第六章
操作与配置
Cisco IOS

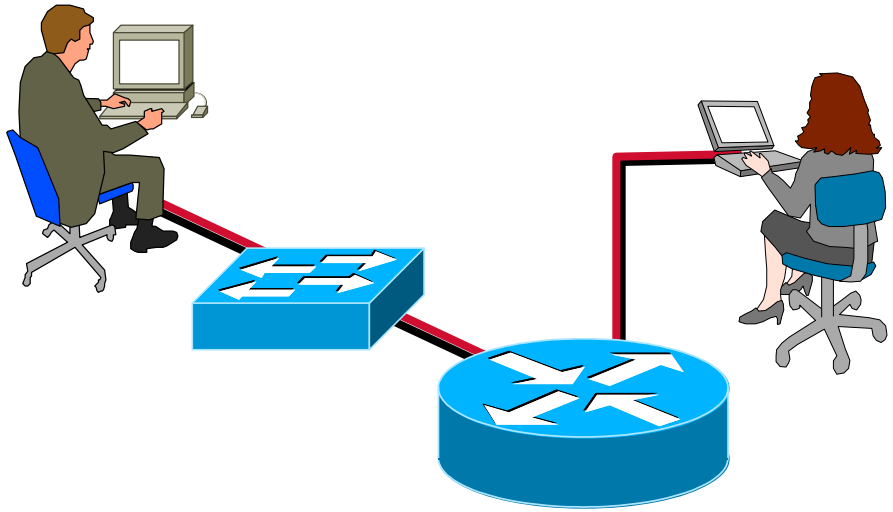
Cisco Systems

本章目标

通过本章的学习，您应该掌握以下内容：

- 完成路由器的初始参数配置
- 在网络设备上进入并辨识不同的命令模式
- 在不同的用户界面下应用各种帮助和命令行编辑功能
- 查看并确认各网络设备的基本信息

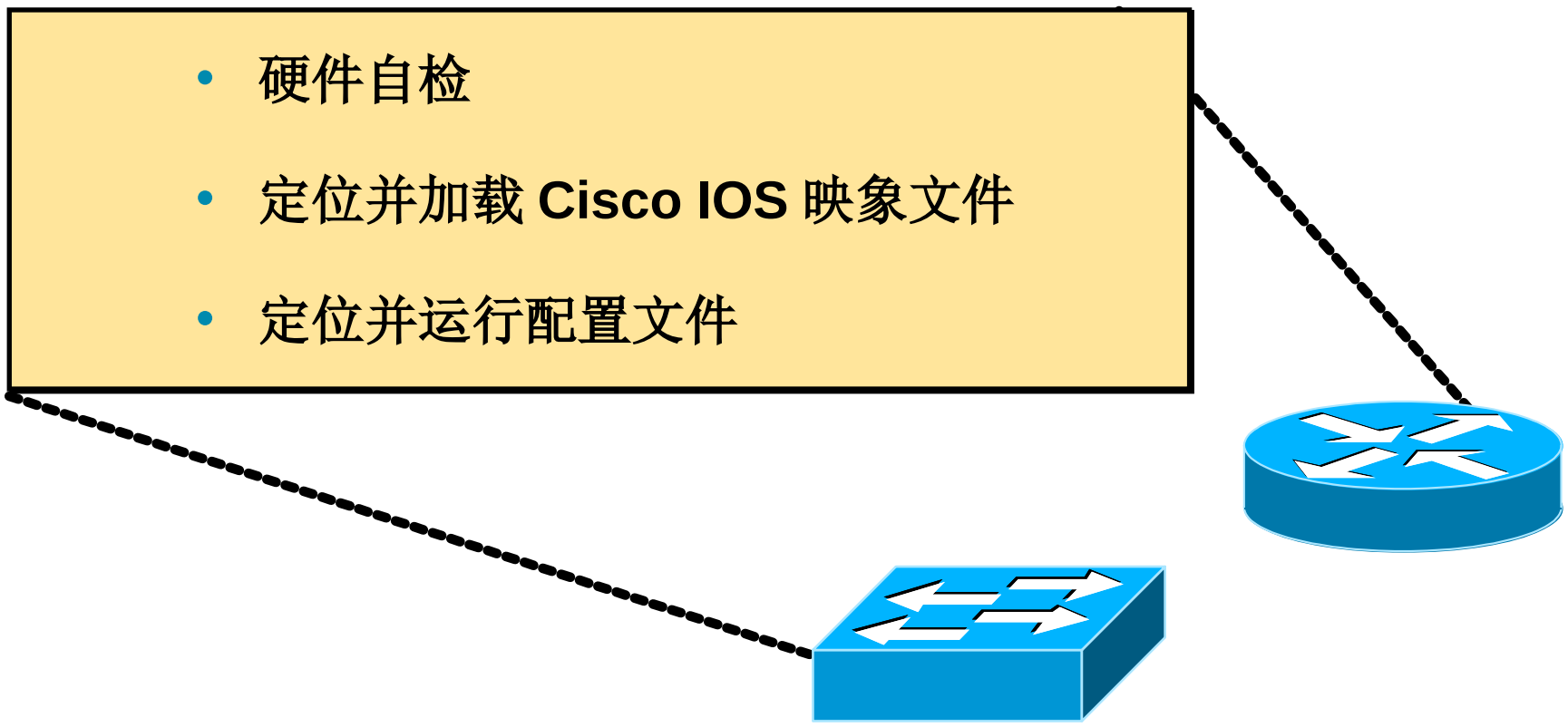
Cisco 互连网操作系统 (IOS) 软件



Cisco IOS 软件提供多种网络服务进而支持各种网络应用 .

Cisco 设备的简单启动过程

- 硬件自检
- 定位并加载 Cisco IOS 映象文件
- 定位并运行配置文件



Cisco IOS 用户界面的基本特性

- 提供命令行界面
- 在不同的网络设备上运行时有差别
- 在命令模式下可以键入或粘贴命令
- 键入命令后回车，设备即解析和执行所键入的命令
- 两个主要命令模式是用户模式和特权模式
- 不同的命令模式有不同的提示符

Cisco IOS 的主要命令模式 (续)

模式二 (也是最常用的模式):

特权 (或 enabled) 模式

- 对交换机和路由器更深入的操作
- 有配置和监视权力
- 是进入其它配置模式的前提
- 命令提示符为
  主机名 #

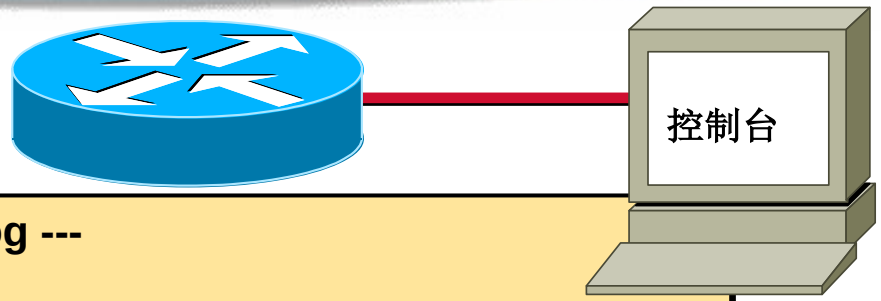
Cisco 路由器的初始启动

- 系统启动例程会初始化路由器
- 如果需要，路由器可以有选择性地回退启动

1. 启动前确认正确连接线缆和控制线
2. 按下电源开关
3. 观察启动顺序

Cisco IOS 输出到控制台上的内容

路由器启动时在控制台上的输出内容




```
        --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]:yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt
Default settings are in square brackets '[ ]'.
```

Setup 模式

```
wg_ro_c con0 is now available

Press RETURN to get started.

wg_ro_c>
```

用户模式提示

没有配置文件与有配置文件的路由器启动对比

Setup：初始配置对话框

```
Router#setup


        --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: y

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.


Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic management setup? [yes/no]: n
```

设置全局参数

```
Configuring global parameters:

  Enter host name [Router]:wg_ro_c

 The enable secret is a password used to protect access to
  privileged EXEC and configuration modes. This password, after
  entered, becomes encrypted in the configuration.
  Enter enable secret: cisco

  The enable password is used when you do not specify an
  enable secret password, with some older software versions, and
  some boot images.
  Enter enable password: sanfran

  The virtual terminal password is used to protect
  access to the router over a network interface.
  Enter virtual terminal password: sanjose
  Configure SNMP Network Management? [no]:
```

初始化全局参数

设置脚本的确认与应用

The following configuration command script was created:

```
hostname Router
enable secret 5 $
enable password
line vty 0 4
password sanjos
no snmp-server
!
no appletalk rout
no decnet routing
ip routing
no clns routing
no ipx routing
no vines routing
no xns routing
no apollo routing
isdn switch-type
interface BRI0
shutdown
no ip address
!
interface Ethernet0
no shutdown
ip address 10.1.1.31 255.255.255.0
no mop enabled
!
interface Serial0
shutdown
no ip address
<text omitted>
end

[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]:
```

