

Cisco Enhanced Device Interface 2.2

Product Overview

Cisco® Enhanced Device Interface (EDI) is an external implementation of the network element interface at these levels:

- Command-line interface (CLI)
- Extensible Markup Language programmatic interface (XML PI).
- GUI applications

The CLI interface, a CLI-like command emulator with added features enhanced for usability, allows the user to manage multiple network elements from a single location, individually or as a group. The exposed CLI is based on the CLI of the managed network element; in this release, the Cisco IOS® Software, Cisco Catalyst® OS, and Cisco PIX® OS CLIs are supported.

The XML PI in Cisco EDI provides a programmatic interface to be used by management applications for configuring Cisco devices. The programmatic interface has a well-defined set of operations based on the IETF NETCONF Internet draft along with a supporting data model defined using the XML schema language. Customers who configure or monitor devices with scripting tools and do not wish to use the data model can continue to use CLI commands as payload in the management operations supported over the XML PI.

The GUI applications help enable users to view and edit device configurations, perform macro command operations, translate commands, analyze commands, and create CLI models.

Key Features and Benefits

The goal of Cisco EDI is to increase productivity of both the end user and the management application developer in the areas of device configuration and troubleshooting. Having an external device interface supporting multiple Cisco operating systems (Cisco IOS Software, Cisco PIX OS, and Cisco Catalyst OS initially) simplifies deployment because it eliminates the need for device OS upgrades and provides consistency in management information exchange with the devices. Cisco EDI provides comprehensive device configuration coverage, given its ability to “learn” the CLI of the device. This feature makes it possible to position Cisco EDI as a single point of access to the network elements, thus minimizing if not completely eliminating the need to access devices by other means—often the cause of data synchronization loss between management applications and the network elements.

Device CLI information and knowledge are included in the Cisco EDI distribution software; it also is available to Cisco EDI users for download from Cisco.com at <http://www.cisco.com/cgi-bin/tablebuild.pl/E-DI-2.0>. Ongoing incremental support is provided through incremental device updates (IDUs), which also are available through Cisco.com.

The Cisco EDI feature set consists of :

- Base management features
- Enhanced CLI
- XML PI
- GUI applications

These features are described in the following sections.

Base Management Features

Base management features are applicable to all devices in the network because they are not dependent on device support packages (that is, network element CLI knowledge). Included here are commonly used facilities such as device discovery and identification, status monitoring, Cisco EDI server monitoring and alarm generation, Perl scripting, and so on. These features allow the user to interact with Cisco devices even when specific device support packages are not available. Internally, Cisco EDI uses these features to obtain device configuration and status information that is made available to CLI user interface users. Table 1 gives a list of base management features with brief descriptions.

Table 1. Base Management Features

Feature	Benefit
OS parser emulation (CLI syntax check command context validation)	This feature helps eliminate common user errors.
Grouping capability	This feature allows for the definition of administrative domains. Access control can be performed at the administrative domain level. This feature simplifies configuration and administrative tasks.
Group least common denominator CLI (that is, a common CLI)	This feature allows users to perform group operations without the possibility of generating an unsupported command.
Context-based CLI	This capability allows users to simultaneously apply changes to one or more devices by simply selecting the context. Provides a single point for network configuration.

Enhanced CLI

This interface was designed to improve usability and productivity through added features, keeping CLI users in mind to preserve existing CLI knowledge. Cisco EDI provides a CLI command emulator for Cisco IOS Software, Cisco PIX OS, and Cisco Catalyst OS with full CLI syntax and contextual check (that is, command submenu validation), thus helping eliminate common errors. For novice CLI users this feature promotes efficiency because it provides instant visual syntactical and contextual validation.

Often it is necessary to perform various changes to multiple network elements within the network. Cisco EDI simplifies this task through its grouping feature, whereby device groups can either be defined by the user (static definition) or created dynamically (after a device is added to the Cisco EDI management domain) based on a predefined set of device capabilities (that is, predefined device characteristics such as device type, OS, supported feature, and so on). A device group can consist of individual network elements or other device groups, giving the user flexibility. This grouping feature forms the basis for identifying administrative domains that are commonly used for segmenting network operations.

