



AXL Serviceability API Programming Guide for Cisco Unified CallManager 4.2(3)

This document describes the implementation of AXL-Serviceability APIs that are based on version 4.2(3). Cisco Unified CallManager real-time information, performance counters, and database information exposure occurs through an AXL-Serviceability Interface that conforms to the World Wide Web Consortium (W3C) standard. The Web Service Description Language (WSDL) files provide interface definitions.

To access all AXL API downloads and AXL requests and responses found in this document, refer to http://www.cisco.com/pcgi-bin/dev_support/access_level/product_support.

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Introduction

By exposing Cisco Unified CallManager real-time information, performance counter, and database information, customers can write customized applications. AXL-Serviceability APIs, an extensible SOAP-based XML web service, conforms to the SOAP Spec 1.1 [1] and the WSDL Spec 1.1 [2]. AXL-Serviceability APIs represent one server component of the Cisco Serviceability product.

AXL-Serviceability APIs provides remote procedure call (RPC) operations for the clients. Clients of AXL-Serviceability APIs can run in different OS platforms and can communicate with AXL-Serviceability APIs through the standard SOAP protocol. The AXL-Serviceability APIs includes a goal to provide access to the core Cisco Serviceability functionalities through an open and standard transport protocol and data model.

The following list gives the Serviceability services that are exposed via AXL-Serviceability APIs:

- Windows 2000 Perfmon Data Collection.
- Cisco Unified CallManager Device Remote Installation Service (RIS) Search

The AXL-Serviceability API gets implemented as an Internet Server API (ISAPI) component of the Internet Information Server (IIS). As an extensible service, the AXL-Serviceability API allows external implementation of SOAP ports that are to be plugged in through the SOAP port extension DLL. This document describes the implementation of AXL-Serviceability APIs that are based on version 4.2(3) or higher. The latest implementation of AXL-Serviceability APIs supports only the perfmon data collection functionality and real-time information.

Data Model

SOAP with XML request and response messages provides the basis for AXL-Serviceability APIs. They must conform to the structure of a SOAP Envelope element. Although SOAP is a standard protocol, many of its data model aspects get left open for flexibility reasons. For example, it permits different transport protocols such as SMTP, FTP, or HTTP to carry SOAP messages. The implementation of a SOAP service must specify the bindings of the data model to constitute a concrete wire protocol specification.

WSDL 1.1[2] provides the mechanism to describe the complete SOAP bindings that AXL-Serviceability APIs use.

The Cisco Unified CallManager server file `http://ASTSERVERNAME/soap/AstService.wsdl` contains perfmon SOAP requests service definitions.

The file `http://ASTSERVERNAME/soap/risport.wsdl` contains Cisco Unified CallManager and CTI manager SOAP real-time information requests definitions.

To know what services are available, how to form the request message, and how to interpret the response message properly, you must download these files. The WSDL file includes everything that you need to know about AXL-Serviceability APIs. You can get the WSDL file as a static XML page.

ASTSERVERNAME refers to the server on which the AXL-Serviceability APIs are running.

Soap Binding

The binding section of the Serviceability SOAP WSDL files specifies AXL-Serviceability APIs SOAP binding information. Binding specifications apply to both request and response messages. SOAP Binding covers the following aspects.

Character Encoding

AXL-Serviceability APIs use UTF-8 to encode the data stream in both request and response SOAP messages. The encoding attribute of the XML declaration specifies UTF-8 encoding. AXL-Serviceability APIs also set “text/xml; charset=utf-8” as the value of the Content-Type response header field. Internally, AXL-Serviceability APIs process the data by using UCS-2 Unicode code page.

Binding Style

AXL-Serviceability APIs uses RPC binding style. In SOAP, the word operation refers to method or function. Each AXL-Serviceability API operation call gets modeled as a remote procedure call that is encapsulated in SOAP messages. The HTTP request carries the RPC calls while the HTTP response carries the call returns. The call information gets modeled as a structure. The member elements of the body entry represent the accessor elements, which represent the input parameters. Similar to the request, the response data structure also gets modeled as a structure with accessors that correspond to output parameters. Parameters that are both input and output must appear in both the request and response message.

Transport

SOAP allows different transport protocols to carry SOAP messages. AXL-Serviceability APIs use the standard HTTP as its transport. The clients use the POST verb to send request to AXL-Serviceability APIs.



Note

AXL-Serviceability APIs do not use the M-POST method as defined in the HTTP Extension Framework.

Encoding Rule

AXL-Serviceability APIs follow the recommended data model and serialization/encoding rules as defined in Section 5.1 of SOAP Spec 1.1 [1] for both the request and response messages. The built-in data types that are defined in XML Schema Part 2 [4] provide the basis for SOAP simple types.

AXL-Serviceability APIs define their own data types, which are derived from the built-in types. The schemas element of the AXL-Serviceability APIs WSDL file specifies AXL-Serviceability APIs that are derived data types. AXL-Serviceability APIs use both simple and compound data types, such as arrays and structures. All operations in AXL-Serviceability APIs pass parameters by value.