登入路由器


```
wg_ro_c con0 is now available
Press RETURN to get started.

wg_ro_c>                    用户模式提示
wg_ro_c>enable
wg_ro_c#                    特权模式提示
wg_ro_c#disable
wg_ro_c>
wg_ro_c>logout
```

路由器在用户模式下的命令清单

```
wg_ro_c>?
Exec commands:
  access-enable    Create a temporary Access-List entry
  atmsig           Execute Atm Signalling Commands
  cd               Change current device
  clear            Reset functions
  connect          Open a terminal connection
  dir              List files on given device
  disable          Turn off privileged commands
  disconnect       Disconnect an existing network connection
  enable           Turn on privileged commands
  exit             Exit from the EXEC
  help             Description of the interactive help system
  lat              Open a lat connection
  lock             Lock the terminal
  login            Log in as a particular user
  logout           Exit from the EXEC
-- More --
```

只要所输命令串在全部命令中是唯一的，可以将一个命令尽可能地简写，

路由器在特权模式下的命令清单

```
wg_ro_c#?
Exec commands:
  access-enable    Create a temporary Access-List entry
  access-profile   Apply user-profile to interface
  access-template  Create a temporary Access-List entry
  bfe              For manual emergency modes setting
  cd               Change current directory
  clear            Reset functions
  clock            Manage the system clock
  configure        Enter configuration mode
  connect          Open a terminal connection
  copy             Copy from one file to another
  debug            Debugging functions (see also 'undebug')
  delete           Delete a file
  dir              List files on a filesystem
  disable          Turn off privileged commands
  disconnect       Disconnect an existing network connection
  enable           Turn on privileged commands
  erase            Erase a filesystem
  exit             Exit from the EXEC
  help             Description of the interactive help system
-- More --
```

只要输入部分命令串 (唯一表示某个命令)，紧接着按 tab 键就可以完整地输入一个命令

show version 命令

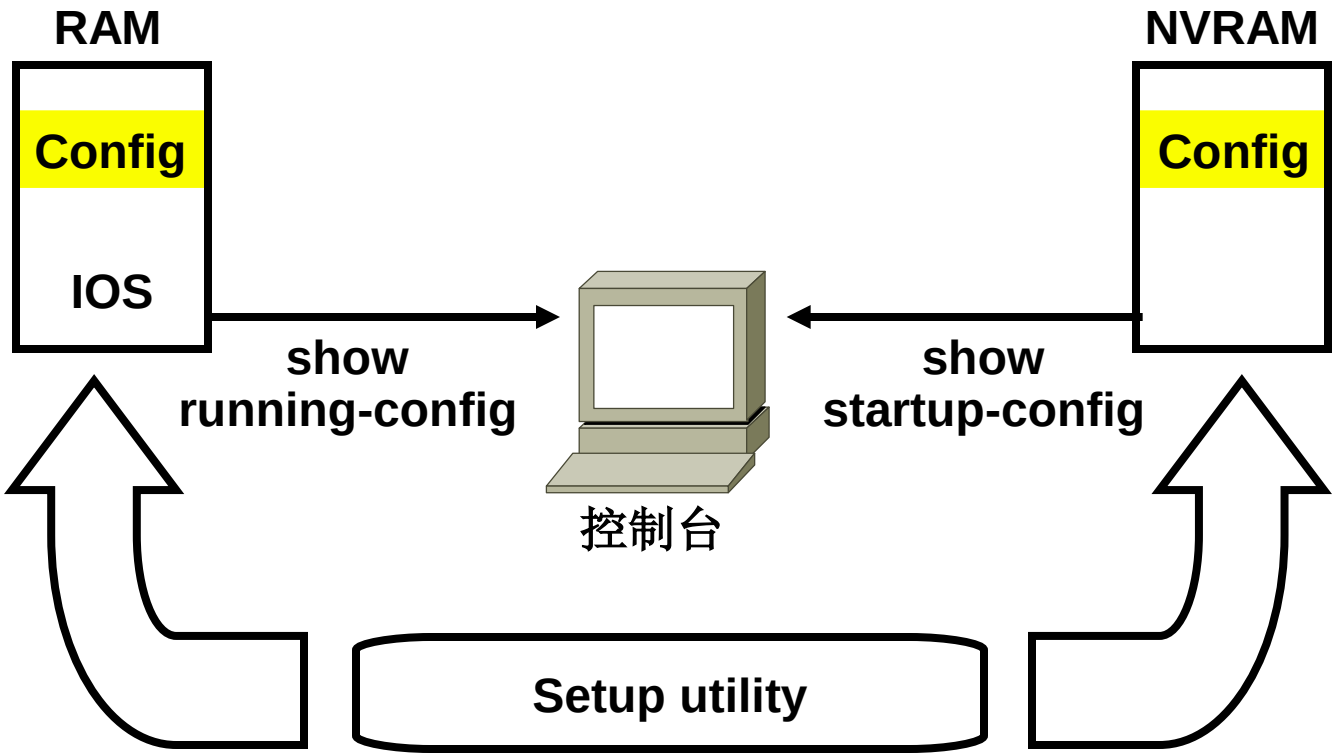
```
wg_ro_a#show version
Cisco Internetwork Operating System Software
IOS (tm) 2500 Software (C2500-JS-L), Version 12.0(3), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 08-Feb-99 18:18 by phanguye
Image text-base: 0x03050C84, data-base: 0x00001000

ROM: System Bootstrap, Version 11.0(10c), SOFTWARE
BOOTFLASH: 3000 Bootstrap Software (IGS-BOOT-R), Version 11.0(10c), RELEASE SOFTWARE(fc1)

wg_ro_a uptime is 20 minutes
System restarted by reload
System image file is "flash:c2500-js-l_120-3.bin"
(output omitted)
--More--

Configuration register is 0x2102
```