As previously mentioned, Cisco EDI has comprehensive knowledge of the network element CLI, and this feature in combination with the grouping capability is used to identify the least common denominator CLI for a given group (that is, a common CLI across group members). This allows

users to safely construct common sets of CLI commands without having to validate command support for each individual network element. When the command set is validated, it can be distributed to the network elements or saved for future use.

Configuration file comparison (textual and contextual) allows the user to quickly identify changes across configuration files. Configuration file archival and restoration also can be done through Cisco EDI.

Table 2 gives features and benefits of the enhanced CLI feature set.

Table 2. Enhanced CLI—Key Features and Benefits

Feature	Benefit
OS parser emulation (CLI syntax check command context validation)	This feature helps eliminate common human errors.
Grouping capability	This feature allows for the definition of administrative domains. Access control can be performed at the administrative domain level. This feature simplifies configuration and administrative tasks.
Group least common denominator CLI (that is, a common CLI)	This feature allows users to perform group operations without the possibility of generating an unsupported command.
Context-based CLI	This capability allows users to simultaneously apply changes to one or more devices by simply selecting the context. Provides a single point for network configuration.
Macro CLI	Helps enable users to push commands to various types of platforms (Cisco Catalyst OS, Cisco IOS Software, and Cisco PIX OS) that have variation in CLI commands.
Operational data model	Provides applications with an XML interface to retrieve from network elements the operational data that is available through the CLI show commands. Allows you to create a model specification file, an XML file, and an XSD.
Configuration compliance	Provides Cisco EDI with the capability to verify the configuration commit. It displays details about the success or failure of the configuration on the given network. This helps you ensure that the configuration commit is successful and complies with the candidate configuration.

XML Programmatic Interface

A CLI to configure Cisco devices was defined and organized to facilitate user interaction with the devices, and therefore, it is not the optimal way for management applications to configure Cisco devices. Cisco EDI offers an XML PI for device configuration with a well-defined set of operations and a supported data model. To promote use of standard protocols and consistency across Cisco implementations, Cisco EDI supports the IETF NETCONF Internet draft, thus providing a well-defined set of operations. A complete XML data model resembling the CLI command structure is available in the form of multiple XML schema definition (XSD) files, which allow management applications to programmatically read and store the supported command structure and relevant syntax for a particular network element and OS combination. A command data model, in combination with a well-defined set of management operations, simplifies management application development and interactions with Cisco devices.

In some situations, users choose to continue using the CLI to configure Cisco devices (that is, instead of using the XML command model); sometimes it is necessary (for example, to continue using scripting tools or as part of a migration process). For these situations, Cisco EDI allows the encapsulation of CLI text as the payload to NETCONF operations.

Table 3 gives a list of the supported NETCONF operations and other XML PI features.

Table 3. XML PI Key Features and Benefits

Feature	Benefit
IETF NETCONF operations	The standards-based interface promotes consistency.
XML command data model	Command structure and syntax can be programmatically read, simplifying interaction with Cisco devices and the Cisco EDI server.
XML support for operational information	Generates a unique data model for show command output and translating the output into XML data model to accelerate application integration.
XML PI Java SDK	Provides Java APIs over XML PI. Cisco EDI provides Java client API libraries that take Java objects as inputs and return Java objects; you can use these APIs to develop your own applications. You can also use these APIs in existing applications.

GUI Applications

Cisco EDI offers interfaces with network devices through an Eclipse-based GUI.

Table 4 gives a list of the GUI applications.

Table 4. GUI Applications

Feature	Benefit
Config Manager	Viewing and editing various device configurations
Macro Command Manager	Create macros across the various device OS versions. Allows for the provisioning of the network, using the macro grouping capability.
Command Translator	Helps enable you to translate Cisco Catalyst Operating System configurations to equivalent, supported Cisco IOS configurations.
Command Modeler	Provides an infrastructure to generate and validate device-independent CLI models. You can use the generated device-independent CLI models to generate device-specific Java code.
Command Analyzer	Helps enable you to compare two Cisco IOS images. Also allows you to check commands for completeness.

Cisco EDI Features

Table 5 provides a detailed list of the Cisco EDI 2.2 features.

