Configuring WAN Failover with a Cisco 881 Router and an AirLink ES440

When the AirLink ES440 is combined with a third-party router, the combined solution supports business continuity by providing primary and backup Internet access to one or more computers or other devices.

This guide provides instructions for configuring an AirLink ES440 and a Cisco 881 router for WAN Failover. Figure 1 shows the network topology. This guide also applies to customers subscribed to the AirLink Enterprise Connect service.

Figure 1: Hardware Configuration for Enterprise Business Continuity
Configure the Cisco 881 Router for WAN Failover

Configure the Cisco router’s IP SLA feature to support WAN failover. Figure 2 shows the router ports used in this sample configuration.

The following instructions provide a sample Cisco 881 configuration.

1. Connect the router to a laptop, using the serial cable supplied with the router. If you are asked to enter an initial configuration, choose No.

2. Open a terminal connection on the serial interface, using a terminal emulator application such as TeraTerm, PuTTY, etc. Configure the terminal speed to 9600 baud.

3. Type “enable” to enter root mode, and then type “configure terminal” to enter configuration mode.

4. Configure the internal VLAN: 192.168.1.1 using DHCP.

```plaintext
ip dhcp pool ccp-pool
  import all
  lease 0 2
  network 192.168.1.0 255.255.255.0
  default-router 192.168.1.1
  dns-server 8.8.4.4
interface vlan 1
  description "Internal VLAN"
  ip address 192.168.1.1 255.255.255.0
  no shutdown
```

Create a DHCP pool for the router DHCP server. The router is the default gateway for DHCP clients. This example uses the Google DNS server (8.8.4.4). If you use a different DNS, choose one that will work with both the primary and backup routes, i.e. do not choose the ES440 or a host inside your ISP. The router interface for the default VLAN1. This IP must be included in the DHCP pool. Turn the interface up.

5. Configure the connection to the AirLink ES440 as an independent VLAN.

```plaintext
interface FastEthernet3
  switchport access vlan 2
interface vlan 2
  description "backup VLAN"
  ip address 192.168.13.101 255.255.255.0
  no shutdown
```

The interface the ES440 is connected to. Make this interface belong to VLAN2. The router IP address inside the ES440 VLAN.
6. Configure the WAN interface IP.

```cisco
interface FastEthernet4
    description "Primary WAN interface"
    no ip address
    ip dhcp client route track 22
    ip address dhcp
    no shutdown
```

- The interface for the ISP
- The routes implied by DHCP configuration will be deactivated if track 22 fails.
- Enable DHCP client on this interface.

7. Configure the NAT rules to allow access to the Internet.

```cisco
interface FastEthernet4
    ip nat outside
    ip nat enable
interface vlan 1
    ip nat inside
    ip nat enable
interface vlan 2
    ip nat inside
    ip nat enable
    ip nat inside source list 8
interface FastEthernet4 overload
    access-list 8 permit 192.168.1.0 0.0.0.255
    access-list 8 permit 192.168.13.0 0.0.0.255
```

- Traffic going out this interface goes to the Internet.
- Enable NATing for this interface.
- Traffic going out this interface stays in the LAN.
- NAT should be applied to traffic that transits through FE4 and matches the access list below. Overload means the same outside IP can be used several times.
- Traffic from PC
- Traffic from ES440

Note: If desired, you can add new criteria for the access list.

8. Configure the failover mechanism.

```cisco
ip routing
ip route 8.8.8.8 255.255.255.255 DHCP
ip sla 33
    icmp-echo 8.8.8.8 source-interface FastEthernet4
    threshold 500
    timeout 500
    frequency 1
    ip sla schedule 33 life forever start-time now
    track 22 ip sla 33 reachability
    delay down 3 up 1
```

- Enable IP routing.
- Add a static route to force ping through ISP (gateway obtained from DHCP).
- Object that generates the ping
- Ping Google DNS through FE4. (Google DNS can be considered a reliable Internet host.)
- Timeout after 500 ms
- Ping every 1 sec.
- Start ping now until always
- Object that verifies ping was successful
- Wait 3 consecutive seconds of ping failures before changing the state to down; wait 1 sec. before changing to up. (This avoids repetitive ups and downs.)
9. Configure failover routes.

```plaintext
ip dhcp-client default-router distance 200
ip route 0.0.0.0 0.0.0.0 192.168.13.31 201
```

All gateways discovered by DHCP have a 200 metric.
Add static route to Internet through ES440, with a larger metric than gateways discovered by DHCP. This route is not used until the above route is removed.

10. Save the configuration.

```plaintext
end
copy running-config startup-config
```

Exit configuration mode.
Save current configuration as reboot-proof.