查看配置情况



将配置参数保存到 NVRAM 中

show running 和 show startup 命令

保存在 RAM 中

```
wg_ro_c#show running-config
Building configuration...

Current configuration:
!
version 12.0
!
        -- More --
```

保存在 NVRAM 中

```
wg_ro_c#show startup-config
Using 1359 out of 32762 bytes
!
version 12.0
!
        -- More --
```

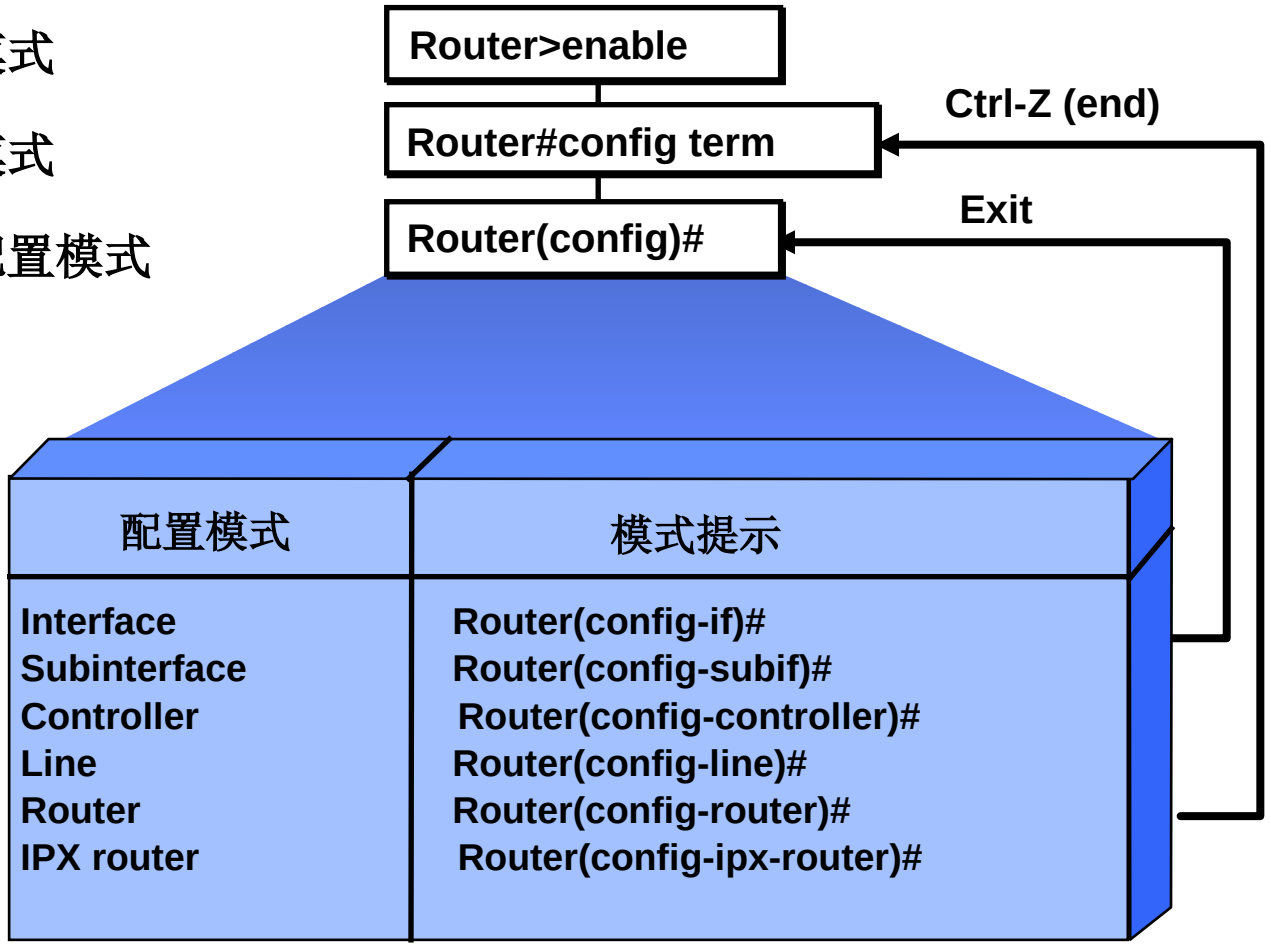
显示当前运行的和保存的配置情况

路由器模式一览

用户模式

特权模式

全局配置模式



保存配置

```
wg_ro_c#
wg_ro_c#copy running-config startup-config
Destination filename [startup-config]?
Building configuration…

wg_ro_c#
```

将当前运行的配置复制到 **NVRAM** 中

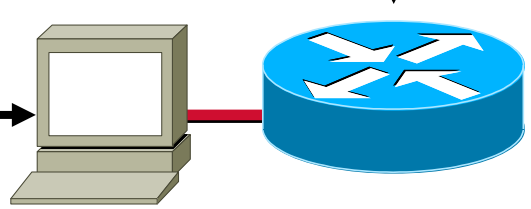
配置路由器的各种标识

路由器名

```
Router(config)#hostname wg_ro_c
wg_ro_c(config)#
```

开机时的固定显示信息

```
wg_ro_c(config)#banner motd #
