
hccp 8 working 1 hccp 8 channel-switch 1 rfsw2b
```

```

rfswitch-group 192.168.1.6 22220200 1 hccp 8 reverttime
120 ! router eigrp 2500 network 10.11.12.0 0.0.0.255
network 192.168.1.0 network 192.168.3.0 no auto-summary
no eigrp log-neighbor-changes !--- Open Shortest Path
First (OSPF) may be the best routing protocol, with its
new !--- fast-hellos. ip classless ip route 0.0.0.0
0.0.0.0 192.168.1.254 ip route 192.168.1.0 255.255.255.0
FastEthernet0/0 ip route 192.168.2.0 255.255.255.0
FastEthernet0/1 no ip http server ! cdp run ! snmp-
server community private RW !--- This does not affect
the HCCP communications between the Switch and the VXR,
but !--- it must be set to Private on the RF Switch.
snmp-server community public RO snmp-server enable traps
tty snmp-server manager tftp-server disk0: tftp-server
disk1: tftp-server disk1:rfs250-fl-1935030e tftp-server
disk1:rfs250-bf-1935022d alias exec shb show hccp brief
alias exec shd show hccp detail alias exec scm show
cable modem alias exec scr show cable modem remote alias
exec sm show cab modu alias exec sch show cab hop alias
exec sc300 show cont c3/0 u0 alias exec sint300 show int
c3/0 u0 alias exec scs show cable spec

```

保护VXR配置

```

version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname "ProtectVXR"
!
boot system disk0:ubr7200-ik8s-mz.BC.28July03
no logging console
enable secret 5 $1$5YHG$mquxabcqzFoUUKhp/c9WT4/
!
cab modem remote-query 10 public
cable modulation-profile 41 request 0 16 0 8 qpsk
scrambler 152 no-diff 64 fixed
cable modulation-profile 41 initial 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed
cable modulation-profile 41 station 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed
cable modulation-profile 41 short 3 78 35 25 qpsk
scrambler 152 no-diff 100 short
cable modulation-profile 41 long 9 232 0 137 qpsk
scrambler 152 no-diff 80 short
cable modulation-profile 42 request 0 16 0 8 qpsk
scrambler 152 no-diff 64 fixed
cable modulation-profile 42 initial 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed
cable modulation-profile 42 station 5 34 0 48 qpsk
scrambler 152 no-diff 128 fixed
cable modulation-profile 42 short 3 78 17 10 16qam
scrambler 152 no-diff 136 short
cable modulation-profile 42 long 9 232 0 77 16qam
scrambler 152 no-diff 216 short
!--- Be sure to pre-configure all global configurations
on the Protect, such as !--- modulation profiles,
spectrum groups, load balancing, and so forth. no cable
qos permission create no cable qos permission update
cable qos permission modems no cable clock source-
midplane no cable clock force primary no cable clock
force secondary ! cable config-file docsis.cm frequency
453000000 service-class 1 max-upstream 10000 service-
class 1 max-downstream 10000 service-class 1 max-burst

```

```
1522 ! ip subnet-zero ip cef ! ip name-server
171.68.226.120 ! ip dhcp pool MODEMS1 network
192.168.3.0 255.255.255.0 bootfile docsis.cm next-server
192.168.3.5 default-router 192.168.3.5 option 7 ip
192.168.3.5 option 4 ip 192.168.3.5 option 2 hex
0000.0000 lease 2 3 4 ! ip dhcp pool PC network
10.11.12.0 255.255.255.0 default-router 10.11.12.1 dns-
server 171.68.226.120 lease 10 1 11 ! packetcable
element_id 35417 ! interface FastEthernet0/0 ip address
192.168.1.11 255.255.255.0 no keepalive speed auto full-
duplex no cdp enable !--- This interface is used for
HCCP traffic. ! interface FastEthernet0/1 ip address
192.168.2.11 255.255.255.0 keepalive 1 speed auto full-
duplex no cdp enable ! interface Cable3/0 no ip address
!--- There is no need to set the IP address, because it
will come from the Working card !--- via SNMP. no
keepalive !--- This defaults to 10 seconds with the N+1
Cisco IOS code, but it is recommended that !--- you
disable it on the Protect interface or set it to a
relatively high value. cable downstream annex B cable
downstream modulation 64qam cable downstream interleave-
depth 32 !--- The DS modulation, annex mode, and
interleave must be pre-configured and must be !--- the
same on the Protect and on the Working of the same
group. no shut !--- The interface must be activated to
start HCCP functionality. Do this last. cable upstream 0
shutdown !--- This will automatically become "no shut"
when a failover occurs. hccp 1 protect 1 192.168.1.7 !---
- This is the Protect for the first group. Remember to
configure the Protect !--- interface(s) last, after the
Working interfaces are configured. This is the HCCP !---
first group, and it is protecting member 1 with member
1's FE IP address. hccp 1 channel-switch 1 rfswwa
rfswwa-group 192.168.1.5 44440400 1 !--- This is the
IP address of the Switch, and it is protecting member 1,
which has a !--- bitmap of 44440400 in Switch slot 1.
hccp 1 protect 2 192.168.1.8 !--- This is the HCCP first
group, and it is protecting member 2 with its IP
address. hccp 1 channel-switch 2 rfswwa rfswwa-group
192.168.1.5 44440400 2 hccp 1 protect 3 192.168.1.9 hccp
1 channel-switch 3 rfswwa rfswwa-group 192.168.1.5
44440400 3 hccp 1 protect 4 192.168.1.10 hccp 1 channel-
switch 4 rfswwa rfswwa-group 192.168.1.5 44440400 4
hccp 1 timers 666 2000 !--- hccp 1 timers <hellotime>
<holdtime> !--- This is for inter-chassis communication.
! interface Cable3/1 hccp 2 protect 1 192.168.1.7 hccp 2
channel-switch 1 rfswwa rfswwa-group 192.168.1.5
11110100 1 hccp 2 protect 2 192.168.1.8 hccp 2 channel-
switch 2 rfswwa rfswwa-group 192.168.1.5 11110100 2
hccp 2 protect 3 192.168.1.9 hccp 2 channel-switch 3
rfswwa rfswwa-group 192.168.1.5 11110100 3 hccp 2
protect 4 192.168.1.10 hccp 2 channel-switch 4 rfswwa
rfswwa-group 192.168.1.5 11110100 4 hccp 2 timers 666
2000 ! interface Cable4/0 hccp 3 protect 1 192.168.1.7
hccp 3 channel-switch 1 rfswwb rfswwb-group
192.168.1.5 88880800 1 hccp 3 protect 2 192.168.1.8 hccp
3 channel-switch 2 rfswwb rfswwb-group 192.168.1.5
88880800 2 hccp 3 protect 3 192.168.1.9 hccp 3 channel-
switch 3 rfswwb rfswwb-group 192.168.1.5 88880800 3
hccp 3 protect 4 192.168.1.10 hccp 3 channel-switch 4
rfswwb rfswwb-group 192.168.1.5 88880800 4 hccp 3
timers 666 2000 ! interface Cable4/1 hccp 4 protect 1
192.168.1.7 hccp 4 channel-switch 1 rfswwb rfswwb-
group 192.168.1.5 22220200 1 hccp 4 protect 2
```