For performance reasons, AXL-Serviceability APIs do not specify the size of the array elements in the response message. It leaves the size as [], which means that no particular size is specified, but the clients can determine the size by enumerating the actual number of elements that are inside the array. Point 8 of section 5.1 of SOAP Spec 1.1 [1] specifies this.

The following target namespace URL for AXL-Serviceability APIs data types schema applies:
 xmlns:axl =http://www.cisco.com/AXL/API/1.0

AXL-Serviceability APIs qualify the first body entry in the response, which represents the call-return, with this target namespace. Similarly, clients of AXL-Serviceability APIs also need to qualify the first body entry in the request, which represents the call, with this namespace.

Request

This section describes the SOAP protocol specifications that are relevant only to the request message. With RPC-style SOAP binding, the request SOAP message contains the operation call information that is encoded as a struct. The call struct appears as the first body entry in the request message. The call struct basically contains the name of the operation and the input parameters. The name of the top-level element gets set to be the operation name. The struct contains accessor element members that represent the input parameters. Operation that takes no parameters will have no members in the struct. The names of the accessor elements get set to be the same as the names of the input parameters. The values of the accessor elements represent the values of the input parameters. The order of the accessor elements must match the order of the input parameters as specified in the signature of the operation.

SOAP Action Header

AXL-Serviceability APIs requires SOAP clients to include the SOAP Action HTTP header field in the request message. The *Simple Object Access Protocol (SOAP) 1.1* specification does not place any restrictions on the format of this header. For AXL-Serviceability APIs, the `soapAction` attribute of the SOAP element, which is defined under the binding section of the Serviceability SOAP API WSDL files, specifies the format of the SOAP Action header. All AXL-Serviceability APIs operations use the following URI format:

```
http://schemas.cisco.com/ast/soap/action/#PortName#OperationName
```



Note

Because enclosing double-quote characters are part of the URI, the header must include them.

PortName acts as a placeholder that refers to the name of the port. AXL-Serviceability APIs must support the port. OperationName represents a placeholder that refers to the name of the intended operation within the specified port. This name must match the operation name in the request body, which is specified as the name of the first body entry element. The SOAPAction header gets used to indicate the intent of the SOAP request without having to parse the body of the request. A SOAP server can check the value of this header first and determine whether to fail the operation before it proceeds with the XML parsing of the body. This gives some efficiency edge on the server side. This scheme also allows non-SOAP-aware intermediary HTTP servers or proxies to determine the intent of the payload.

Port

A SoapPort basically represents an instantiation of a SoapBinding with a specific network address. Because AXL-Serviceability APIs use HTTP as the transport protocol, the network address in this case specifies an HTTP request URL. SoapPortType, with specific binding rules added to it, provides a basis for the definition of SoapBinding. The service section of the WSDL file defines the request URL for all AXL-Serviceability APIs operations as follows:

```
http://ASTSERVERNAME/soap/astsvc.dll
```

ASTSERVERNAME refers to the server name on which the AXL-Serviceability SOAP service is running. Every request for the AXL-Serviceability API operations must use this URL. The word SOAP refers to the virtual root on which “astsvc.dll” gets placed.

SOAP Header

As previously explained, the SOAP header provides a general way to add features to SOAP messages in a decentralized fashion with no prior contract between the sender and recipient. AXL-Serviceability APIs do not use this feature, so no `Header` element is expected in the envelope, and it gets ignored. If the `Header` element gets included with the `mustUnderstand` attribute set to 1, AXL-Serviceability APIs reply with a fault and fault code value that is set to `MustUnderstand`.

The following example shows AXL-Serviceability APIs SOAP request message with the HTTP header information:

Example

```
POST /soap/astsvc.dll HTTP/1.1
Host: nozomi
Content-Type: text/xml; charset=utf-8
Content-Length: xxx
SOAPAction: "http://schemas.cisco.com/ast/soap/action/#PerfmonPort#PerfmonOpenSession"

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonOpenSession xmlns:q1="http://schemas.cisco.com/ast/soap/" />
  </soap:Body>
</soap:Envelope>
```

Response

This section describes the SOAP protocol specifications that are relevant only to the response message.

For a successful operation call, the call-return gets encoded as a structure. The structure appears as the first body entry of the response. The call-return basically contains the output parameters or return values of the call. The name of the structure top-level element has no significance, and *Simple Object Access Protocol (SOAP) 1.1* specification does not place any restriction on the name. The structure contains accessor member elements, which represent the output parameters of the call. The names of the accessor elements match the names of the output parameters. The contents of the accessor elements represent the values of the output parameters. The order of the accessor elements must match the order of output parameters as specified in the operation signatures. Operation, which does not return any value, contains no member elements in the call-return struct. AXL-Serviceability APIs use the following naming conventions for its call-return top-level element:

`OperationNameResponse`

OperationName represents a placeholder that refers to the name of the operation that is specified in the corresponding request message. This format is specific only for AXL-Serviceability APIs implementation.

The target namespace that is described in the [“Encoding Rule” section on page 3](#) qualifies the call-return. AXL-Serviceability APIs return HTTP status 200 when the operation succeeds.