        Accounting Department
    You have entered a secured
    system. Authorized access
    only! #
```



为路由器或其端口设置标识或信息

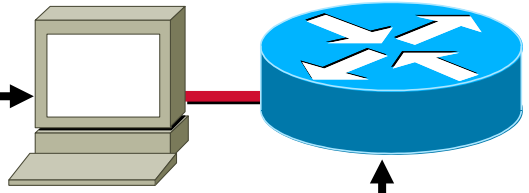
配置路由器的各种标识

路由器名

```
Router(config)#hostname wg_ro_c
wg_ro_c(config)#
```

开机时的固定显示信息

```
wg_ro_c(config)#banner motd  #
        Accounting Department
    You have entered a secured
    system. Authorized access
    only! #
```



端口描述

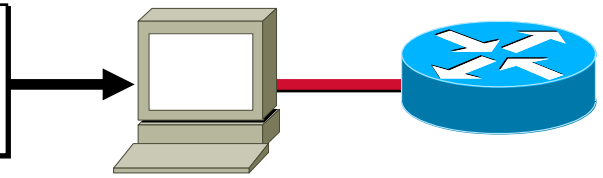
```
wg_ro_c(config)#interface ethernet 0
wg_ro_c(config-if)#description Engineering LAN, Bldg. 18
```

为路由器或其端口设置标识或信息

路由器密码配置

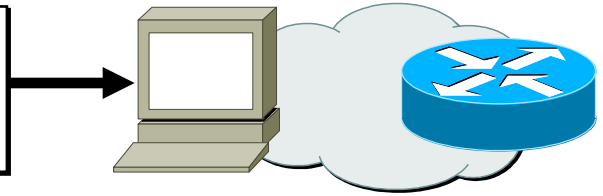
控制台密码

```
Router(config)#line console 0
Router(config-line)#login
Router(config-line)#password cisco
```