```

192.168.1.8 hccp 4 channel-switch 2 rfswlb rfswitch-
group 192.168.1.5 22220200 2 hccp 4 protect 3
192.168.1.9 hccp 4 channel-switch 3 rfswlb rfswitch-
group 192.168.1.5 22220200 3 hccp 4 protect 4
192.168.1.10 hccp 4 channel-switch 4 rfswlb rfswitch-
group 192.168.1.5 22220200 4 hccp 4 timers 666 2000 !
interface Cable5/0 hccp 5 protect 1 192.168.1.7 hccp 5
channel-switch 1 rfsw2a rfswitch-group 192.168.1.6
44440400 1 hccp 5 protect 2 192.168.1.8 hccp 5 channel-
switch 2 rfsw2a rfswitch-group 192.168.1.6 44440400 2
hccp 5 protect 3 192.168.1.9 hccp 5 channel-switch 3
rfsw2a rfswitch-group 192.168.1.6 44440400 3 hccp 5
protect 4 192.168.1.10 hccp 5 channel-switch 4 rfsw2a
rfswitch-group 192.168.1.6 44440400 4 hccp 5 timers 666
2000 ! interface Cable5/1 hccp 6 protect 1 192.168.1.7
hccp 6 channel-switch 1 rfsw2a rfswitch-group
192.168.1.6 11110100 1 hccp 6 protect 2 192.168.1.8 hccp
6 channel-switch 2 rfsw2a rfswitch-group 192.168.1.6
11110100 2 hccp 6 protect 3 192.168.1.9 hccp 6 channel-
switch 3 rfsw2a rfswitch-group 192.168.1.6 11110100 3
hccp 6 protect 4 192.168.1.10 hccp 6 channel-switch 4
rfsw2a rfswitch-group 192.168.1.6 11110100 4 hccp 6
timers 666 2000 ! interface Cable6/0 hccp 7 protect 1
192.168.1.7 hccp 7 channel-switch 1 rfsw2b rfswitch-
group 192.168.1.6 88880800 1 hccp 7 protect 2
192.168.1.8 hccp 7 channel-switch 2 rfsw2b rfswitch-
group 192.168.1.6 88880800 2 hccp 7 protect 3
192.168.1.9 hccp 7 channel-switch 3 rfsw2b rfswitch-
group 192.168.1.6 88880800 3 hccp 7 protect 4
192.168.1.10 hccp 7 channel-switch 4 rfsw2b rfswitch-
group 192.168.1.6 88880800 4 hccp 7 timers 666 2000 !
interface Cable6/1 hccp 8 protect 1 192.168.1.7 hccp 8
channel-switch 1 rfsw2b rfswitch-group 192.168.1.6
22220200 1 hccp 8 protect 2 192.168.1.8 hccp 8 channel-
switch 2 rfsw2b rfswitch-group 192.168.1.6 22220200 2
hccp 8 protect 3 192.168.1.9 hccp 8 channel-switch 3
rfsw2b rfswitch-group 192.168.1.6 22220200 3 hccp 8
protect 4 192.168.1.10 hccp 8 channel-switch 4 rfsw2b
rfswitch-group 192.168.1.6 22220200 4 hccp 8 timers 666
2000 ! router eigrp 2500 network 10.11.12.0 0.0.0.255
network 10.11.13.0 0.0.0.255 network 192.168.1.0 network
192.168.3.0 network 192.168.5.0 no auto-summary no eigrp
log-neighbor-changes !--- OSPF may be the best routing
protocol, with its new fast-hellos. ! ip classless ip
route 0.0.0.0 0.0.0.0 192.168.1.254 ip route 192.168.1.0
255.255.255.0 FastEthernet0/0 ip route 192.168.2.0
255.255.255.0 FastEthernet0/1 no ip http server ! cdp
run ! snmp-server community private RW snmp-server
community public RO snmp-server enable traps tty snmp-
server enable traps cable snmp-server manager alias exec
shb show hccp brief alias exec shd show hccp detail
alias exec scm show cable modem alias exec scr show
cable modem remote

```

场景 3

与MC28C线卡的uBR10K N+1配置示例。

图2 – Belden 1855A (mini-RG-59哄骗)用f或BNC连接器

ubr10k配置

```
uBR10012-1# show run Current configuration : 8567 bytes
! version 12.2 no parser cache no service single-slot-
reload-enable no service pad service timestamps debug
uptime service timestamps log uptime no service
password-encryption ! hostname uBR10k ! boot system
flash slot0: ubr10k-k8p6-mz.122-4.BC1b logging rate-
limit console all 10 except critical enable secret 5
$1$.Dvy$fcPOhshUNjyfePH73FHRG. ! no cable qos permission
create no cable qos permission update cable qos
permission modems cable time-server ! cable config-file
docsis.cm frequency 453000000 service-class 1 max-
upstream 10000 service-class 1 max-downstream 10000
service-class 1 max-burst 1522 ! redundancy main-cpu
auto-sync standard facility-alarm intake-temperature
major 49 facility-alarm intake-temperature minor 40
facility-alarm core-temperature major 53 facility-alarm
core-temperature minor 45 card 1/0 lgigetherne-1 card
1/1 2cable-tccplus card 2/0 lgigetherne-1 card 2/1
2cable-tccplus card 5/0 2cable-mc28c card 5/1 2cable-
mc28c card 6/0 2cable-mc28c card 6/1 2cable-mc28c card
7/0 2cable-mc28c card 7/1 2cable-mc28c card 8/0 2cable-
mc28c card 8/1 2cable-mc28c ip subnet-zero ip host
rfswitch 2001 10.10.10.1 !--- This is set for console
access from the 10K to the Switch. The IP address is for
!--- Loopback0. ip dhcp pool MODEMS1 network 172.25.1.0
255.255.255.0 bootfile docsis.cm next-server 172.25.1.1
default-router 172.25.1.1 option 7 ip 172.25.1.1 option
4 ip 172.25.1.1 option 2 hex 0000.0000 lease 2 3 4 ! ip
dhcp pool MODEMS2 network 172.25.2.0 255.255.255.0
bootfile docsis.cm next-server 172.25.2.1 default-router
172.25.2.1 option 7 ip 172.25.2.1 option 4 ip 172.25.2.1
option 2 hex 0000.0000 lease 2 3 4 ! ip dhcp-client
network-discovery informs 2 discovers 2 period 15 !---
An internal DHCP server was used for testing, instead of
external servers (cable !--- helper, Time-of-Day [ToD],
TFTP, and so forth). External servers are recommended !-
-- in a "real" production network. ! interface Loopback0
ip address 10.10.10.1 255.255.255.252 ! interface
FastEthernet0/0/0 ip address 10.97.1.8 255.255.255.0 ip
rip receive version 2 no ip split-horizon no keepalive !
interface GigabitEthernet1/0/0 no ip address negotiation
auto ! interface GigabitEthernet2/0/0 no ip address
negotiation auto ! interface Cable5/1/0 !--- This is the
Protect for the first group. Remember to configure the
Protect !--- interface(s) last, after the Working
interfaces are configured. no ip address !--- There is
no need to set the IP address because it will come from
the Working card !--- via SNMP. no keepalive !--- This
defaults to 10 seconds with the N+1 Cisco IOS code, but
it is recommended !--- that you disable it on the
Protect interface or set it to a relatively high value.
cable downstream annex B cable downstream modulation
64qam cable downstream interleave-depth 32 !--- The DS
modulation, annex mode, and interleave must be same on
the Protect and on !--- the Working of the same group.
cable upstream 0 shutdown !--- This will automatically
become "no shut" when a failover occurs. cable upstream
1 shutdown cable upstream 2 shutdown cable upstream 3
shutdown cable dhcp-giaddr policy hccp 1 protect 1
10.10.10.1 !--- This is the HCCP first group, and it is
protecting member 1 with member 1's FE IP !--- address.
If it is intra-chassis, you can use the Loopback0 IP
address. hccp 1 channel-switch 1 uc wavecom-hd
10.97.1.21 2 10.97.1.21 16 !--- This is the IP address
```

of the upconverter, and it is module 2 (B) that is backing !--- module 16 (P) of the upconverter. This shows that one upconverter could have a !--- module that backs up a module in a different chassis with a different IP address, !--- if need be. If this statement is not present when you are using Cisco IOS Software !--- Release 15(BC2) or later, then IF-Muting is assumed, and an external upconverter !--- with SNMP capability is not needed.

