



NM-16A/S

The NM-16A/S is a slow-speed, high-density serial network module (NM) offering asynchronous and synchronous interfaces and flexible port configuration. The NM-16A/S offers:

- Synchronous interfaces that support a data rate of up to 128 kbps
- Asynchronous interfaces that support a data rate of up to 115.2 kbps
- Configurable data terminal equipment (DTE) and data circuit-terminating equipment (DCE)

Feature History for NM-16A/S

Release	Modification
12.2(15)ZJ	This feature was introduced.
12.3(2)T	This feature was integrated into Cisco IOS Release 12.3(2)T.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Prerequisites for NM-16A/S

This feature requires Cisco IOS Release 12.2(15)ZJ or Release 12.3(2)T or a later release.

Restrictions for NM-16A/S

The NM-16A/S is factory configurable and not field upgradable.

Information About NM-16A/S

To configure the NM-16A/S feature, you must understand the following concept.

- [Synchronous and Asynchronous Mode Configurations, page 2](#)
- [Platform Support for the NM-16A/S Feature, page 2](#)

Synchronous and Asynchronous Mode Configurations

The synchronous ports are addressed as **interface serial slot/port**. The asynchronous port, when configured, utilizes the tty line numbering scheme, which is linear and allows for 32 tty ports per network module slot. [Table 1](#) shows the port number corresponding to tty line number.

Table 1 Port Numbering Scheme

Slot Number	tty Terminal Line Number	Telnet TCP Port Number	Raw TCP Port Number	Binary TCP Port Number
0	1–32	2001–2032	4001–4032	6001–6032
1	33–64	2033–2064	4033–4064	6033–6064
2	65–96	2065–2096	4065–4096	6065–6096
3	97–128	2097–2128	4097–4128	6097–6128
4	129–160	2129–2160	4129–4160	6129–6160
5	161–192	2161–2192	4161–4192	6161–6192
6	193–224	2193–2224	4193–4224	6193–6224

Platform Support for the NM-16A/S Feature

This feature is supported on Cisco 2610XM, Cisco 2611XM, Cisco 2620XM, Cisco 2621XM, Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745 routers.

This feature is *not* supported on the non-XM models of the Cisco 2610, Cisco 2611, Cisco 2620, Cisco 2621, Cisco 2650, Cisco 2651. This feature is *not* supported on the Cisco 3620, Cisco 3640, and Cisco 3640/A routers.

How to Configure the NM-16A/S

This section contains the following procedures:

- [Configuring the Slow-Speed Interfaces for NM-16A/S, page 3](#)
- [Configuring the ignore Command for NM-16A/S, page 6](#)

Configuring the Slow-Speed Interfaces for NM-16A/S

To specify the mode of a slow-speed serial interface on a router as either synchronous or asynchronous, use the following commands:

SUMMARY COMMANDS

1. **enable**
2. **configure terminal**
3. **interface serial** *slot/port*
4. **physical-layer** {*sync* | *async*}
5. **clock rate** {*speed* | *line rate*}
6. **speed** *bps*
7. **ip address** *ip-address mask* [*secondary*]
8. **encapsulation** *encapsulation-type*
9. **load-interval** *seconds*
10. **exit**

DETAILED COMMANDS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface serial <i>slot/port</i> Example: Router(config)# interface serial 1/1	Enters interface configuration mode and specifies the serial interface created on the controller. <ul style="list-style-type: none"> • <i>slot/port</i>—Backplane slot number and port number on the controller. The slash mark is required.