Table 5. Features of Cisco EDI 2.2

Feature	Description	General System Feature	Requires Device Identification Package	Requires Device Package
General Features				
Multiple OS support	Cisco EDI supports Cisco IOS Software, Cisco PIX OS, and Cisco Catalyst OS.			X
Device support packages	Cisco EDI provides wide device coverage. Ongoing incremental support for new devices and OS combinations is available at Cisco.com through IDU packages. Device packages are required to use the CLI and XML PI.			X
Device identification	Cisco EDI distribution software contains a device identification and capability package that is necessary to use all base device management features.		X	
CLI modes	CLI modes include: <ul style="list-style-type: none"> • Server configuration mode 	X		

Base Device Management				
CLI color mode (server configuration)	Color is used to indicate status summary in the CLI prompt and to indicate syntax validity by highlighting the entered command text.	X		
Device discovery	<p>Cisco EDI performs device discovery with the Simple Network Management Protocol (SNMP) after one of the following is provided:</p> <ul style="list-style-type: none"> • IP address range • List of IP addresses and the maximum hop count (Cisco EDI uses Cisco Discovery Protocol neighbor information to traverse the network.) <p>This feature is intended for use in standalone deployments or in situations where the management application does not provide device discovery.</p> <p>In addition, a list of devices to be managed also can be provided to Cisco EDI through a seed file.</p>		X	
Basic device inventory	<p>After a device is added into the Cisco EDI management domain, device identification, physical configuration, and status information is retrieved:</p> <ul style="list-style-type: none"> • Device type and name • OS software version • Interface and status based on Interface MIB (IF-MIB) • Modules, slots, and ports obtained from ENTITY-MIB when supported by the device 		X	
Device status monitoring (periodic information update)	<p>Cisco EDI monitors:</p> <ul style="list-style-type: none"> • Basic inventory • Device status • Device configuration <p>Cisco EDI gathers data at scheduled polling and inventory collection intervals to update its view of the device status. This monitoring capability gives the user an up-to-date view of the health of the device and warns the user when configuration changes are likely to fail because of faults in the network.</p> <p>Device status monitoring allows Cisco EDI to keep up-to-date device status information needed when performing configuration operations. This feature is provided for Cisco EDI standalone deployments.</p>		X	
Change updates	Cisco EDI receives and processes configuration-change syslogs to determine changes to the network element configuration.		X	
Configuration file archival	Cisco EDI automatically archives the device configuration when a change occurs.		X	
Configuration restore	Cisco EDI supports configuration file restore from its archive.		X	
Device file system information	The device file system structure is duplicated in Cisco EDI to allow file-system navigation within Cisco EDI.		X	

Security	<ul style="list-style-type: none"> • User authentication: Cisco EDI authenticates all users using the standard Linux password authentication mechanism. • Device-level authorization: Cisco EDI controls access to devices. • Group-level authorization: Cisco EDI supports the definition of domain groups. When a user is created, the user is associated with a predefined domain group that determines the user's privilege level to execute tasks. • Accounting: Access (login) and configuration changes are published as syslog messages stored in the database. 	X		
Credential set	Login, password, and transport type specify how to communicate with the managed devices.	X		
Mapping network elements	Cisco EDI uses its capability to map network elements to determine which of its functions are applicable to the device.		X	
Job scheduling	This feature offers scheduling of jobs consisting of any of the following: EXEC commands, network configuration-level commands, and batch or executable files.	X		
Communication protocol support	<p>Management application to Cisco EDI follows:</p> <ul style="list-style-type: none"> • Telnet • Secure Shell (SSH) Protocol <p>Support for Cisco EDI to network element communication includes the following protocols:</p> <ul style="list-style-type: none"> • Syslog • Telnet • SSH • Trivial File Transfer Protocol (TFTP) (delivery of configuration changes) 	X		
Onboard Perl scripting	Offers onboard Perl interpreter to support scripting applications	X		
Cisco EDI server configuration	Cisco EDI configuration is done through the CLI user interface in a similar manner as a network element. Cisco EDI is treated as another network element, and its configuration file is similar to Cisco IOS Software.	X		
Cisco EDI administration	<ul style="list-style-type: none"> • View server information: Administrators can view Cisco EDI-related information such as device packages, clock, netstat, interfaces, thread pools, and so on. • Repair login: This feature is used for troubleshooting the Cisco EDI server and performing server maintenance operations (for example, restart services, display memory, disk usage, and so on). • Maintenance submode: The maintenance shell can be used to perform routine maintenance tasks such as patch installation, server reboot, and so on. 	X		