```
hccp 1 channel-switch 1 rfswitch rfswitch-group 10.97.1.20 AA200000 1 !--- This is the IP address of the Switch, and it is protecting member 1, which has a !--- bitmap of AA200000 in Switch slot 1. hccp 1 protect 2 10.10.10.1 !--- This is the HCCP first group, and it is protecting member 2 with its IP address. hccp 1 channel-switch 2 uc wavecom-hd 10.97.1.21 2 10.97.1.21 14 !--- This is the IP address of the upconverter, and it is module 2 (B) that is backing !--- module 14 (N). hccp 1 channel-switch 2 rfswitch rfswitch-group 10.97.1.20 AA200000 2 !--- This is the IP address of the Switch, and it is protecting member 2, with a bitmap !--- of AA200000 in Switch slot 2. hccp 1 protect 3 10.10.10.1 hccp 1 channel-switch 3 uc wavecom-hd 10.97.1.21 2 10.97.1.21 12 hccp 1 channel-switch 3 rfswitch rfswitch-group 10.97.1.20 AA200000 3 hccp 1 protect 4 10.10.10.1 hccp 1 channel-switch 4 uc wavecom-hd 10.97.1.21 2 10.97.1.21 10 hccp 1 channel-switch 4 rfswitch rfswitch-group 10.97.1.20 AA200000 4 hccp 1 protect 5 10.10.10.1 hccp 1 channel-switch 5 uc wavecom-hd 10.97.1.21 2 10.97.1.21 8 hccp 1 channel-switch 5 rfswitch rfswitch-group 10.97.1.20 AA200000 5 hccp 1 protect 6 10.10.10.1 hccp 1 channel-switch 6 uc wavecom-hd 10.97.1.21 2 10.97.1.21 6 hccp 1 channel-switch 6 rfswitch rfswitch-group 10.97.1.20 AA200000 6 hccp 1 protect 7 10.10.10.1 hccp 1 channel-switch 7 uc wavecom-hd 10.97.1.21 2 10.97.1.21 4 hccp 1 channel-switch 7 rfswitch rfswitch-group 10.97.1.20 AA200000 7 hccp 1 timers 5000 15000 !--- hccp 1 timers <hellotime> <holdtime> !--- This is for inter-chassis communication, so set high for the 10K. ! interface Cable5/1/1 !--- This is the Protect for the second group. no ip address no keepalive cable downstream annex B cable downstream modulation 64qam cable downstream interleave-depth 32 cable upstream 0 shutdown cable upstream 1 shutdown cable upstream 2 shutdown cable upstream 3 shutdown cable dhcp-giaddr policy ! hccp 2 protect 1 10.10.10.1 hccp 2 channel-switch 1 uc wavecom-hd 10.97.1.21 1 10.97.1.21 15 hccp 2 channel-switch 1 rfswitch rfswitch-group 10.97.1.20 55100000 1 !--- Because this MAC domain is on right side of header, the bitmap in hexadecimal code !--- is 55100000. hccp 2 protect 2 10.10.10.1 hccp 2 channel-switch 2 uc wavecom-hd 10.97.1.21 1 10.97.1.21 13 hccp 2 channel-switch 2 rfswitch rfswitch-group 10.97.1.20 55100000 2 hccp 2 protect 3 10.10.10.1 hccp 2 channel-switch 3 uc wavecom-hd 10.97.1.21 1 10.97.1.21 11 hccp 2 channel-switch 3 rfswitch rfswitch-group 10.97.1.20 55100000 3 hccp 2 protect 4 10.10.10.1 hccp 2 channel-switch 4 uc wavecom-hd 10.97.1.21 1 10.97.1.21 9 hccp 2 channel-switch 4 rfswitch rfswitch-group 10.97.1.20 55100000 4 hccp 2 protect 5 10.10.10.1 hccp 2 channel-switch 5 uc wavecom-hd 10.97.1.21 1 10.97.1.21 7 hccp 2 channel-switch 5 rfswitch rfswitch-group 10.97.1.20 55100000 5 hccp 2 protect 6 10.10.10.1 hccp 2 channel-switch 6 uc wavecom-hd 10.97.1.21 1 10.97.1.21 5 hccp 2 channel-switch 6 rfswitch rfswitch-group
```

```
10.97.1.20 55100000 6 hccp 2 protect 7 10.10.10.1 hccp 2
channel-switch 7 uc wavecom-hd 10.97.1.21 1 10.97.1.21 3
hccp 2 channel-switch 7 rfswitch rfswitch-group
10.97.1.20 55100000 7 hccp 2 timers 5000 15000 !
interface Cable8/1/0 !--- This is the Working for the
first group. ip address 10.192.5.1 255.255.255.0
secondary ip address 172.25.1.1 255.255.255.0 !---
Interface bundling is supported, as are subinterfaces.
ip rip send version 2 ip rip receive version 2 keepalive
1 !--- The keepalive time is in seconds, and the default
is 10 seconds for HCCP code. cable downstream annex B
cable downstream modulation 64qam cable downstream
interleave-depth 32 cable downstream frequency 453000000
!--- This is the DS frequency, which used to be
informational only when you are using !--- an external
upconverter. This must be set when doing N+1, so the
Protect !--- upconverter knows what frequency to use.
cable upstream 0 frequency 24000000 !--- If you are
doing dense mode combining, the US frequencies must be
different. !--- If no two US ports are shared, the same
frequency can be used. cable upstream 0 power-level 0 no
cable upstream 0 shutdown cable upstream 1 power-level 0
cable upstream 1 shutdown cable upstream 2 power-level 0
cable upstream 2 shutdown cable upstream 3 power-level 0
cable upstream 3 shutdown cable dhcp-giaddr policy !---
This tells the CMs to get an IP address from the primary
scope, and it tells the !--- CPE to use the secondary
scope. hccp 1 working 1 !--- This is Working member 1 of
HCCP Group 1. hccp 1 channel-switch 1 uc wavecom-hd
10.97.1.21 2 10.97.1.21 16 !--- This is the IP address
of the upconverter, and it is module 2 (B) that is
backing !--- module 16 (P). hccp 1 channel-switch 1
rfswitch rfswitch-group 10.97.1.20 AA200000 1 !--- This
is the IP address of the Switch and of member 1, which
has a bitmap of !--- AA200000 in Switch slot 1. hccp 1
reverttime 120 !--- This is the time in minutes (plus a
2 minute suspend) for the card to switch back !--- to
normal mode, if the fault has cleared. If a fault is
initiated by a keepalive !--- and you have a fault on
the Protect card, then it will revert back after the !--
- suspend time, and it will not wait for the full revert
time. ! interface Cable8/1/1 !--- This is the Working
interface for the second HCCP group. ip address
10.192.5.1 255.255.255.0 secondary ip address 172.25.2.1
255.255.255.0 ip rip send version 2 ip rip receive
version 2 keepalive 1 cable downstream annex B cable
downstream modulation 64qam cable downstream interleave-
depth 32 cable downstream frequency 453000000 cable
upstream 0 frequency 24000000 cable upstream 0 power-
level 0 no cable upstream 0 shutdown cable upstream 1
power-level 0 cable upstream 1 shutdown cable upstream 2
power-level 0 cable upstream 2 shutdown cable upstream 3
power-level 0 cable upstream 3 shutdown cable dhcp-
giaddr policy hccp 2 working 1 !--- This is Working
member 1 of HCCP Group 2. hccp 2 channel-switch 1 uc
wavecom-hd 10.97.1.21 1 10.97.1.21 15 hccp 2 channel-
switch 1 rfswitch rfswitch-group 10.97.1.20 55100000 1
!--- This is the IP address of the Switch and of member
1 of Group 2, which has a !--- bitmap of 55100000 in
Switch slot 1. hccp 2 reverttime 120 ! ip classless no
ip http server ! no cdp run snmp-server community
private RW !--- This does not affect the HCCP
communications between the upconverter, the Switch, !---
and the 10K. snmp-server enable traps cable no cdp run
```

```

snmp-server manager tftp-server server tftp-server
ios.cf alias ios.cf ! line con 0 logging synchronous
line aux 0 no exec transport input all !--- The previous
three lines are used to console from the Auxiliary port
of the 10K to !--- the Switch. line vty 0 4 session-
timeout 400 password xx login endBuilding
configuration...

```

场景 4

5x20线卡的配置示例在8+1模式。

图3 – Belden mini-RG-59同轴用MCX连接器

ubr10k配置