For a failed operation call, AXL-Serviceability APIs include the SOAP `fault` element in the response body. Similar to call-return, the `fault` element also appears as the first body entry. AXL-Serviceability APIs set HTTP 500 status when a fault message is sent.

Fault

When AXL-Serviceability APIs process a request and detect that an error occurred, the response contains a SOAP `fault` element. The `fault` element appears as the first response body entry. The `fault` element comprises the following four subelements:

- [Fault Code](#)
- [FaultString](#)
- [FaultActor](#)
- [Detail](#)

Fault Code

AXL-Serviceability APIs use the following standard fault code values as defined in Section 4.4.1 of the *Simple Object Access Protocol (SOAP) 1.1* specification.

VersionMismatch

This fault code gets set when the namespace URL of the request envelope does not match `xmlns:axl=http://www.cisco.com/AXL/API/1.0`.

MustUnderstand

This fault code gets set when the clients include the `Header` element in the envelope along with the `mustUnderstand` attribute set to 1. AXL-Serviceability APIs do not use the `Header` element. See the [“SOAP Header” section on page 5](#) for details.

Client

This fault code gets set when AXL-Serviceability APIs encounter errors that are related to the clients.

Server

This fault code gets set when AXL-Serviceability APIs encounter errors that are related to the service itself.

The `faultcode` value gets qualified with `xmlns:axl=http://www.cisco.com/AXL/API/1.0` namespace. This subelement always exists in the `fault` element as the *Simple Object Access Protocol (SOAP) 1.1* specification specifies. This represents a general classification of errors.

FaultString

AXL-Serviceability APIs set a short error description in the `faultstring` element that is intended for human reading. Similar to `faultcode`, this subelement remains always present as required by the *Simple Object Access Protocol (SOAP) 1.1* specification. The string value of the `FaultString` is specific only to the AXL-Serviceability APIs.

FaultActor

AXL-Serviceability APIs do not set this subelement. A proxy or intermediary server must include this subelement if it generates a fault message.

Detail

If AXL-Serviceability APIs parse and process the request body and determine that an error occurs afterwards, it includes the detailed error information in the `detail` subelement.

If AXL-Serviceability APIs do not include the `detail` subelement in the fault element, the error does not relate to the request body. Data types that are defined in the AXL-Serviceability APIs WSDL files specify the encoding rule for the `detail` element. The following fragments of the file describe the types:

```

64<complexType name='CallInfoType'>
65  <sequence>
66    <element name='FileName' type='xsd:string' />
67    <element name='LineNo' type='xsd:int' />
68    <element name='ErrorCode' type='xsd:unsignedInt' />
69    <element name='Function' type='xsd:string' />
70    <element name='Params' type='xsd:string' />
71  </sequence>
72</complexType>
73
74<complexType name='ErrorInfoType'>
75  <sequence>
76    <element name='Version' type='xsd:string' />
77    <element name='Time' type='xsd:time' />
78    <element name='ProcId' type='xsd:unsignedInt' />
79    <element name='ThreadId' type='xsd:unsignedInt' />
80    <element name='ArrayOfCallInfo' type='tns:ArrayOfCallInfoType' />
81  </sequence>
82</complexType>

128<complexType name='ArrayOfCallInfoType'>
129  <complexContent>
130    <restriction base='SOAP-ENC:Array'>
131      <sequence>
132        <element name='CallInfo'
133          type='tns:CallInfoType' minOccurs='1' maxOccurs='unbounded' />
134      </sequence>
135    </restriction>
136  </complexContent>
137</complexType>

```

AXL-Serviceability APIs name the `detail` entry element as `ErrorInfo` and the type as `ErrorInfoType`. This type provides a structure with several accessor elements. The `Version` accessor contains the build version of the `astsvc.dll`. The `Time` accessor denotes the time when the error occurs. The `ProcId` accessor contains the process ID of the AXL-Serviceability APIs, and, in this case, it should be the same process as the `inetinfo.exe` (IIS process). The `ThreadId` accessor contains the thread ID that generates the fault. The `ArrayOfCallInfo` accessor contains an array of `CallInfo` elements.

The type for `CallInfo` specifies `CallInfoType` and also represents a structure. `CallInfoType` contains detailed information that describes where the error occurs in the codes. It also includes the returned error code of the function, and the parameter data. The `CallInfoType` design allows capturing as much information as needed, so it is easy and fast to track down and investigate a problem. Depending on the implementation of the operation, several `CallInfo` elements can exist in the array.