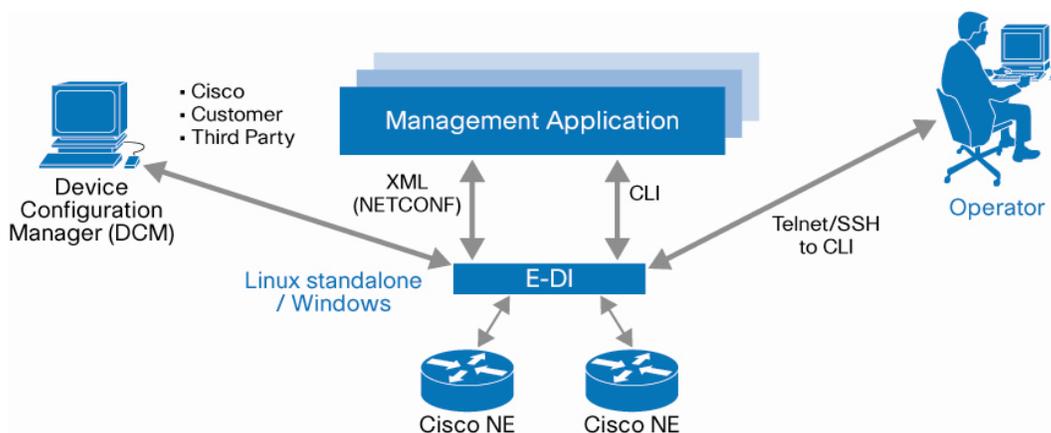
Cisco EDI monitoring and troubleshooting	Cisco EDI is instrumented to allow management applications to monitor the health of the solution. Troubleshooting tools are provided through the CLI user interface. Major capabilities include: <ul style="list-style-type: none"> • Debug logs • Cisco EDI self-alarms conveyed through syslog messages • Cisco EDI and OS patches • Utilities to monitor health and status of Cisco EDI (for example, event queues, interfaces, processes, and so on) 		X	
Basic troubleshooting	Connectivity verification (SNMP reach, Internet Control Message Protocol ping, Telnet, and traceroute)		X	
Network Time Protocol (NTP) clock	Cisco EDI uses NTP to maintain clock synchronization.	X		
Event triggers	Event triggers allow users to perform an action upon detecting a specified pattern in the events received from the network or server. Any EXEC-level task can be performed as an action, including sending an e-mail or generating an alarm.	X		
E-mail notification	Refer to "Event triggers" in this table.	X		
Enhanced CLI User Interface				
CLI command emulator and interpreter (Cisco IOS Software and Cisco Catalyst OS)	The interpreter provides complete access to the device CLI commands.			X
CLI syntax check	Cisco EDI performs CLI command syntax validation as commands are entered on the command line. Color is used to indicate the syntax validity.			X
Grouping capabilities	Grouping capabilities include: <ul style="list-style-type: none"> • Device grouping <ul style="list-style-type: none"> – Static (that is, user-defined network element groups) – Dynamic (based on include/exclude network element capabilities, IP address range, device name pattern, device type, and device family) • Interface grouping: Interface groups are a set of static, system-defined groups that combine multiple network interfaces into a single interface at which users configure several interfaces at once. Examples of interface groups include all-Ethernet and all-Fast-Ethernet groups. 		X	
Configuration file archive	Cisco EDI stores configuration files.		X	
Configuration file comparison	Cisco EDI offers textual and intelligent (context) configuration file comparisons.			X
Cisco EDI virtual file system	Cisco EDI replicates the network element file system structure to allow users local navigation (that is, in Cisco EDI) of the file system.		X	