```

uBR10012-1# show run Current configuration : 8567 bytes
! version 12.2 no parser cache no service single-slot-
reload-enable no service pad service timestamps debug
uptime service timestamps log uptime no service
password-encryption ! hostname uBR10k ! boot system
flash slot0: ubr10k-k8p6-mz.122-15.BC1 logging rate-
limit console all 10 except critical enable secret 5
$1$.Dvy$fcPOhshUNjyfePH73FHRG cable modulation-profile
21 request 0 16 0 22 qpsk scrambler 152 no-diff 32 fixed
cable modulation-profile 21 initial 5 34 0 48 qpsk
scrambler 152 no-diff 64 fixed cable modulation-profile
21 station 5 34 0 48 qpsk scrambler 152 no-diff 64 fixed
cable modulation-profile 21 short 3 76 12 22 qpsk
scrambler 152 no-diff 64 shortened cable modulation-
profile 21 long 7 231 0 22 qpsk scrambler 152 no-diff 64
shortened !--- Advanced time division multiplex access
(ATDMA) Cisco IOS has different !--- modulation profiles
and requirements. ! no cable qos permission create no
cable qos permission update cable qos permission modems
cable time-server ! cable config-file docsis.cm
frequency 453000000 service-class 1 max-upstream 10000
service-class 1 max-downstream 10000 service-class 1
max-burst 1522 ! redundancy main-cpu auto-sync standard
facility-alarm intake-temperature major 49 facility-
alarm intake-temperature minor 40 facility-alarm core-
temperature major 53 facility-alarm core-temperature
minor 45 card 1/0 lgigetherne-1 card 1/1 2cable-tccplus
card 2/0 lgigetherne-1 card 2/1 2cable-tccplus card 5/0
5cable-mc520s-d card 5/1 5cable-mc520s-d card 6/0
5cable-mc520s-d card 6/1 5cable-mc520s-d card 7/0
5cable-mc520s-d card 7/1 5cable-mc520s-d card 8/0
5cable-mc520s-d card 8/1 5cable-mc520s-d ip subnet-zero
ip host rfs witch 2001 10.10.10.1 !--- This is set for
console access from the 10K to the Switch. The IP
address is for !--- Loopback0. ip dhcp pool MODEMS1
network 172.25.1.0 255.255.255.0 bootfile docsis.cm
next-server 172.25.1.1 default-router 172.25.1.1 option
7 ip 172.25.1.1 option 4 ip 172.25.1.1 option 2 hex
0000.0000 lease 2 3 4 ! ip dhcp pool MODEMS2 network
172.25.2.0 255.255.255.0 bootfile docsis.cm next-server
172.25.2.1 default-router 172.25.2.1 option 7 ip
172.25.2.1 option 4 ip 172.25.2.1 option 2 hex 0000.0000
lease 2 3 4 ! ip dhcp-client network-discovery informs 2
discovers 2 period 15 !--- An internal DHCP server was
used for testing instead of external servers (cable !---
helper, ToD, TFTP, and so forth). External servers are

```



```
recommended in a "real" !--- production network. !
interface Loopback0 ip address 10.10.10.1
255.255.255.252 ! interface FastEthernet0/0/0 ip address
10.97.1.8 255.255.255.0 ip rip receive version 2 no ip
split-horizon no keepalive ! interface
GigabitEthernet1/0/0 no ip address negotiation auto !
interface GigabitEthernet2/0/0 no ip address negotiation
auto !--- This assumes rfs2 is on the top, as shown in
the cable reference guide. Other !--- interfaces will be
the same, except they will have a different member
number !--- for each HCCP group. interface Cable5/1/0 !-
-- This is the Protect for the first group. It may be
best to configure the Protect !--- interface(s) last,
after the Working interfaces are configured, or keep the
!--- interface "shut" until you are finished with all
configurations. no ip address !--- There is no need to
set the IP address, because it will come from the
Working card !--- via SNMP. no keepalive !--- This
defaults to 10 seconds with the N+1 Cisco IOS code, but
it is recommended !--- that you disable it on the
Protect interface or set it to a relatively high value.
cable downstream annex B cable downstream modulation
64qam cable downstream interleave-depth 32 !--- The DS
modulation and interleave must be the same on the
Protect and on the !--- Working of the same group. The
Protect interface itself must be "no shut" for !--- HCCP
to activate. cable downstream rf-shutdown cable upstream
0 shutdown !--- These will automatically become "no
shut" when a failover occurs. cable upstream 1 shutdown
cable upstream 2 shutdown cable upstream 3 shutdown hccp
1 protect 1 10.10.10.1 !--- This is the HCCP first
group, and it is protecting member 1 with member 1's FE
IP !--- address. If it is intra-chassis, you can use the
Loopback0 IP address. hccp 1 channel-switch 1 rfs2
rfs2-switch-group 10.97.1.20 AA200000 1 !--- This is the IP
address of the Switch, and it is protecting member 1,
which has a !--- bitmap of AA200000 in Switch slot 1.
hccp 1 protect 2 10.10.10.1 !--- This is the HCCP first
group, and it is protecting member 2 with the loopback
IP !--- address. hccp 1 channel-switch 2 rfs2 rfs2-switch-
group 10.97.1.20 AA200000 2 !--- This is the IP address
of the Switch, and it is protecting member 2, with a
bitmap !--- of AA200000 in Switch slot 2. hccp 1 protect
3 10.10.10.1 hccp 1 channel-switch 3 rfs2 rfs2-switch-
group 10.97.1.20 AA200000 3 hccp 1 protect 4 10.10.10.1
hccp 1 channel-switch 4 rfs2 rfs2-switch-group 10.97.1.20
AA200000 4 hccp 1 protect 5 10.10.10.1 hccp 1 channel-
switch 5 rfs2 rfs2-switch-group 10.97.1.20 AA200000 5 hccp
1 protect 6 10.10.10.1 hccp 1 channel-switch 6 rfs2
rfs2-switch-group 10.97.1.20 AA200000 6 hccp 1 protect 7
10.10.10.1 hccp 1 channel-switch 7 rfs2 rfs2-switch-group
10.97.1.20 AA200000 7 !--- These channel-switch
configurations can be copied and pasted into their
respective !--- Working interfaces. hccp 1 timers 5000
15000 !--- hccp 1 timers <hellotime> <holdtime> !---
This is mostly for inter-chassis communication, so set
it high for the 10K, as !--- this can create extra CPU
load. no hccp 1 revertive ! interface Cable5/1/1 !---
This is the Protect for the second group. no ip address
no keepalive cable downstream annex B cable downstream
modulation 64qam cable downstream interleave-depth 32
cable downstream rf-shutdown cable upstream 0 shutdown
cable upstream 1 shutdown cable upstream 2 shutdown
cable upstream 3 shutdown ! hccp 2 protect 1 10.10.10.1
```

```
hccp 2 channel-switch 1 rfs2 rfs2switch-group 10.97.1.20
55100000 1 !--- Because this MAC domain is on right side
of header, the bitmap in hexadecimal code !--- is
55100000. hccp 2 protect 2 10.10.10.1 hccp 2 channel-
switch 2 rfs2 rfs2switch-group 10.97.1.20 55100000 2 hccp
2 protect 3 10.10.10.1 hccp 2 channel-switch 3 rfs2
rfs2switch-group 10.97.1.20 55100000 3 hccp 2 protect 4
10.10.10.1 hccp 2 channel-switch 4 rfs2 rfs2switch-group
10.97.1.20 55100000 4 hccp 2 protect 5 10.10.10.1 hccp 2
channel-switch 5 rfs2 rfs2switch-group 10.97.1.20
55100000 5 hccp 2 protect 6 10.10.10.1 hccp 2 channel-
switch 6 rfs2 rfs2switch-group 10.97.1.20 55100000 6 hccp
2 protect 7 10.10.10.1 hccp 2 channel-switch 7 rfs2
rfs2switch-group 10.97.1.20 55100000 7 hccp 2 timers 5000
15000 no hccp 2 revertive ! interface Cable5/1/2 !---
This is the Protect for the third group. no ip address
no keepalive cable downstream annex B cable downstream
modulation 64qam cable downstream interleave-depth 32
cable downstream rf-shutdown cable upstream 0 shutdown
cable upstream 1 shutdown cable upstream 2 shutdown
cable upstream 3 shutdown hccp 3 protect 1 10.10.10.1
hccp 3 channel-switch 1 rfs1 rfs1switch-group 10.97.1.19
00C80000 1 hccp 3 channel-switch 1 rfs2 rfs2switch-group
10.97.1.20 00C00000 1 !--- Because the third MAC domain
will traverse both Switches, two statements are !---
needed. The 00 in front of the bitmaps will be dropped,
when the running !--- configuration is viewed. no hccp 3
revertive ! interface Cable5/1/3 !--- This is the
Protect for the fourth group. hccp 4 protect 1
10.10.10.1 hccp 4 channel-switch 1 rfs1 rfs1switch-group
10.97.1.19 AA200000 1 hccp 4 protect 2 10.10.10.1 hccp 4
channel-switch 2 rfs1 rfs1switch-group 10.97.1.19
AA200000 2 hccp 4 protect 3 10.10.10.1 hccp 4 channel-
switch 3 rfs1 rfs1switch-group 10.97.1.19 AA200000 3 hccp
4 protect 4 10.10.10.1 hccp 4 channel-switch 4 rfs1
rfs1switch-group 10.97.1.19 AA200000 4 hccp 4 protect 5
10.10.10.1 hccp 4 channel-switch 5 rfs1 rfs1switch-group
10.97.1.19 AA200000 5 hccp 4 protect 6 10.10.10.1 hccp 4
channel-switch 6 rfs1 rfs1switch-group 10.97.1.19
AA200000 6 hccp 4 protect 7 10.10.10.1 hccp 4 channel-
switch 7 rfs1 rfs1switch-group 10.97.1.19 AA200000 7 no
hccp 4 revertive ! interface Cable5/1/4 !--- This is the
Protect for the fifth group. hccp 5 protect 1 10.10.10.1
hccp 5 channel-switch 1 rfs1 rfs1switch-group 10.97.1.19
55100000 1 hccp 5 protect 2 10.10.10.1 hccp 5 channel-
switch 2 rfs1 rfs1switch-group 10.97.1.19 55100000 2 hccp
5 protect 3 10.10.10.1 hccp 5 channel-switch 3 rfs1
rfs1switch-group 10.97.1.19 55100000 3 hccp 5 protect 4
10.10.10.1 hccp 5 channel-switch 4 rfs1 rfs1switch-group
10.97.1.19 55100000 4 hccp 5 protect 5 10.10.10.1 hccp 5
channel-switch 5 rfs1 rfs1switch-group 10.97.1.19
55100000 5 hccp 5 protect 6 10.10.10.1 hccp 5 channel-
switch 6 rfs1 rfs1switch-group 10.97.1.19 55100000 6 hccp
5 protect 7 10.10.10.1 hccp 5 channel-switch 7 rfs1
rfs1switch-group 10.97.1.19 55100000 7 !--- Output
suppressed. ! interface Cable8/1/0 !--- This is the
Working for the first group. ip address 10.192.5.1
255.255.255.0 secondary ip address 172.25.1.1
255.255.255.0 !--- Interface bundling is supported, as
are subinterfaces. ip rip send version 2 ip rip receive
version 2 keepalive 1 !--- The keepalive time is in
seconds, and the default is 10 seconds for HCCP code. !-
-- Only set this after the modems have stabilized. cable
downstream annex B cable downstream modulation 64qam
```