虚拟终端密码

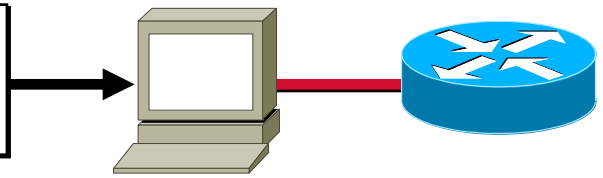
```
Router(config)#line vty 0 4
Router(config-line)#login
Router(config-line)#password sanjose
```



路由器密码配置

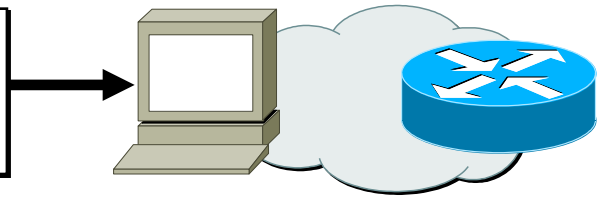
控制台密码

```
Router(config)#line console 0
Router(config-line)#login
Router(config-line)#password cisco
```



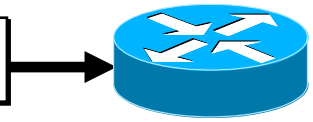
虚拟终端密码

```
Router(config)#line vty 0 4
Router(config-line)#login
Router(config-line)#password sanjose
```



特权模式明文密码

```
Router(config)#enable password cisco
```



特权模式加密密码

```
Router(config)#enable secret sanfran
```

其它控制台命令

```
Router(config)#line console 0
Router(config-line)#exec-timeout 0 0
```

- 禁止控制台会话自动退出

```
Router(config)#line console 0
Router(config-line)#logging synchronous
```

- 重显被打乱的控制台输入

端口配置

```
Router(config)#interface type number
Router(config-if)#
```

- ***type*** 包括 **serial, ethernet, token ring, fddi, loopback, dialer, null, async, atm, bri, and tunnel**
- ***number*** 用来识别具体的单个端口

```
Router(config)#interface type slot/port
Router(config-if)#
```

- 模块化端口的表示法

```
Router(config-if)#exit
```

- 从当前端口配置模式退出

配置串口

进入全局配置模式

```
Router#configure term
Router(config)#
```

指定某个端口

```
Router(config)#interface serial 0
Router(config-if)#
```

配置串口

进入全局配置模式

```
Router#configure term
Router(config)#
```

指定某个端口

```
Router(config)#interface serial 0
Router(config-if)#
```

设置时钟频率
(只在 DCE 端)

```
Router(config-if)#clock rate 64000
Router(config-if)#
```

确认参数修改情况

```
Router#show interface serial 0
Serial0 is up, line protocol is up
  Hardware is HD64570
  Internet address is 10.140.4.2/24
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:09, output 00:00:04, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/1/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
(output omitted)
```

开启或关闭端口

```
Router#configure term
Router(config)#interface serial 0
Router(config-if)#shutdown
%LINK-5-CHANGED: Interface Serial0, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
```

人工关闭端口

```
Router#configure term
Router(config)#interface serial 0
Router(config-if)#no shutdown
%LINK-3-UPDOWN:  Interface Seria0, changed state to up
%LINEPROTO-5-UPDOWN:  Line Protocol on Interface Serial0, changed state to up
```

开启已经关闭的端口

路由器的 *show interfaces* 命令

```
Router#show interfaces
Ethernet0 is up, line protocol is up
  Hardware is Lance, address is 00e0.1e5d.ae2f (bia 00e0.1e5d.ae2f)
  Internet address is 10.1.1.11/24
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:07, output 00:00:08, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     81833 packets input, 27556491 bytes, 0 no buffer
     Received 42308 broadcasts, 0 runts, 0 giants, 0 throttles
     1 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort
     0 input packets with dribble condition detected
     55794 packets output, 3929696 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 4 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

串口上用 *show controller* 命令

```
Router#show controller serial 0
HD unit 0, idb = 0x121C04, driver structure at 0x127078
buffer size 1524  HD unit 0, V.35 DTE cable
                    .
                    .
                    .
```

显示串口线的线缆类型

本章总结

通过本章的学习，您应该掌握以下内容：

- 开启交换机和路由器并观察其启动过程
- 注意交换机的出厂初始配置情况，完成路由器的初始参数配置
- 在网络设备上进入并辨识不同的命令模式
- 在不同的用户界面下应用各种帮助和命令行编辑功能
- 查看并确认并于各网络设备的基本信息