Command or Action	Purpose
<p>Step 4 <code>physical-layer {sync async}</code></p> <p>Example: Router (config-if)# <code>physical-layer async</code></p>	<p>Specifies the mode of a slow-speed serial interface.</p> <ul style="list-style-type: none"> • sync—Places the interface in synchronous mode. This is the default. • async—Places the interface in asynchronous mode.
<p>Step 5 <code>clock rate {speed line rate}</code></p> <p>Example: Router (config-if)# <code>clock rate 128000</code></p>	<p>Configures the clock rate for serial interfaces and interface processors to an acceptable bit rate.</p> <ul style="list-style-type: none"> • <i>speed</i>—Desired clock rate in bits per second: 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 32000, 38400, 56000, 57600, 64000, 72000, 125000, or 128000. • Using the line keyword specifies the line clock. • The <i>rate</i> argument specifies the rate when the line keyword is used. • Must be configured on the DCE interface if the mode is synchronous. • To remove the clock rate if you change the interface from a DCE to a DTE device, use the no form of this command. • Using the no form of this command on a DCE interface sets the clock rate to the hardware-dependent default value.
<p>Step 6 <code>speed bps</code></p> <p>Example: Router (config-if)# <code>speed 115200</code></p>	<p>(Optional) Configures the speed for an interface.</p> <ul style="list-style-type: none"> • This is only for asynchronous mode; default is 9600 bps. • Configured only if a different speed is required. • Both interfaces at each end of the cable must be configured for the same speed. • To disable a speed setting, use the no form of this command.
<p>Step 7 <code>ip address ip-address mask [secondary]</code></p> <p>Example: Router (config-if)# <code>ip address 192.168.220.220 255.255.0.0 secondary</code></p>	<p>Sets a primary or secondary IP address for an interface.</p> <ul style="list-style-type: none"> • <i>ip-address</i>—IP address for the interface. • <i>mask</i>—Mask for the associated IP subnet. • secondary—(Optional) Specifies that the configured address is a secondary IP address. If this keyword is omitted, the configured address is the primary IP address.

	Command or Action	Purpose
<p>Step 8</p>	<p>encapsulation <i>encapsulation-type</i></p> <p>Example: Router(config-if)# encapsulation ppp</p>	<p>Sets the encapsulation method used by the interface.</p> <ul style="list-style-type: none"> • <i>encapsulation-type</i>—Encapsulation type; one of the following keywords: <ul style="list-style-type: none"> – atm-dxi—ATM Mode-Data Exchange Interface. – bstun—Block Serial Tunnelling. – frame-relay—Frame Relay (for serial interface). – hdlc—High-Level Data Link Control (HDLC) protocol for serial interface. This encapsulation method provides the synchronous framing and error detection functions of HDLC without windowing or retransmission. This is the default for synchronous serial interfaces. – isl—Inter-Switch Link (ISL) (for virtual LANs). – lapb—X.25 Link Access Procedure, Balanced. Data link layer protocol (LAPB) DTE operation (for serial interface). – ppp—PPP (for serial interface). – sdlc—IBM serial Systems Network Architecture (SNA). – sdlc-primary—IBM serial SNA (for primary serial interface). – sdlc-secondary—IBM serial SNA (for secondary serial interface). – slip—Specifies Serial Line Internet Protocol (SLIP) encapsulation for an interface configured for dedicated asynchronous mode or dial-on-demand routing (DDR). This is the default for asynchronous interfaces. – smds—Switched Multimegabit Data Services (SMDS) (for serial interface). <p>Note For more extensive information about the options for <i>encapsulation-type</i>, refer to the Cisco IOS Release 12.3 T Cisco IOS command references master index for the encapsulation command. This information is available on cisco.com.</p>
<p>Step 9</p>	<p>load-interval <i>seconds</i></p> <p>Example: Router(config-if)# load-interval 90</p>	<p>Changes the length of time for which data is used to compute load statistics.</p> <ul style="list-style-type: none"> • <i>seconds</i>—Length of time for which data is used to compute load statistics. A value that is a multiple of 30, from 30 to 600 (30, 60, 90, 120, and so on).
<p>Step 10</p>	<p>exit</p> <p>Example: Router(config-if)# exit</p>	<p>Exits interface configuration mode.</p>

Configuring the ignore Command for NM-16A/S


Perform this task to configure the serial interface to ignore the specified signals as the line up/down indicator:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface serial *slot/port***
4. **ignore [dtr | rts]**
or
ignore [dtr | local-loopback | rts]
or
ignore [cts | dsr]
or
ignore [cts | dcd | dsr]
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface serial <i>slot/port</i> Example: Router(config)# interface serial 1/1	Specifies the serial interface created on the controller. <ul style="list-style-type: none"> • <i>slot/port</i>—Backplane slot number and port number on the controller. The slash mark is required.