```
cable downstream interleave-depth 32 cable downstream
frequency 453000000 !--- This is the DS frequency, which
must be set for the internal upconverter to !---
operate. cable downstream channel-id 0 no cable
downstream rf-shutdown !--- This is needed to turn on
the DS RF output. cable upstream 0 frequency 24000000 !-
-- If you are doing dense mode combining, the US
frequencies must be different. !--- If no two US ports
are shared, the same frequency can be used. cable
upstream 0 power-level 0 cable upstream 0 connector 0 !-
-- This is a new command for virtual interfaces, where
USs can be used for different !--- DS MAC domains. cable
upstream 0 channel-width 3200000 cable upstream 0
minislot-size 2 cable upstream 0 modulation-profile 22
no cable upstream 0 shutdown !--- Output suppressed.
cable dhcp-giaddr policy !--- This tells the the CMs to
get an IP address from the primary scope, and it tells
!--- the CPE to use the secondary scope. hccp 1 working
1 !--- This is Working member 1 of HCCP Group 1. hccp 1
channel-switch 1 rfs2 rfs2switch-group 10.97.1.20
AA200000 1 !--- This is the IP address of the Switch and
of member 1, which has a bitmap of !--- AA200000 in
Switch slot 1. hccp 1 reverttime 120 !--- This is the
time in minutes (plus a 2 minute suspend) for the card
to switch back !--- to normal mode, if the fault has
cleared. If a fault is initiated by a keepalive !--- and
you have a fault on the Protect card, then it will
revert back after the !--- suspend time, and it will not
wait for the full revert time. ! interface Cable8/1/1 !-
-- This is the Working interface for the second HCCP
group. ip address 10.192.5.1 255.255.255.0 secondary ip
address 172.25.2.1 255.255.255.0 ip rip send version 2
ip rip receive version 2 keepalive 1 cable downstream
annex B cable downstream modulation 64qam cable
downstream interleave-depth 32 cable downstream
frequency 453000000 cable downstream channel-id 1 no
cable downstream rf-shutdown cable upstream 0 frequency
24000000 cable upstream 0 power-level 0 cable upstream 0
connector 4 cable upstream 0 channel-width 3200000 cable
upstream 0 minislot-size 22 cable upstream 0 modulation-
profile 2 no cable upstream 0 shutdown !--- Output
suppressed. cable dhcp-giaddr policy hccp 2 working 1 !-
-- This is Working member 1 of HCCP Group 2. hccp 2
channel-switch 1 rfs2 rfs2switch-group 10.97.1.20
55100000 1 !--- This is the IP address of the Switch and
of member 1 of Group 2, which has a !--- bitmap of
55100000 in Switch slot 1. hccp 2 reverttime 120 !
interface Cable8/1/2 !--- This is the Working interface
for the third HCCP group. ip address 10.192.5.1
255.255.255.0 secondary ip address 172.25.3.1
255.255.255.0 ip rip send version 2 ip rip receive
version 2 keepalive 1 cable downstream annex B cable
downstream modulation 64qam cable downstream interleave-
depth 32 cable downstream frequency 453000000 cable
downstream channel-id 2 no cable downstream rf-shutdown
cable upstream 0 frequency 24000000 cable upstream 0
power-level 0 cable upstream 0 connector 8 cable
upstream 0 channel-width 3200000 cable upstream 0
minislot-size 2 cable upstream 0 modulation-profile 22
no cable upstream 0 shutdown cable dhcp-giaddr policy !-
-- Output suppressed. hccp 3 working 1 !--- This is
Working member 1 of HCCP Group 3. hccp 3 channel-switch
1 rfs1 rfs1switch-group 10.97.1.19 00c80000 1 hccp 3
channel-switch 1 rfs2 rfs2switch-group 10.97.1.20
```

```

00c00000 1 hccp 3 reverttime 120 ! interface Cable8/1/3
!--- This is the Working interface for the fourth HCCP
group. hccp 4 working 1 hccp 4 channel-switch 1 rfswl
rfswhitch-group 10.97.1.19 AA200000 1 hccp 4 reverttime
120 ! interface Cable8/1/4 !--- This is the Working
interface for the fifth HCCP group. hccp 5 working 1
hccp 5 channel-switch 1 rfswl rfswhitch-group 10.97.1.19
55100000 1 hccp 5 reverttime 120 ! ip classless no ip
http server ! no cdp run snmp-server community private
RW !--- This does not affect the HCCP communications
between the Switch and 10K. snmp-server enable traps
cable no cdp run snmp-server manager tftp-server server
tftp-server ios.cf alias ios.cf ! alias exec t configure
terminal alias exec scm show cable modem alias exec scr
sh cab mode remote alias exec shb sh hccp br alias exec
shd sh hccp detail alias exec shc sh hccp chan ! line
con 0 logging synchronous line aux 0 no exec transport
input all !--- The three previous lines are used to
console from the Auxiliary port of the 10K !--- to the
Switch. line vty 0 4 session-timeout 400 password xx
login endBuilding configuration...

```

方案 5

5x20线卡的配置示例在4+1与一RF交换机的模式。

图4 –与MC5x20和1 RF交换机(4+1)的ubr10k RF交换机

IP 地址	10.1.1.10	
SNMP团体	Private	
保护模式	4	
位图	Group1	0x44440400
	第2组	0x11110100
	Group3	0x00005000
	Group4	0x0000a080
	Group5	0x88880800
	Group6	0x22220200

图5 –位图

下配置示例是为五个MC5x20卡的高可用性与在4+1的一uBR-RFSW保护模式的4+1。保护模式影响交换机和有线调制解调器终端系统(CMTS)配置的位映象。如果还添加一个5x20，必须更改整件事。

参考在[布线Cisco UBR 3x10 RF交换机的布线到思科在Cisco UBR10012 CMTS的uBR10-MC5X20S/U电缆接口线路卡](#)。

1. 采取说在slot 1， 2， 3和4的RF交换机2的报头(顶部交换机)和事假。
2. 采取说slot的5， 6， 7和8 RF交换机1和地方RF交换机2的报头。
3. 采取从RF交换机2的保护并且放置它保护2。
4. 采取从RF交换机1的保护并且放置它保护1 RF交换机2。
5. 一旦达到五个工作的5x20卡，必须更改位映象配置，并且必须从一RF交换机移动报头，到其他。例如， slot 5报头RF交换机2将移动向slot 1报头RF交换机1。

配置被标记_{rfswa}，因为适合于对slot 1至4，并且他们的各自保护槽，是请保护2.保护在RF交换机的1个盖板slot 5至8，并且它被标记_{rfswb}。在4+1模式，RF交换机slot 5至8为配置的目的地认为slot 1至

4。

用在下一个示例的那个替代您的RF交换机IP地址(10.10.10.10)显示。

4+1工作配置