11. Key commands to monitor the router state.

```plaintext
show running-config
descrip running-config
show track
descrip show track
show ip route
descrip show ip route
show ip sla statistics
descrip show ip sla statistics
debag ip sla trace
descrip debug ip sla trace
debag ip routing detail
descrip debug ip routing detail
```

Show current configuration.
Show current state of tracking object (ping status).
Show IP route table.
Show past statistics of ping results.
Enable logging for ping events.
Enable logging for routing events.

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**Configure Reliable Static Routing on the ES440**

Configuring Reliable Static Route (RSR) on the ES440 reduces airtime usage by directing traffic between the ES440 and AirVantage Management Service over the wired network when the primary Internet connection is active and over the wireless connection when it becomes inactive.

AirVantage Management Service can track the status of RSR and indicate on the Failover Status dashboard widget whether your Internet connection is using the primary or failover WAN link.
If the AirLink ES440 is not already configured for Reliable Static Routing, you can use either AVMS or ACEmanager to configure it.

**Configure the ES440 using AVMS**

The following instructions provide a sample configuration for Reliable Static Routing. You may need to tweak the values for your particular configuration. For more information, refer to the AVMS user documentation.

**Create or Update a Template**

Using templates makes it easier to apply the same configuration to several devices.

*Note: These instructions assume that some initial configuration, such as the cellular credentials (APN, username, etc) and settings for AirVantage Management Service (URL, frequency, etc.) has already been done (typically by the distributor or mobile network operator).*

1. Log into your AVMS account and select Configure > Templates.

2. If you already have a template to Set up RSR on the ES440, select Actions > Edit and make any changes to the template that are required for your specific configuration.

3. If you do not already have a template, click the + sign drop-down menu and select Brand new.
The Create template window opens.

4. In the Application / Firmware window, select (or enter) ALEOS ES440 (4.3.6c.004)

5. Enter the following sample parameters, or values for your particular configuration:
   - WAN/Cellular > Reliable Static Route (RSR) > Reliable Static Route (RSR)
     Primary Interface = Ethernet 1
     Gateway for Primary Interface = 192.168.13.101
     Backup Interface = Cellular
     Destination IP/Network = 84.14.252.0
     Destination Subnet Mask = 255.255.255.192
     Tracking Object = Tracking Object 1
   - WAN/Cellular > Reliable Static Route (RSR) > Tracking Object
     Test IP Address = 8.8.8.8
     Test Interface = Ethernet 1
     Test Interval (seconds) = 20
     Test Timeout (seconds) = 4
     Maximum number of Test Retries = 2
     Tracking Object = Enable
   - WAN/Cellular > Reliable Static Route (RSR) > Reliable Static Route (RSR)
     Reliable Static Routing = Enable
   - LAN > Ethernet > General
     DHCP Server Mode = 0
   - LAN > Host Port Routing
     Primary Gateway = enable
Host Network 2 = 192.168.1.0  
Host Network Subnet Mask 2 = 255.255.255.0  
Host Network 2 Route = Ethernet port  
Host Network 2 Gateway = 192.168.13.101

Optional (Helps when checking that your setup is correct)  
- Services > Telnet/SSH  
  Remote Login Server Telnet/SSH Port Timeout (minutes) = 40

6. Click Save to create a new template or overwrite an existing one.
Apply the Template

1. Go to your system detail page and apply the template.

Note: Using an AVMS template is not mandatory. You can change settings directly on the System Configuration page. However, if you have multiple devices to configure, it’s a good idea to create an AVMS template.
Configure the ES440 using ACEmanager

To use ACEmanager to configure the ES440:

1. Connect your PC to ES440 using an Ethernet cable.
2. Save the template file attached to this PDF (SWIApplayTemplate_cisco_4.3.6c.004.xml).
   a. In Adobe Reader, click the Attachments icon on the left side of the screen.
   b. Right-click the template file, select Save Attachment, and save it as a .xml file.

Note: This template assumes that some initial configuration, such as the cellular credentials (APN, username, etc) and settings for AirVantage Management Service (URL, frequency, etc.) has already been done (typically by the distributor or mobile network operator).

3. Launch your browser and go to http://192.168.13.31:9191 and enter the user name (default is user).
4. Click the Template button (at the right of the screen).

The Template window opens.
5. Click Browse....

7. Click Upload.
8. Click Reboot.

The template provides a sample configuration. You may need to tweak the settings for your particular configuration on the following ACEmanager screens:
- WAN/Cellular > Reliable Static Routing (RSR)
- LAN > Ethernet
- LAN > Host Port Routing

For more information refer to the ALEOS Software Configuration User Guide.
Figure 3: ACEmanager: WAN/Cellular > Reliable Static Routing (RSR)

Figure 4: ACEmanager: LAN > Ethernet
Figure 5: ACEmanager: LAN > Host Port Routing

Using AVMS to Monitor the Failover

You can use AVMS to monitor the WAN failover. For more information, go to https://doc.airvantage.net/display/USERGUIDE/AirLink+Enterprise+Connect+-+Management+Features.