The following example shows a successful AXL-Serviceability APIs SOAP response message with HTTP headers:

Example

```

HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Content-Length: xxx

<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">

```

```

    <SOAP-ENV:Body>
      <m:PerfmonOpenSessionResponse xmlns:m="http://schemas.cisco.com/ast/soap/">
        <SessionHandle>{01944B7E-183F-44C5-977A-F31E3AE59C4C}</SessionHandle>
      </m:PerfmonOpenSessionResponse>
    </SOAP-ENV:Body>
  </SOAP-ENV:Envelope>

```

The following example shows a failed AXL-Serviceability APIs SOAP response message with HTTP headers:

Example

HTTP/1.1 500 OK

Content-Type: text/xml; charset=utf-8

Content-Length: xxx

```

<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <SOAP-ENV:Fault>
      <faultcode>SOAP-ENV:Server</faultcode>
      <faultstring>Perfmon error occurs</faultstring>
      <detail>
        <m:ErrorInfo xmlns:m="http://schemas.cisco.com/ast/soap/">
          <Version>3.2.0.2</Version>
          <Time>07/16/2001 - 00:00:24</Time>
          <ProcId>1200</ProcId>
          <ThreadId>300</ThreadId>
          <ArrayOfCallInfo SOAP-ENC:arrayType="m:CallInfoType[]">
            <CallInfo>
              <FileName>perfmon.cpp</FileName>
              <LineNo>396</LineNo>
              <ErrorCode>3221228473</ErrorCode>
              <Function>AddCounter</Function>
              <Params>\nozomi\tcp\Bad Counter Name</Params>
            </CallInfo>
          </ArrayOfCallInfo>
        </m:ErrorInfo>
      </detail>
    </SOAP-ENV:Fault>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

Perfmon error codes can be referred from Microsoft site. Above error 3221228473 code refers to

0xC0000BB9 The specified counter could not be found.PDH_CSTATUS_NO_COUNTER

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/perfmon/base/pdh_error_codes.asp

Namespaces

AXL-Serviceability APIs use the following XML namespaces:

- `xmlns:axl=http://www.cisco.com/AXL/API/1.0`
This example represents the namespace URI for SOAP envelope.
- `xmlns:axl=http://www.cisco.com/AXL/API/1.0`
This example represents the namespace for the SOAP-recommended encoding rule that is based on XML Schema.
- `xmlns:axl=http://www.cisco.com/AXL/API/1.0`
This example represents the namespace URL for AXL-Serviceability APIs data types as defined in the WSDL file.



Note

XML Namespace 'xmlns:m' maps to URI `http://schemas.cisco.com/ast/soap/`, which is defined as the target name space in `astservice.wsdl`.

Highly Isolated IIS Service

In this release, SOAP moves to a highly isolated process that does not run as part of an IIS thread. Faults on SOAP service, therefore, will not affect the IIS process.

Components and Dependency

AXL-Serviceability API comprises the following modules:

- `Astsvc.dll` provides the base implementation of SOAP Serviceability APIs.
- `AstService.wsdl` and `RisPort.wsdl` represent XML files that describe the web service.
- Real-time information server (Cisco RIS Data Collector).

AXL-Serviceability APIs Ports

This section explains the interface of SOAP service built-in ports.

PerfmonPort

PerfmonPort comprises several operations that allow clients to do the following perfmon-related tasks:

- Collect perfmon counter data.

AXL-Serviceability APIs provide two ways to collect perfmon data: session-based and single-transaction.

- Get the list of all perfmon object and counters names that are installed in a particular host.
- Get the list of current instances of a perfmon object.
- Get textual description of a perfmon counter.

The 'perfport.dll' SOAP extension implements PerfmonPort. For a short overview of Perfmon Monitoring in Windows 2000, refer to following links:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/perfmon/base/performance_objects_and_counters.asp

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/perfmon/base/performance_data.asp


Note

Because the ISAPI-based Dll on IIS implements the SOAP functionality, all SOAP service URLs in 4.x releases reference perfport.dll.

PerfmonListCounter

This operation returns the list of perfmon objects and counters in a particular host.

Request Format

The PerfmonListCounter operation takes a single parameter:

Parameter	Type	Derived From	Description
Host	xsd:string	xsd:string	Contains the name or address of the target server from which to get the counter information

The following example shows a PerfmonListCounter request:

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonListCounter xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <Host xsi:type="xsd:string">nozomi</Host>
    </q1:PerfmonListCounter>
  </soap:Body>
</soap:Envelope>
```

Response Format

PerfmonListCounter returns with information that describes the hierarchical structures of the perfmon objects and counters. The body entry includes an *ArrayOfObjectInfo* element. The following fragments from the AXL-Serviceability APIs WSDL file describes the types that this response uses:

```
106 <complexType name='ArrayOfObjectInfoType'>
107   <complexContent>
```

```

106         <restriction base='SOAP-ENC:Array'>
107             <sequence>
108                 <element name='ObjectInfo'
109                     type='tns:ObjectInfoType' minOccurs='1' maxOccurs='unbounded' />
110             </sequence>
111         </restriction>
112     </complexContent>
113 </complexType>

```

The `ArrayOfObjectInfo` element comprises an array of `ObjectInfo` elements that have the following type:

```

56 <complexType name='ObjectInfoType'>
57     <sequence>
58         <element name='Name' type='tns:ObjectNameType' />
59         <element name='MultiInstance' type='xsd:boolean' />
60         <element name='ArrayOfCounter' type='tns:ArrayOfCounterType' />
61     </sequence>
62 </complexType>

24 <simpleType name='ObjectNameType'>
25     <restriction base='string' />
26 </simpleType>

```

The `Name` element, whose type is derived from `string`, describes the name of the object. `MultiInstance` element indicates whether the object has more than one instance. The `ArrayOfCounter` element acts as a container for an array of `Counter` elements that have the following types:

```

44 <complexType name='CounterType'>
45     <sequence>
46         <element name='Name' type='tns:CounterNameType' />
47     </sequence>
48 </complexType>
32 <simpleType name='CounterNameType'>
33     <restriction base='string' />
34 </simpleType>

```

The `Name` element, whose type is derived from `xsd:string`, describes the name of the counter.