```
interface c7/1/0
hccp 1 working 1
hccp 1 channel-switch 1 rfswa rfswitch-group 10.10.10.10
44440400 1
interface c7/1/1
hccp 2 working 1
hccp 2 channel-switch 1 rfswa rfswitch-group 10.10.10.10
11110100 1
interface c7/1/2
hccp 3 working 1
hccp 3 channel-switch 1 rfswa rfswitch-group 10.10.10.10
00005000 1
hccp 3 channel-switch 1 rfswb rfswitch-group 10.10.10.10
0000a080 1
!--- Prepended 0s will not show up when you execute a
show run !--- command. Do not blindly copy and paste an
interface !--- configuration. interface c7/1/3 hccp 4
working 1 hccp 4 channel-switch 1 rfswb rfswitch-group
10.10.10.10 88880800 1 interface c7/1/4 hccp 5 working 1
hccp 5 channel-switch 1 rfswb rfswitch-group 10.10.10.10
22220200 1 -----
----- interface c6/0/0 hccp 1 working 2
hccp 1 channel-switch 2 rfswa rfswitch-group 10.10.10.10
44440400 2 interface c6/0/1 hccp 2 working 2 hccp 2
channel-switch 2 rfswa rfswitch-group 10.10.10.10
11110100 2 interface c6/0/2 hccp 3 working 2 hccp 3
channel-switch 2 rfswa rfswitch-group 10.10.10.10
00005000 2 hccp 3 channel-switch 2 rfswb rfswitch-group
10.10.10.10 0000a080 2 interface c6/0/3 hccp 4 working 2
hccp 4 channel-switch 2 rfswb rfswitch-group 10.10.10.10
88880800 2 interface c6/0/4 hccp 5 working 2 hccp 5
channel-switch 2 rfswb rfswitch-group 10.10.10.10
22220200 2 -----
----- interface c6/1/0 hccp 1 working 3
hccp 1 channel-switch 3 rfswa rfswitch-group 10.10.10.10
44440400 3 interface c6/1/1 hccp 2 working 3 hccp 2
channel-switch 3 rfswa rfswitch-group 10.10.10.10
11110100 3 interface c6/1/2 hccp 3 working 3 hccp 3
channel-switch 3 rfswa rfswitch-group 10.10.10.10
00005000 3 hccp 3 channel-switch 3 rfswb rfswitch-group
10.10.10.10 0000a080 3 interface c6/1/3 hccp 4 working 3
hccp 4 channel-switch 3 rfswb rfswitch-group 10.10.10.10
88880800 3 interface c6/1/4 hccp 5 working 3 hccp 5
channel-switch 3 rfswb rfswitch-group 10.10.10.10
22220200 3 -----
----- interface c5/0/0 hccp 1 working 4
hccp 1 channel-switch 4 rfswa rfswitch-group 10.10.10.10
44440400 4 interface c5/0/1 hccp 2 working 4 hccp 2
channel-switch 4 rfswa rfswitch-group 10.10.10.10
11110100 4 interface c5/0/2 hccp 3 working 4 hccp 3
channel-switch 4 rfswa rfswitch-group 10.10.10.10
00005000 4 hccp 3 channel-switch 4 rfswb rfswitch-group
10.10.10.10 0000a080 4 interface c5/0/3 hccp 4 working 4
hccp 4 channel-switch 4 rfswb rfswitch-group 10.10.10.10
88880800 4 interface c5/0/4 hccp 5 working 4 hccp 5
channel-switch 4 rfswb rfswitch-group 10.10.10.10
22220200 4
```

保护接口配置

```
interface c5/1/0
hccp 1 protect 1 10.10.10.1
hccp 1 channel-switch 1 rfswa rfs witch-group 10.10.10.10
44440400 1
hccp 1 protect 2 10.10.10.1
hccp 1 channel-switch 2 rfswa rfs witch-group 10.10.10.10
44440400 2
hccp 1 protect 3 10.10.10.1
hccp 1 channel-switch 3 rfswa rfs witch-group 10.10.10.10
44440400 3
hccp 1 protect 4 10.10.10.1
hccp 1 channel-switch 4 rfswa rfs witch-group 10.10.10.10
44440400 4
```

```
-----
interface c5/1/1
hccp 2 protect 1 10.10.10.1
hccp 2 channel-switch 1 rfswa rfs witch-group 10.10.10.10
11110100 1
hccp 2 protect 2 10.10.10.1
hccp 2 channel-switch 2 rfswa rfs witch-group 10.10.10.10
11110100 2
hccp 2 protect 3 10.10.10.1
hccp 2 channel-switch 3 rfswa rfs witch-group 10.10.10.10
11110100 3
hccp 2 protect 4 10.10.10.1
hccp 2 channel-switch 4 rfswa rfs witch-group 10.10.10.10
11110100 4
```

```
-----
interface c5/1/2
hccp 3 protect 1 10.10.10.1
hccp 3 channel-switch 1 rfswa rfs witch-group 10.10.10.10
00005000 1
hccp 3 channel-switch 1 rfswb rfs witch-group 10.10.10.10
0000a080 1
hccp 3 protect 2 10.10.10.1
hccp 3 channel-switch 2 rfswa rfs witch-group 10.10.10.10
00005000 2
hccp 3 channel-switch 2 rfswb rfs witch-group 10.10.10.10
0000a080 2
hccp 3 protect 3 10.10.10.1
hccp 3 channel-switch 3 rfswa rfs witch-group 10.10.10.10
00005000 3
hccp 3 channel-switch 3 rfswb rfs witch-group 10.10.10.10
0000a080 3
hccp 3 protect 4 10.10.10.1
hccp 3 channel-switch 4 rfswa rfs witch-group 10.10.10.10
00005000 4
hccp 3 channel-switch 4 rfswb rfs witch-group 10.10.10.10
0000a080 4
```

```
-----
interface c5/1/3
hccp 4 protect 1 10.10.10.1
hccp 4 channel-switch 1 rfswb rfs witch-group 10.10.10.10
88880800 1
hccp 4 protect 2 10.10.10.1
hccp 4 channel-switch 2 rfswb rfs witch-group 10.10.10.10
88880800 2
hccp 4 protect 3 10.10.10.1
hccp 4 channel-switch 3 rfswb rfs witch-group 10.10.10.10
```

```

88880800 3
hccp 4 protect 4 10.10.10.1
hccp 4 channel-switch 4 rfswb rfswhitch-group 10.10.10.10
88880800 4
-----
-----
interface c5/1/4
hccp 5 protect 1 10.10.10.1
hccp 5 channel-switch 1 rfswb rfswhitch-group 10.10.10.10
22220200 1
hccp 5 protect 2 10.10.10.1
hccp 5 channel-switch 2 rfswb rfswhitch-group 10.10.10.10
22220200 2
hccp 5 protect 3 10.10.10.1
hccp 5 channel-switch 3 rfswb rfswhitch-group 10.10.10.10
22220200 3
hccp 5 protect 4 10.10.10.1
hccp 5 channel-switch 4 rfswb rfswhitch-group 10.10.10.10
22220200 4

```

这些配置是为MAC接口故障切换，但是记住全部的JIB (专用集成电路[ASIC])将一起发生故障。DS 0和1共享同样ASIC，DS 2和3共享同样ASIC，并且DS 4独自地是ASIC。如果接口没有配置的HCCP，则不故障切换，即使共享同样ASIC。

如果配置小室上行最大主机 x 和或小室 $u4$ 连接器 y ，则您配置VI (虚拟接口)，亦称可配置MAC域。现在，当您有所有接口失败时，整个线路卡故障切换作为套件。如果连接器命令删除，取消在故障切换的虚拟接口影响的唯一方法是重新加载路由器。

8+1配置示例

