RouteConfig v1.0
User Guide

Contents

Requirements

Control Station:
Win 9x/NT
Visio 2000

Router:
*nix (tested on FreeBSD and Red Hat linux)
SSH daemon
Account with privileges for ifconfig and route commands (details are in "Setting Up Routers")
One network interface that is statically configured (ie: dedicated for communications outside of testbed environment and will not be reconfigured)
SNMP daemon (optional but recommended)

Caveats and Other Important Information - Please Read

- The communications module (responsible for sending and executing configuration scripts) only supports SSH v1.
- The SNMP code uses the "public" community string. The router SNMP daemons should be configured such that only the necessary parts of the MIB tree are accessible and are read-only (details are in "Setting Up Routers").
- Visio documents created with RouteConfig can only be correctly viewed or edited with machines that have RouteConfig installed.
- Routers must have at least one network interface for traffic outside of the testbed. RouteConfig should never be used to configure such interfaces, as it will halt communication between RouteConfig and the router. RouteConfig has no way of distinguishing between "testbed" interfaces and those that should not be reconfigured.
- RouteConfig uses a commercial component for SNMP, "snmp40.ocx". It is part of IP Works! v4 Visual Basic Edition. It may NOT be redistributed without RouteConfig.

- Usernames and passwords are temporarily stored on the control station while configuring routers. Once the transactions are complete, the portion of memory where this information is stored is "blanked out."
- RouteConfig does not use support "sudo" in its scripts, thus the requirement for "special versions" of the "route" and "ifconfig" commands (see "Setting Up Routers" for details).
- Topologies created with RouteConfig should always be saved before configuring the routers. A bug in the communications dll's may cause Visio to terminate unexpectedly.
- RouteConfig stores configuration information in custom property fields of RouteConfig shapes. Never edit these manually or RouteConfig will likely not work properly.
- Target router shell errors are not detected during script execution. It is recommended that an SNMP scan be used to ensure the routers are configured as desired.
- Scripts generated by RouteConfig may not be renamed or moved in order for the configuration process to work properly.

Installation

1. Control Station

Unzip the contents of "RouteConfig.zip" to a temporary directory. Double-click "setup.exe". After the installation process has completed, the contents of the temporary directory may be deleted.

A folder is created on the Start Menu where RouteConfig may be quickly accessed. Simply click on the RouteConfig icon in the RouteConfig folder on the Start Menu to begin using RouteConfig. Visio will launch using the RouteConfig template.

2. Setting Up Routers

At a minimum, routers require an SSH daemon and a few commands to enable RouteConfig users to remotely execute configuration scripts. An SSH daemon can be found here:

http://www.openssh.org

The scripts require that special versions of the "route" and "ifconfig" commands be located in **`/usr/local/sbin`** . A group should be set up for users of RouteConfig that can use these two commands. In addition, RouteConfig users must have a "routeconfig" subdirectory in their home directory.

Steps for setting up routers (you must be root or use "sudo" to execute most of these commands):

1) Add a "routeconfig" group that includes all users who will be allowed to use configure the routers with RouteConfig

2) Copy ifconfig and route to **`/usr/local/sbin`** . These copies MUST reside here.

3) "Chown" both files such that they are owned by user "root" and group "routeconfig".
Example: **`chown root.routeconfig ifconfig route`**

4) "Chmod" both files such that they may only be executed by user and group. In addition, turn the setuid bit on. For added protection, remove all other modes.
Example: **`chmod ug=sx,o= ifconfig route`**

5) Add a "routeconfig" subdirectory to all RouteConfig users' home directories.

In order to use the scanning feature of RouteConfig the routers will also require an SNMP daemon. A good SNMP daemon can be found here:

http://net-snmp.sourceforge.net

Follow the instructions to configure the daemon such that the following portions of the MIB tree are read-only via the "public" community string:

```
1.3.6.1.2.1.1.5.0
1.3.6.1.2.1.4.20.1...
1.3.6.1.2.1.4.21.1...
1.3.6.1.2.1.2.2.1.2...
```

Excerpt of an example snmpd.conf file for ucd-snmpd that accomplishes this (rather liberally):

```
#        sec.name source  community
com2sec readonly default public

#     groupName securityModel securityName
group readonly  v1            readonly
group readonly  v2c           readonly

#    name incl/excl subtree mask(optional)
view all  included  .1

#      group    context sec.model sec.level prefix read write notif
access readonly ""      any       noauth    exact  all  none  none
```

Please consult the documentation for the SNMP daemon that you use in order to properly set up access.

Basic Usage

There are three major parts of RouteConfig: manually creation of topologies, automatic creation of topologies using SNMP, and configuring the routers. RouteConfig was meant to be simple and straightforward. This section describes basic usage of RouteConfig.

1. Manual Creation of Logical Topologies

The RouteConfig template, "routeconfig.vst," is accompanied by a RouteConfig stencil, "routeconfig.vss." This stencil provides three shapes for creating topologies: router, interface, and network. By dragging a router onto the drawing area or double clicking on a router, the router dialog appears. The router dialog provides fields for the user to enter the hostname, OS, and description. The hostname is the minimal required information for a router shape. If no hostname is provided the user will be prompted to either enter a hostname or delete the shape. The OS and description fields are optional and are not used during the configuration process.