Command or Action	Purpose
<p>Step 4</p> <pre>ignore [dtr rts] or ignore [dtr local-loopback rts] or ignore [cts dsr] or ignore [cts dcd dsr]</pre> <p>Example: Router(config-if)# ignore dtr</p>	<p>For DCE asynchronous mode. or For DCE synchronous mode. or For DTE asynchronous mode. or For DTE synchronous mode.</p> <p> Note This command is disabled by default. The no ignore command restores the default.</p> <p>Specifies the serial signal to be ignored.</p> <ul style="list-style-type: none"> • dtr—Specifies that the DCE ignores the data terminal ready (dtr) signal. • rts—Specifies that the DCE ignores the request to send (rts) signal. • local-loopback—Specifies that the DCE ignores the local loopback signal. • cts—Specifies that the DTE ignores the clear to send (cts) signal. • dsr—Specifies that the DTE ignores the data set ready (dsr) signal. • dcd—Specifies that the DTE ignores the data carrier detect (dcd) signal.
<p>Step 5</p> <pre>exit</pre> <p>Example: Router(config-if)# exit</p>	<p>Exits interface configuration mode.</p>

What to Do Next

To verify that the slow-speed serial interface is configured correctly, enter the **show interfaces serial** privileged EXEC command to display the command settings for the router.

To enable the transition of the serial control leads to be reported on the console, use the **debug serial lead-transition** command in privileged EXEC mode.



Caution

To avoid having the debug message flood the console screen with debug information, use these commands only when traffic on the IP network is low, so other activity on the system is not adversely affected.

The following is sample output from the **debug serial lead-transition** command:

```

Router# debug serial lead-transition
Router# debug condition interface serial 1/1

*Mar  1 00:17:15.040:slot(1) Port(1):DSR/DTR is Deasserted
*Mar  1 00:17:15.040:slot(1) Port(1):CTS/RTS is Deasserted

*Mar  1 00:17:47.955:slot(1) Port(1):DCD/Local Loop is Deasserted
*Mar  1 00:17:47.955:slot(1) Port(1):DSR/DTR is Deasserted
*Mar  1 00:17:47.955:slot(1) Port(1):CTS/RTS is Deasserted

Router# no shut down serial 1/1

*Mar  1 00:16:52.298:slot(1) Port(1):DSR/DTR is Asserted
*Mar  1 00:16:52.298:slot(1) Port(1):CTS/RTS is Asserted

*Mar  1 00:16:31.648:slot(1) Port(1):DCD/Local Loop is Asserted
*Mar  1 00:16:31.648:slot(1) Port(1):DSR/DTR is Asserted
*Mar  1 00:16:31.648:slot(1) Port(1):CTS/RTS is Asserted

```

Configuration Examples for NM-16A/S

The following is sample output from the **show running-config** command:

- [show running-config Example, page 8](#)

show running-config Example

```

interface Serial1/0
 ip address 10.1.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/1
 ip address 10.2.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/2
 ip address 10.3.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/3
 ip address 10.4.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue

```



```
no cdp enable
!
interface Serial1/4
 ip address 10.5.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/5
 ip address 10.6.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/6
 ip address 10.7.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/7
 ip address 10.8.0.2 255.255.255.0
 load-interval 30
 no keepalive
 clockrate 128000
 fair-queue
 no cdp enable
!
interface Serial1/8
 physical-layer async
 ip address 10.9.0.2 255.255.255.0
 encapsulation ppp
 load-interval 60
 async mode dedicated
 fair-queue 64 16 0
!
interface Serial1/9
 physical-layer async
 ip address 10.10.0.2 255.255.255.0
 encapsulation ppp
 load-interval 60
 async mode dedicated
 fair-queue 64 16 0
!
interface Serial1/10
 physical-layer async
 ip address 10.11.0.2 255.255.255.0
 encapsulation ppp
 load-interval 60
 async mode dedicated
 fair-queue 64 16 0
!
interface Serial1/11
 physical-layer async
 ip address 10.12.0.2 255.255.255.0
 encapsulation ppp
 load-interval 60
 async mode dedicated
```

```
    fair-queue 64 16 0
    !
interface Serial1/12
  physical-layer async
  ip address 10.13.0.2 255.255.255.0
  encapsulation ppp
  load-interval 60
  async mode dedicated
  fair-queue 64 16 0
  !
interface Serial1/13
  physical-layer async
  ip address 10.14.0.2 255.255.255.0
  encapsulation ppp
  load-interval 60
  async mode dedicated
  fair-queue 64 16 0
  !
interface Serial1/14
  physical-layer async
  ip address 10.15.0.2 255.255.255.0
  encapsulation ppp
  load-interval 60
  async mode dedicated
  fair-queue 64 16 0
  !
interface Serial1/15
  physical-layer async
  ip address 10.16.0.2 255.255.255.0
  encapsulation ppp
  load-interval 60
  async mode dedicated
  !
end
```

Additional References

The following sections provide references related to NM-16A/S.

Related Documents

Related Topic	Document Title
Basic information for configuration	<i>Cisco IOS Configuration Fundamentals and Network Management Configuration Guide, Release 12.3</i>
Cisco IOS voice commands	<i>Cisco IOS Voice Command Reference, Release 12.3 T</i>
Configuration guidelines and detailed command reference information for voice, video, and fax	<i>Cisco IOS Voice Configuration Library</i>
Hardware installation instructions for network modules	Connecting Serial Network Modules

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • CISCO-ENTITY-VENDORTYPE-OID-MIB.my • OLD-CISCO-CHASSIS-MIB.my • ENTITY-MIB.my 	<p>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:</p> <p>http://www.cisco.com/go/mibs</p>

RFCs

RFCs	Title
RFC 2515	Definitions of Managed Objects for ATM Management. K. Tesink, Ed.

Technical Assistance

Description	Link
<p>Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, tools, and lots more. Registered Cisco.com users can log in from this page to access even more content.</p>	<p>http://www.cisco.com/public/support/tac/home.shtml</p>

Glossary

ATM—asynchronous transfer mode.

cts—clear to send. Circuit in the EIA/TIA-232 specification that is activated when DCE is ready to accept data from a DTE.

DCE—data circuit-terminating equipment (ITU-T expansion). Devices and connections of a communications network that comprise the network end of the user-to-network interface. The DCE provides a physical connection to the network, forwards traffic, and provides a clocking signal used to synchronize data transmission between DCE and DTE devices. Modems and interface cards are examples of DCE. Compare with DTE.

dcd—data carrier detect. DCD is a signal from the DCE device that typically means that the DCE is ready to accept data. If the DCE device is a modem, the DCD signal traditionally refers to the modem having received a modulation carrier signal and is now able to pass data.

DDR—dial-on-demand routing.

dsr—data set ready. EIA/TIA-232 interface circuit that is activated when DCE is powered up and ready for use.

DTE—data terminal equipment. Device at the user end of a user-to-network interface that serves as a data source, destination, or both. DTE connects to a data network through a DCE device (for example, a modem) and typically uses clocking signals generated by the DCE. DTE includes such devices as computers, protocol translators, and multiplexers. Compare with DCE.

dtr—data terminal ready. EIA/TIA-232 circuit that is activated to let the DCE know when the DTE is ready to send and receive data.

HDLC—High-Level Data Link Control.

ISL—Inter-Switch Link.

LAPB—Link Access Procedure, Balanced.

NIM—network interface module.

PPP—Point-to-Point Protocol.

rts—request to send. EIA/TIA-232 control signal that requests a data transmission on a communications line.

SLIP—Serial Line Internet Protocol.

SMDS—Switched Multimegabit Data Services.

VIP—Versatile Interface Processor.

**Note**

Refer to the *Networking Terms and Acronyms* for terms not included in this glossary.

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