```

uBR10012-1# show run Current configuration : 8567 bytes
! version 12.2 no parser cache no service single-slot-
reload-enable no service pad service timestamps debug
uptime service timestamps log uptime no service
password-encryption ! hostname uBR10k ! boot system
flash slot0: ubr10k-k8p6-mz.122-15.BC1 logging rate-
limit console all 10 except critical enable secret 5
$1$.Dvy$fcPOhshUNjyfePH73FHrg cable modulation-profile
21 request 0 16 0 22 qpsk scrambler 152 no-diff 32 fixed
cable modulation-profile 21 initial 5 34 0 48 qpsk
scrambler 152 no-diff 64 fixed cable modulation-profile
21 station 5 34 0 48 qpsk scrambler 152 no-diff 64 fixed
cable modulation-profile 21 short 3 76 12 22 qpsk
scrambler 152 no-diff 64 shortened cable modulation-
profile 21 long 9 232 0 22 qpsk scrambler 152 no-diff 64
shortened ! no cable qos permission create no cable qos
permission update cable qos permission modems cable
time-server ! cable config-file docsis.cm frequency
453000000 service-class 1 max-upstream 10000 service-
class 1 max-downstream 10000 service-class 1 max-burst
1522 ! redundancy main-cpu auto-sync standard facility-
alarm intake-temperature major 49 facility-alarm intake-
temperature minor 40 facility-alarm core-temperature
major 53 facility-alarm core-temperature minor 45 card
1/0 lgigethernet-1 card 1/1 2cable-tccplus card 2/0
lgigethernet-1 card 2/1 2cable-tccplus card 5/0 5cable-
mc520s-d card 5/1 5cable-mc520s-d card 6/0 5cable-
mc520s-d card 6/1 5cable-mc520s-d card 7/0 5cable-
mc520s-d card 7/1 5cable-mc520s-d card 8/0 5cable-
mc520s-d card 8/1 5cable-mc520s-d ip subnet-zero ip host
rfswhitch 2001 10.10.10.1 !--- This is set for console
access from the 10K to the Switch. !--- The IP address

```

```

is for Loopback0. ip dhcp pool MODEMS1 network
172.25.1.0 255.255.255.0 bootfile docsis.cm next-server
172.25.1.1 default-router 172.25.1.1 option 7 ip
172.25.1.1 option 4 ip 172.25.1.1 option 2 hex 0000.0000
lease 2 3 4 ! ip dhcp pool MODEMS2 network 172.25.2.0
255.255.255.0 bootfile docsis.cm next-server 172.25.2.1
default-router 172.25.2.1 option 7 ip 172.25.2.1 option
4 ip 172.25.2.1 option 2 hex 0000.0000 lease 2 3 4 ! ip
dhcp-client network-discovery informs 2 discovers 2
period 15 !--- An internal DHCP server was used for
testing instead of external servers !--- (cable helper,
TOD, TFTP, and so forth). External servers are
recommended !--- in a "real" production network. !
interface Loopback0 ip address 10.10.10.1
255.255.255.252 ! interface FastEthernet0/0/0 ip address
10.97.1.8 255.255.255.0 ip rip receive version 2 no ip
split-horizon no keepalive ! interface
GigabitEthernet1/0/0 no ip address negotiation auto !
interface GigabitEthernet2/0/0 no ip address negotiation
auto !

```

N+1示例接口配置

```

!--- This assumes rfs2 is on the top, as shown in the
cable reference guide. !--- Other interfaces will be the
same, except a different member number for each !---
HCCP group. interface Cable5/1/0 !--- This is the
Protect for the first group. It may be best to configure
the Protect !--- interface(s) last, after the Working
interfaces are configured, or keep the !--- interface
"shut" until finished with all configurations. no ip
address !--- No need to set the IP address because it
will come from the Working card via SNMP. no keepalive
!--- This defaults to 10 seconds with the N+1 Cisco IOS
code, but it should be disabled !--- on the Protect
interface or set relatively high. cable downstream annex
B cable downstream modulation 64qam cable downstream
interleave-depth 32 !--- The DS modulation and
Interleave must be the same on Protect and Working !---
of the same group. The Protect interface itself must be
"no shut" for HCCP !--- to activate. cable downstream
rf-shutdown cable upstream 0 shutdown !--- These will
automatically become "no shut" when a failover occurs.
cable upstream 1 shutdown cable upstream 2 shutdown
cable upstream 3 shutdown hccp 1 protect 1 10.10.10.1 !-
-- This is the HCCP first group and it is protecting
member 1 with member one's !--- FE IP address. If it is
intra-chassis, you can use the Loopback0 IP address.
hccp 1 channel-switch 1 rfs2 rfs2switch-group 10.97.1.20
AA200000 1 !--- This is the IP address of the Switch and
it is protecting member 1, !--- which has a bitmap of
AA200000 in Switch slot 1. hccp 1 protect 2 10.10.10.1
!--- This is the HCCP first group and it is protecting
member 2 with the loopback !--- IP address. hccp 1
channel-switch 2 rfs2 rfs2switch-group 10.97.1.20
AA200000 2 !--- This is the IP address of the Switch and
it is protecting member 2, !--- with a bitmap of
AA200000 in Switch slot 2. hccp 1 protect 3 10.10.10.1
hccp 1 channel-switch 3 rfs2 rfs2switch-group 10.97.1.20
AA200000 3 hccp 1 protect 4 10.10.10.1 hccp 1 channel-
switch 4 rfs2 rfs2switch-group 10.97.1.20 AA200000 4 hccp
1 protect 5 10.10.10.1 hccp 1 channel-switch 5 rfs2
rfs2switch-group 10.97.1.20 AA200000 5 hccp 1 protect 6
10.10.10.1 hccp 1 channel-switch 6 rfs2 rfs2switch-group

```



```
10.97.1.20 AA200000 6 hccp 1 protect 7 10.10.10.1 hccp 1
channel-switch 7 rfs2 rfs2-switch-group 10.97.1.20
AA200000 7 !--- These channel-switch configurations can
be copied and pasted into their !--- respective Working
interfaces. hccp 1 timers 5000 15000 !--- hccp 1 timers
<hellotime> <holdtime> !--- This is mostly for inter
chassis communication, so set it high for the 10K !---
as this can create extra CPU load. no hccp 1 revertive !
interface Cable5/1/1 !--- This is the Protect for the
second group. no ip address no keepalive cable
downstream annex B cable downstream modulation 64qam
cable downstream interleave-depth 32 cable downstream
rf-shutdown cable upstream 0 shutdown cable upstream 1
shutdown cable upstream 2 shutdown cable upstream 3
shutdown ! hccp 2 protect 1 10.10.10.1 hccp 2 channel-
switch 1 rfs2 rfs2-switch-group 10.97.1.20 55100000 1 !---
Because this MAC domain is on right side of header, the
bitmap in hexadecimal !--- code is 55100000. hccp 2
protect 2 10.10.10.1 hccp 2 channel-switch 2 rfs2
rfs2-switch-group 10.97.1.20 55100000 2 hccp 2 protect 3
10.10.10.1 hccp 2 channel-switch 3 rfs2 rfs2-switch-group
10.97.1.20 55100000 3 hccp 2 protect 4 10.10.10.1 hccp 2
channel-switch 4 rfs2 rfs2-switch-group 10.97.1.20
55100000 4 hccp 2 protect 5 10.10.10.1 hccp 2 channel-
switch 5 rfs2 rfs2-switch-group 10.97.1.20 55100000 5 hccp
2 protect 6 10.10.10.1 hccp 2 channel-switch 6 rfs2
rfs2-switch-group 10.97.1.20 55100000 6 hccp 2 protect 7
10.10.10.1 hccp 2 channel-switch 7 rfs2 rfs2-switch-group
10.97.1.20 55100000 7 hccp 2 timers 5000 15000 no hccp 2
revertive interface Cable5/1/2 !--- This is the Protect
for the third group. no ip address no keepalive cable
downstream annex B cable downstream modulation 64qam
cable downstream interleave-depth 32 cable downstream
rf-shutdown cable upstream 0 shutdown cable upstream 1
shutdown cable upstream 2 shutdown cable upstream 3
shutdown hccp 3 protect 1 10.10.10.1 hccp 3 channel-
switch 1 rfs1 rfs1-switch-group 10.97.1.19 00C80000 1 hccp
3 channel-switch 1 rfs2 rfs2-switch-group 10.97.1.20
00C00000 1 !--- Because the third MAC domain will
traverse both Switches, two statements are !--- needed.
The "00" in front of the bitmaps will be dropped when
viewing the !--- running configuration. no hccp 3
revertive interface Cable5/1/3 !--- This is the Protect
for the fourth group. hccp 4 protect 1 10.10.10.1 hccp 4
channel-switch 1 rfs1 rfs1-switch-group 10.97.1.19
AA200000 1 hccp 4 protect 2 10.10.10.1 hccp 4 channel-
switch 2 rfs1 rfs1-switch-group 10.97.1. 19 AA200000 2
hccp 4 protect 3 10.10.10.1 hccp 4 channel-switch 3
rfs1 rfs1-switch-group 10.97.1. 19 AA200000 3 hccp 4
protect 4 10.10.10.1 hccp 4 channel-switch 4 rfs1
rfs1-switch-group 10.97.1. 19 AA200000 4 hccp 4 protect 5
10.10.10.1 hccp 4 channel-switch 5 rfs1 rfs1-switch-group
10.97.1. 19 AA200000 5 hccp 4 protect 6 10.10.10.1 hccp
4 channel-switch 6 rfs1 rfs1-switch-group 10.97.1. 19
AA200000 6 hccp 4 protect 7 10.10.10.1 hccp 4 channel-
switch 7 rfs1 rfs1-switch-group 10.97.1. 19 AA200000 7 no
hccp 4 revertive interface Cable5/1/4 !--- This is the
Protect for the fifth group. hccp 5 protect 1 10.10.10.1
hccp 5 channel-switch 1 rfs1 rfs1-switch-group 10.97.1.19
55100000 1 hccp 5 protect 2 10.10.10.1 hccp 5 channel-
switch 2 rfs1 rfs1-switch-group 10.97.1. 19 55100000 2
hccp 5 protect 3 10.10.10.1 hccp 5 channel-switch 3
rfs1 rfs1-switch-group 10.97.1. 19 55100000 3 hccp 5
protect 4 10.10.10.1 hccp 5 channel-switch 4 rfs1
```