The router dialog also has two listboxes with accompanying buttons: one for interfaces and one for routes. There are two ways to add interfaces to a router. First, by clicking on the "Add Interface" button. Second, by dragging an interface shape from the stencil and connecting it to the router shape. Interfaces that are connected to router shapes in the latter manner must be configured first by double clicking on them and filling in all the fields.

NOTE: each router should have at least one interface that should not be configured by RouteConfig (ie: the interface with the router's "global" IP). NEVER include such interfaces in the

topology. RouteConfig will attempt to reconfigure them, temporarily bringing them down in the process. This will likely halt communications with this router and may only be fixed at the router's console. To distinguish such interfaces with those that RouteConfig should configure, the former will be called "non-testbed interfaces" and the latter "testbed interfaces" henceforth.

All testbed interfaces should be included in the router dialog and no non-testbed interfaces should be included (see previous paragraph for important distinction between the two). Even if the topology does not require use of all testbed interfaces, they need to be included. This is what the "Mark for Removal" checkbox is for in the Interface editing dialog (appears when you click on Add Interface or Edit Interface or double click on an interface shape). An interface that has been marked for removal will be brought down during the configuration process. Such interfaces do not have a shape associated with them. Interfaces that are not marked for removal do have a shape. When a new interface is created within the router dialog, a new interface shape is automatically created and attached to the router shape.

Router shapes connect to interface shapes and interface shapes connect to network shapes. Network shapes require a network IP and netmask in order to exist in the drawing area. The user is prompted for this information when a network shape is dragged onto the drawing area or when it is double clicked.

Topologies can be saved and loaded like any Visio document. Unless the user wishes to modify the RouteConfig VBA code, the template and stencil should not ever be overwritten. In the event of accidental modification of the RouteConfig template or stencil, reinstall RouteConfig or keep backup copies of "routeconfig.vst" and "routeconfig.vss" to replace the tainted versions.

2. Automatic Creation with SNMP

This feature can be a useful tool to take snapshots of the testbed and to verify that the testbed has been configured correctly. It is recommended that automatic topology creation be performed with a blank drawing area. This process calls a Visio function to lay out the shapes generated by a testbed scan. This function will move all drawing objects on the page, thus it is best to perform this operation before adding additional shapes. The manner in which the shapes are lain out may be adjusted within Visio under

Tools® Layout Shapes...

To begin a testbed scan, click on

Tools® Macros® RouteConfig® SNMP_Scan

RouteConfig will broadcast a request for basic system information to all devices on the same network as the control station. Devices that respond (and are hence SNMP-capable) will be listed on the left. Move the desired devices (ie: testbed routers) to the right list by using the Add and Add All buttons or by double clicking on the device name. Click on the "Drop These Into Visio" button to proceed.

A second SNMP scan is performed on the selected devices. This time, interface and route table information is retrieved and displayed on this screen. Interfaces that are listed only by name (no IP, netmask, etc) are currently in the "down" state and will be added to the router as "marked for removal". If no interface or route table information appears for a router, the SNMP daemon was not configured correctly for the "public" community string.

The user should filter out all non-testbed interfaces. This includes any interfaces that are assigned "global" IP's for the router and special interfaces like the loopback. Two types of filters are available: masked IP and type. For instance, if the testbed routers are all connected via the 129.176.80.0 network and have global IP's on this network, 129.176.80.0 should be added to the masked IP filter list. To filter the loopback, select loopback from the type filter. By default "Use This Filter With Next Router" is checked. This allows the filters to be remembered for the next router. To automate the process of scanning the remaining routers, check the "Automate Dropping Remaining Routers" option.

All associated shapes will be created and connected appropriately. If a mistake was made with a filter (ie: non-testbed interfaces were included), either edit the router shapes

accordingly or delete the topology and re-scan with the correct filter(s). Again, it is critical that non-testbed interfaces NOT be included.

3. Configuration

In order to configure the routers click on
Tools® Macros® RouteConfig® Configure_Routers
A dialog appears with the hostnames of all the router shapes listed. Initially they will all be colored red. This indicates that further information is required to continue. The type of script transmission and execution must be indicated and the username and passwords are required. Any number of the routers may be selected while selecting this information by SHIFT or CONTROL clicking the hostnames. Once a transmission method is chosen, the hostname will turn yellow. Once the username and password information is given, the hostname will turn green indicating that all required information has been entered. If, for some reason, some of the routers should not be configured, the "Do Not Configure" checkbox should be checked. This will turn the hostname gray. The configuration process will not begin until each of the hostnames are either gray or green.

There are currently two methods of script transmission and execution: "SCP/SSH Script" and "SSH". The former copies the script to the user's routeconfig directory on the target router using SCP. It then executes the script using SSH. The latter does not copy the script to the target router. Instead it remotely executes the script line by line via SSH. Note that at this time no shell errors are detected during script execution (for either method).

The scripts can be viewed and/or edited manually before they are transferred and/or executed. The "View/Edit Script" button launches Notepad with the generated script. Manual changes may be made here provided the script is saved (and NOT renamed) with Notepad. "Re-Generate Script" will revert the script to its unaltered state. Scripts generated by RouteConfig are dropped in the working directory of the Visio document.