Example

```

<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonListCounterResponse xmlns:m="http://schemas.cisco.com/ast/soap/">
      <ArrayOfObjectInfo SOAP-ENC:arrayType="m:ObjectInfoType[]">
        <ObjectInfo>
          <Name>.NET CLR Memory</Name>
          <MultiInstance>true</MultiInstance>
          <ArrayOfCounter SOAP-ENC:arrayType="m:CounterType[]">
            <Counter>
              <Name># Gen 0 Collections</Name>
            </Counter>
            <Counter>
              <Name># Gen 1 Collections</Name>
            </Counter>
            ...
          </ArrayOfCounter>
        </ObjectInfo>
      </ArrayOfObjectInfo>
    </m:PerfmonListCounterResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

```

</ObjectInfo>
<ObjectInfo>
  <Name>.NET CLR LocksAndThreads</Name>
  <MultiInstance>true</MultiInstance>
  <ArrayOfCounter SOAP-ENC:arrayType="m:CounterType[]">
    <Counter>
      <Name>Total # of Contentions</Name>
    </Counter>
    <Counter>
      <Name>Contention Rate / sec</Name>
    </Counter>
    <Counter>
      <Name>Current Queue Length</Name>
    </Counter>
    ...
  </ArrayOfCounter>
</ObjectInfo>
...
</ArrayOfObjectInfo>
</m:PerfmonListCounterResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

PerfmonListInstance

This operation returns the list of instances of a perfmon object in a particular host. Instances of an object can dynamically come and go, and this operation returns the most recent list of instances.

Request Format

The PerfmonListInstance operation takes the following parameters:

Parameter	Type	Derived From	Description
Host	xsd:string	xsd:string	Contains the address of the target server on which the object resides
Object	xsd:string	xsd:string	Contains the name of the object

The following example shows the PerfmonListInstance request with nozomi host and Process object parameters.

Example

```

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonListInstance xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <Host xsi:type="xsd:string">nozomi</Host>
      <Object xsi:type="xsd:string">Process</Object>
    </q1:PerfmonListInstance>
  </soap:Body>
</soap:Envelope>

```


Response Format

PerfmonListInstance returns an element that is named ArrayOfInstance. The type for this element specifies ArrayOfInstanceType, which is an array of Instance elements. The following fragments from AXL-Serviceability APIs WSDL file explain the types that this response uses:

```

84<complexType name='ArrayOfInstanceType'>
85  <complexContent>
86    <restriction base='SOAP-ENC:Array'>
87      <sequence>
88        <element name='Instance'
89          type='tns:InstanceType' minOccurs='0' maxOccurs='unbounded' />
90      </sequence>
91    </restriction>
92  </complexContent>
93 </complexType>

```



Note

ArrayOfInstanceType can have 0 (zero) Instance element, in which case the requested object is not of a multi-instance object.

```

50 <complexType name='InstanceType'>
51  <sequence>
52    <element name='Name' type='tns:InstanceNameType' />
53  </sequence>
54 </complexType>

```

The type for Instance element specifies InstanceType. It represents a structure with a single-element member: Name.

```

28<simpleType name='InstanceNameType'>
29  <restriction base='string' />
30</simpleType>

```

The Name element, whose type is InstanceNameType, which is derived from xsd:string, contains the name of the instance of the requested object.

The following example shows the response to the request in the previous example:

Example

```

<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonListInstanceResponse xmlns:m="http://schemas.cisco.com/ast/soap/">
      <ArrayOfInstance SOAP-ENC:arrayType="m:InstanceType[]">
        <Instance>
          <Name>Idle</Name>
        </Instance>
        <Instance>
          <Name>System</Name>
        </Instance>
        <Instance>
          <Name>SMSS</Name>
        </Instance>
      </ArrayOfInstance>
    </m:PerfmonListInstanceResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

```

        <Name>CSRSS</Name>
      </Instance>
    <Instance>
      <Name>WINLOGON</Name>
    </Instance>
    <Instance>
      <Name>SERVICES</Name>
    </Instance>
    <Instance>
      <Name>_Total</Name>
    </Instance>
    ...
  </ArrayOfInstance>
</m:PerfmonListInstanceResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

PerfmonQueryCounterDescription

This operation returns the help text of a particular counter.

Request Format

PerfmonQueryCounterDescription takes the following parameter:

Parameter	Type	Derived From	Description
Counter	CounterNameType	xsd:string	Contains the name of the counter.

The following example shows the PerfmonQueryCounterDescription request:

Example

```

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonQueryCounterDescription
      xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <Counter xsi:type="xsd:string">\\nozomi\\Server\\Files Open</Counter>
    </q1:PerfmonQueryCounterDescription>
  </soap:Body>
</soap:Envelope>

```

Response Format

PerfmonQueryCounterDescription returns an element named `HelpText` that is of the `xsd:string` type. It contains the help text of the requested counter.