```
rfswitch-group 10.97.1. 19 55100000 4 hccp 5 protect 5
10.10.10.1 hccp 5 channel-switch 5 rfswl rfswitch-group
10.97.1. 19 55100000 5 hccp 5 protect 6 10.10.10.1 hccp
5 channel-switch 6 rfswl rfswitch-group 10.97.1. 19
55100000 6 hccp 5 protect 7 10.10.10.1 hccp 5 channel-
switch 7 rfswl rfswitch-group 10.97.1. 19 55100000 7 !--
- Output suppressed. ! interface Cable8/1/0 !--- This is
the Working for the first group. ip address 10.192.5.1
255.255.255.0 secondary ip address 172.25.1.1
255.255.255.0 !--- Interface bundling is supported as
well as subinterfaces. ip rip send version 2 ip rip
receive version 2 keepalive 1 !--- The keepalive time is
in seconds and the default is 10 seconds for HCCP code.
!--- Only set this when modems have stabilized. cable
downstream annex B cable downstream modulation 64qam
cable downstream interleave-depth 32 cable downstream
frequency 453000000 !--- This is DS frequency, which
must be set for the internal upconverter to operate.
cable downstream channel-id 0 no cable downstream rf-
shutdown !--- This is needed to turn on the DS RF
output. cable upstream 0 frequency 24000000 !--- If you
are doing dense mode combining, the upstream frequencies
must be different. !--- If no two US ports are shared,
then the same frequency can be used. cable upstream 0
power-level 0 cable upstream 0 connector 0 !--- This is
a new command for virtual interfaces, where USs can be
used for different !--- DS MAC domains. cable upstream 0
channel-width 3200000 cable upstream 0 minislots-size 2
cable upstream 0 modulation-profile 21 no cable upstream
0 shutdown !--- Output suppressed. cable dhcp-giaddr
policy !--- This tells CMS to get an IP address from the
primary scope and !--- tells CPEs to use the secondary
scope. hccp 1 working 1 !--- This is Working member 1 of
HCCP Group 1. hccp 1 channel-switch 1 rfsw2 rfswitch-
group 10.97.1.20 AA200000 1 !--- This is the IP address
of Switch and member 1, which has a bitmap of !---
AA200000 in Switch slot 1. hccp 1 reverttime 120 !---
This is the time in minutes (plus 2 minute suspend) for
the card to switch back !--- to normal mode, if the
fault has cleared. If a fault was initiated by a
keepalive !--- and you had a fault on the Protect card,
it would revert back after the suspend !--- time and not
wait the full revert time. ! interface Cable8/1/1 !---
This is the Working interface for the second HCCP group.
ip address 10.192.5.1 255.255.255.0 secondary ip address
172.25.2.1 255.255.255.0 ip rip send version 2 ip rip
receive version 2 keepalive 1 cable downstream annex B
cable downstream modulation 64qam cable downstream
interleave-depth 32 cable downstream frequency 453000000
cable downstream channel-id 1 no cable downstream rf-
shutdown cable upstream 0 frequency 24000000 cable
upstream 0 power-level 0 cable upstream 0 connector 4
cable upstream 0 channel-width 3200000 cable upstream 0
minislots-size 22 cable upstream 0 modulation-profile 21
no cable upstream 0 shutdown !--- Output suppressed.
cable dhcp-giaddr policy hccp 2 working 1 !--- This is
Working member 1 of HCCP Group 2. hccp 2 channel-switch
1 rfsw2 rfswitch-group 10.97.1.20 55100000 1 !--- This
is the IP address of the Switch and Member 1 of Group 2,
which has a bitmap !--- of 55100000 in Switch slot 1.
hccp 2 reverttime 120 ! interface Cable8/1/2 !--- This
is the Working interface for the third HCCP group. ip
address 10.192.5.1 255.255.255.0 secondary ip address
172.25.3.1 255.255.255.0 ip rip send version 2 ip rip
```

```
receive version 2 keepalive 1 cable downstream annex B
cable downstream modulation 64qam cable downstream
interleave-depth 32 cable downstream frequency 453000000
cable downstream channel-id 2 no cable downstream rf-
shutdown cable upstream 0 frequency 24000000 cable
upstream 0 power-level 0 cable upstream 0 connector 8
cable upstream 0 channel-width 3200000 cable upstream 0
minislot-size 2 cable upstream 0 modulation-profile 21
no cable upstream 0 shutdown cable dhcp-giaddr policy !-
-- Output suppressed. hccp 3 working 1 !--- This is
Working member 1 of HCCP Group 3. hccp 3 channel-switch
1 rfs1 rfs1-switch-group 10.97.1.19 00c80000 1 hccp 3
channel-switch 1 rfs2 rfs2-switch-group 10.97.1.20
00c00000 1 hccp 3 reverttime 120 interface Cable8/1/3 !-
--This is the Working interface for the fourth HCCP
group. hccp 4 working 1 hccp 4 channel-switch 1 rfs1
rfs1-switch-group 10.97.1.19 AA200000 1 hccp 4 reverttime
120 interface Cable8/1/4 !--- This is the Working
interface for the fifth HCCP group. hccp 5 working 1
hccp 5 channel-switch 1 rfs1 rfs1-switch-group 10.97.1.19
55100000 1 hccp 5 reverttime 120 ! ip classless no ip
http server ! no cdp run snmp-server community private
RW !--- This does not affect the HCCP communications
between the Switch and 10K, !--- unless it is changed.
snmp-server enable traps cable no cdp run snmp-server
manager tftp-server server tftp-server ios.cf alias
ios.cf ! alias exec t configure terminal alias exec scm
show cable modem alias exec scr sh cab mode remote alias
exec shb sh hccp br alias exec shd sh hccp detail alias
exec shc sh hccp chan ! line con 0 logging synchronous
line aux 0 no exec transport input all !--- The three
lines above were used to console from the Auxiliary port
of the 10K !--- to the Switch. line vty 0 4 session-
timeout 400 password xx login endBuilding
configuration...
```

相关信息

- [宽带有线支持](#)
- [技术支持 - Cisco Systems](#)