CLI modes	<p>Cisco EDI CLI modes include:</p> <ul style="list-style-type: none"> • Device and group configuration command mode • Device and group tunneled EXEC command mode • Identification of common or least common denominator CLI across multiple OS releases (group mode) • CLI color mode: Color is used for status summary in the CLI prompt and to indicate syntax validity by highlighting the entered command text. 			X
Interactive commands	For commands that produce text output to the screen, a pipe/filter capability is supported (redirects output to e-mail or file, or applies filtering criteria).		X	
XML Programmatic Interface				
NETCONF operations	<p>NETCONF operations include:</p> <ul style="list-style-type: none"> • Session establishment • Session release • <get-config> • <edit-config> • <copy-config> • <delete-config> • <lock> • <unlock> • <get> • <close-session> • <kill-session> • <commit> • <discard-changes> 			X
Other NETCONF features	<p>NETCONF features include:</p> <ul style="list-style-type: none"> • Remote-procedure call (RPC) message pipelining • Data store selection (for example, running, startup, and so on) • Capabilities: Writable-running capability, candidate-configuration capability • Subtree filtering 			X
CLI payload in NETCONF operation	Cisco EDI allows the transfer of CLI commands (that is, CLI text). The response contains the output from the network element in plaintext.			X
Versioning	<p>Versioning includes:</p> <ul style="list-style-type: none"> • Management operation versioning • XML data model versioning 			X
Device support identification	Name spaces are used in the XSD files to specify the supported device type and version.			X
Forbidden command identification and blocking	Cisco EDI offers the ability to disable device commands that may be destructive, such as the write erase command, which erases the entire contents of flash memory on a device.		X	
Backward compatibility	Management operations and data models are compatible with previous versions of Cisco EDI.			X

Applications

Cisco EDI is designed to fulfill various deployment environment needs. As such, it can be deployed either as a standalone system or in conjunction with a management application (See Figure 1). When deployed alongside a management application, information exchange to or from Cisco EDI can take place over the XML PI (NETCONF operations) or over the traditional Telnet or SSH connection for CLI transfers. In a standalone deployment, operators execute configuration operations through the Cisco EDI enhanced CLI user interface.

Figure 1. Cisco EDI Deployment Options



System Requirements

Table 6 gives system requirements for Cisco EDI.

Table 6. System Requirements for Cisco EDI

Supported Platforms	IBM PC-Compatible Computer
Disk space	Hard drive: Single IDE internal hard drive with a minimum capacity of 20 GB
Hardware	<ul style="list-style-type: none"> • Network interfaces: 1 network interface that supports 10 Mbps or more • Console port: 1 RJ-45 console port • Display monitor: 1 RGB display monitor port • 20 GB minimum available disk drive space
Memory	2 GB minimum memory
CPU	Processor: Intel Pentium 4 1.6 GHz or more
Software	<p>Linux:</p> <ul style="list-style-type: none"> • Red Hat Enterprise Linux V 4 or Red Hat Enterprise Linux V 5 • gcc (Linux C Compiler) with version greater than 3.4.x must be installed in the Linux machine as a prerequisite. <p>Windows:</p> <ul style="list-style-type: none"> • Windows XP Professional (with Service Pack 1), or Windows 2000 Professional (with Service Pack 3) • Windows® Installer. V 3.01.4000.1823 or later (msiexec) <p>All the UI applications need Java Runtime Environment (JRE) 1.5. Include Java in path.</p>

Cisco EDI Software Download Information

To download the Cisco EDI 2.2 software, perform the following steps:

Step 1. Go to <https://upload.cisco.com/cgi-bin/swc/fileexg/main.cgi?CONTYPES=ccu-forum>.

Step 2. Log in with your authorized Cisco username and password.

Step 3. Go to the Cisco Enhanced Device Interface 2.2 Release Table. This table contains the following zip files:

- E-DI.2.2-Windows.zip- Windows E-DI Installation(Server and Client Apps)
- E-DI.2.2-Linux.zip- Linux E-DI Installation(Server and Client Apps)
- E-DI.2.2-Documentation.zip – E-DI user documents for Windows and Linux
- E-DI.2.2-ClientApps.zip- E-DI GUI applications for Windows and Linux

Step 4. Download the required zip files.

Please send an e-mail to cs-edi@cisco.com if you have questions relating to Cisco Enhanced Device Interface.

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For More Information

For more information about Cisco EDI, visit

<http://www.cisco.com/en/US/products/ps6456/index.html>, contact your local Cisco account representative, or send an e-mail to ask-edi@cisco.com.



Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

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