The following example shows the response to the request in the previous example.

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonQueryCounterDescriptionResponse
      xmlns:m="http://schemas.cisco.com/ast/soap/">
      <HelpText>The number of files currently opened in the server. Indicates
current server
activity.
</HelpText>
    </m:PerfmonQueryCounterDescriptionResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PerfmonOpenSession

Client program submits this operation to get a session handle from the AXL-Serviceability APIs. The client needs a session handle to do the session-based perfmon counter data collection. The session handle represents a universally unique identifier that gets used only once. This guarantees that no duplicate handles exist. AXL-Serviceability APIs keep the opened handles in the cache. If no activity occurs on a handle for 25 hours, AXL-Serviceability APIs remove the handle and render it invalid.

In a session-based perfmon data collection, use the following related operations:

- PerfmonOpenSession
- PerfmonAddCounter
- PerfmonRemoveCounter
- PerfmonCollectSessionData
- PerfmonCloseSession

After a client gets a session handle, it normally proceeds to submit the `PerfmonAddCounter` operation call and then follows with the `PerfmonCollectSessionData` operation.

`PerfmonCollectSessionData` specifies the main operation that does the collection of the perfmon data for the clients. When the client no longer needs the session handle, it should submit `PerfmonCloseSession`, so the AXL-Serviceability APIs can remove the handle from cache. Clients can dynamically add new counters to the session handle and remove some from it while the session handle is still open. The `PerfmonRemoveCounter` operation does counter removal.

Request Format

The PerfmonOpenSession operation takes no parameter.

The following example shows the PerfmonOpenSession request:

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonOpenSession xmlns:q1="http://schemas.cisco.com/ast/soap/" />
  </soap:Body>
</soap:Envelope>
```

Response Format

PerfmonOpenSession returns a single element that is named sessionhandle. Its type specifies SessionHandleType, which is derived from xsd:string, and it contains the guide for the session handle.

The following example shows the PerfmonOpenSession response:

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonOpenSessionResponse xmlns:m="http://schemas.cisco.com/ast/soap/">
      <SessionHandle>{01944B7E-183F-44C5-977A-F31E3AE59C4C}</SessionHandle>
    </m:PerfmonOpenSessionResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PerfmonAddCounter

This operation adds an array of counters to a session handle.

Request Format

PerfmonAddCounter takes the following parameters:

Parameter	Type	Derived From	Description
SessionHandle	SessionHandleType	xsd:string	Contains the session handle that the PerfmonOpenSession operation previously opened
ArrayOfCounter	ArrayOfCounterType	An array of Counter elements	Contains the name of the counter to be added to the session handle

The following fragments from AXL-Serviceability APIs describe the types that this request uses:

```

95<complexType name='ArrayOfCounterType'>
96  <complexContent>
97    <restriction base='SOAP-ENC:Array'>
98      <sequence>
99        <element name='Counter'
100          type='tns:CounterType' minOccurs='1' maxOccurs='unbounded' />
101      </sequence>
102    </restriction>
103  </complexContent>
104</complexType>

```


Note

ArrayOfCounterType expects at least one Counter element in the array.

```

44<complexType name='CounterType'>
45  <sequence>
46    <element name='Name' type='tns:CounterNameType' />
47  </sequence>
48</complexType>

```

CounterType represents a structure that includes a single element member: Name.

```

32<simpleType name='CounterNameType'>
33  <restriction base='string' />
34</simpleType>

```

The Name element that is of string-derived type contains the name of the counter.

The following example shows the `PerfmomAddCounter` request with two counters. This example uses a single-reference accessor.

Example

```

<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:tns="http://tempuri.org/"
  xmlns:types="http://tempuri.org/encodedTypes"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmomAddCounter xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <SessionHandle xsi:type="xsd:string">
        {1A490F1E-D82C-403F-9CF0-C4D4ABD6FF3E}
      </SessionHandle>
      <ArrayOfCounter soapenc:arrayType="q1:CounterType[2]">
        <Counter>
          <Name>\\nozomi\process(inetinfo)\handle count</Name>
        </Counter>
        <Counter>
          <Name>\\nozomi\process(csrs)\handle count</Name>
        </Counter>
      </ArrayOfCounter>
    </q1:PerfmomAddCounter>
  </soap:Body>
</soap:Envelope>

```

The following example shows the `PerfmonAddCounter` request with three counters in the `ArrayOfCounter` parameter.



Note

This example uses multireference accessors.

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonAddCounter xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <SessionHandle xsi:type="xsd:string">
        {1A490F1E-D82C-403F-9CF0-C4D4ABD6FF3E}
      </SessionHandle>
      <ArrayOfCounter href="#id1" />
    </q1:PerfmonAddCounter>
    <soapenc:Array id="id1"
      xmlns:q2="http://schemas.cisco.com/ast/soap/"
      soapenc:arrayType="q2:CounterType[3]">
      <Item href="#id2" />
      <Item href="#id3" />
      <Item href="#id4" />
    </soapenc:Array>
    <q3:CounterType id="id2" xsi:type="q3:CounterType"
      xmlns:q3="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Segments\sec</Name>
    </q3:CounterType>
    <q4:CounterType id="id3" xsi:type="q4:CounterType"
      xmlns:q4="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Connections Reset</Name>
    </q4:CounterType>
    <q5:CounterType id="id4" xsi:type="q5:CounterType"
      xmlns:q5="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Connections Active</Name>
    </q5:CounterType>
  </soap:Body>
</soap:Envelope>
```

Response Format

The following example shows that the `PerfmonAddCounter` returns no output:

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonAddCounterResponse xmlns:m="http://schemas.cisco.com/ast/soap/" />
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

If `PerfmonAddCounter` fails to add one or more counters that are specified in the request, AXL-Serviceability APIs reply with a fault response. Some counters that are specified in the request may get successfully added, while others failed to be added.

In this case, AXL-Serviceability APIs reply with a fault. The `Params` element of `CallInfo` element specifies each failed counter name. Client programs can conclude that counter names, which are specified in the request but do not appear in the fault message, actually get added successfully to the query handle.

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <SOAP-ENV:Fault>
      <faultcode>SOAP-ENV:Server</faultcode>
      <faultstring>Perfmon error occurs</faultstring>
      <detail>
        <m:ErrorInfo xmlns:m="http://schemas.cisco.com/ast/soap/">
          <Version>3.2.0.1</Version>
          <Time>07/15/2001 - 00:00:24</Time>
          <ProcId>1212</ProcId>
          <ThreadId>340</ThreadId>
          <ArrayOfCallInfo SOAP-ENC:arrayType="m:CallInfoType[]">
            <CallInfo>
              <FileName>perfmon.cpp</FileName>
              <LineNo>396</LineNo>
              <ErrorCode>3221228473</ErrorCode>
              <Function>AddCounter</Function>
              <Params>\\nozomi\tcp\Invalid Counter Name 1</Params>
            </CallInfo>
            <CallInfo>
              <FileName>perfmon.cpp</FileName>
              <LineNo>396</LineNo>
              <ErrorCode>3221228473</ErrorCode>
              <Function>AddCounter</Function>
              <Params>\\nozomi\tcp\Invalid Counter Name 2</Params>
            </CallInfo>
          </ArrayOfCallInfo>
        </m:ErrorInfo>
      </detail>
    </SOAP-ENV:Fault>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PerfmonRemoveCounter

This operation removes an array of counters from a session handle.

Request Format

PerfmonRemoveCounter takes the following parameters:

Parameter	Type	Derived From	Description
SessionHandle	SessionHandleType	xsd:string	Contains the session handle that the PerfmonOpenSession operation previously opened
ArrayOfCounter	ArrayOfCounterType	An array of Counter elements	Contains the name of the counter to be added to the session handle

The following example shows a PerfmonRemoveCounter request with three counters in the ArrayOfCounter parameter.



Note

This example uses single-reference accessor style.

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:tns="http://tempuri.org/"
  xmlns:types="http://tempuri.org/encodedTypes"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonRemoveCounter xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <SessionHandle xsi:type="xsd:string">
        {1A490F1E-D82C-403F-9CF0-C4D4ABD6FF3E}
      </SessionHandle>
      <ArrayOfCounter soapenc:arrayType="q1:CounterType[2]">
        <Counter>
          <Name>\\nozomi\process(inetinfo)\handle count</Name>
        </Counter>
        <Counter>
          <Name>\\nozomi\process(csrs) \handle count</Name>
        </Counter>
      </ArrayOfCounter>
    </q1:PerfmonRemoveCounter>
  </soap:Body>
</soap:Envelope>
```

The following example shows a `PerfmonRemoveCounter` that uses multireference accessors.

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonRemoveCounter xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <SessionHandle xsi:type="xsd:string">
        {1A490F1E-D82C-403F-9CF0-C4D4ABD6FF3E}
      </SessionHandle>
      <ArrayOfCounter href="#id1" />
    </q1:PerfmonRemoveCounter>
    <soapenc:Array id="id1" xmlns:q2="http://schemas.cisco.com/ast/soap/"
      soapenc:arrayType="q2:CounterType[3]">
      <Item href="#id2" />
      <Item href="#id3" />
      <Item href="#id4" />
    </soapenc:Array>
    <q3:CounterType id="id2" xsi:type="q3:CounterType"
      xmlns:q3="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Segments\sec</Name>
    </q3:CounterType>
    <q4:CounterType id="id3" xsi:type="q4:CounterType"
      xmlns:q4="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Connections Reset</Name>
    </q4:CounterType>
    <q5:CounterType id="id4" xsi:type="q5:CounterType"
      xmlns:q5="http://schemas.cisco.com/ast/soap/">
      <Name xsi:type="xsd:string">\nozomi\tcp\Connections Active</Name>
    </q5:CounterType>
  </soap:Body>
</soap:Envelope>
```

Response Format

`PerfmonRemoveCounter` returns no data in the response as shown by the following example:

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonRemoveCounterResponse xmlns:m="http://schemas.cisco.com/ast/soap/" />
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

If `PerfmonRemoveCounter` fails to remove one or more counters that the request specifies, AXL-Serviceability APIs reply with a fault response with similar semantics as `PerfmonAddCounter`. Some counters that are specified in the request get successfully removed, while some others fail to be removed. In this case, AXL-Serviceability APIs reply with a fault. The `Params` element of the `CallInfo` element specifies each failed counter name. Client programs can conclude that counter names, which are specified in the request but do not appear in the fault message, actually get removed successfully from the query handle.

PerfmonCollectSessionData

This operation collects the perfmon data for all counters that have been added to the query handle.

Request Format

PerfmonCollectSessionData takes the following parameter:

Parameter	Type	Derived From	Description
SessionHandle	SessionHandleType	xsd:string	Contains the session handle that the PerfmonOpenSession operation previously opened

The following example shows a PerfmonCollectSessionData request:

Example

```
<?xml version="1.0" encoding="utf-8" ?>
  <soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
      <q1:PerfmonCollectSessionData xmlns:q1="http://schemas.cisco.com/ast/soap/">
        <SessionHandle xsi:type="xsd:string">
          {FB343D6D-AA6E-4EDB-9CFA-63A5A3ED6405}
        </SessionHandle>
      </q1:PerfmonCollectSessionData>
    </soap:Body>
  </soap:Envelope>
```

Response Format

The PerfmonCollectSessionData operation returns the ArrayOfCounterInfo element that contains the value and status of all counters that were previously added to the session handle. The type for ArrayOfCounterInfo element specifies ArrayOfCounterInfoType, which represents an array of CounterInfo elements.

The following fragments from AXL-Serviceability APIs WSDL show the types that this response uses:

```
117<complexType name='ArrayOfCounterInfoType'>
118  <complexContent>
119    <restriction base='SOAP-ENC:Array'>
120      <sequence>
121        <element name='CounterInfo'
122          type='tns:CounterInfoType' minOccurs='1' maxOccurs='unbounded' />
123      </sequence>
124    </restriction>
125  </complexContent>
126</complexType>
```

ArrayOfCounterInfoType has one or more CounterInfo elements in the array. The CounterInfo element includes the following type:

```
36<complexType name='CounterInfoType'>
37  <sequence>
38    <element name='Name' type='tns:CounterNameType' />
```

```

39     <element name='Value' type='xsd:long' />
40     <element name='CStatus' type='xsd:unsignedInt' />
41 </sequence>
42 </complexType>

32<simpleType name='CounterNameType'>
33  <restriction base='string' />
34</simpleType>

```

CounterInfoType specifies a structure with the following three element members.

Element Name	Description
Name	A CounterNameType, derived from xsd:string, contains the name of the counter that was previously added to the session handle
Value	A 64-bit signed integer (xsd:long) that contains the value of the counter
CStatus	Indicates whether the value of the counter was successfully retrieved. The type specifies a 32-bit unsigned integer (xsd:unsignedInt). First check for the value of CStatus element before reading the Value element. If the value of CStatus equals 0 or 1, the Value element contains a good counter value. Otherwise, it indicates a failure in retrieving the counter value; ignore the Value element.

The following example shows a PerfmonCollectSessionData response:

Example

```

<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonCollectSessionDataResponse
      xmlns:m="http://schemas.cisco.com/ast/soap/">
      <ArrayOfCounterInfo SOAP-ENC:arrayType="m:CounterInfoType[]">
        <CounterInfo>
          <Name>\\nozomi\tcp\Segments\sec</Name>
          <Value>0</Value>
          <CStatus>0</CStatus>
        </CounterInfo>
        <CounterInfo>
          <Name>\\nozomi\tcp\Connections Reset</Name>
          <Value>6</Value>
          <CStatus>0</CStatus>
        </CounterInfo>
        <CounterInfo>
          <Name>\\nozomi\tcp\Connections Active</Name>
          <Value>23</Value>
          <CStatus>0</CStatus>
        </CounterInfo>
      </ArrayOfCounterInfo>
    </m:PerfmonCollectSessionDataResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

PerfmonCloseSession

This operation closes the session handle that the PerfmonOpenSession previously retrieved.

Request Format

PerfmonCloseSession takes the following parameter:

Parameter	Type	Derived From	Description
SessionHandle	SessionHandleType	xsd:string	Contains the session handle that the PerfmonOpenSession operation previously opened

The following example shows a PerfmonCloseSession request:

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonCloseSession xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <SessionHandle xsi:type="xsd:string">
        {01944B7E-183F-44C5-977A-F31E3AE59C4C}
      </SessionHandle>
    </q1:PerfmonCloseSession>
  </soap:Body>
</soap:Envelope>
```

Response Format

The following example shows that the PerfmonCloseSession does not return data in the response:

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonCloseSessionResponse xmlns:m="http://schemas.cisco.com/ast/soap/">
    </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

PerfmonCollectCounterData

This operation returns the perfmon data for all counters that belong to an object in a particular host. Unlike the session-based perfmon data collection, this operation collects all data in a single request/response transaction. If the object represents a multiple-instance object, this operation always returns the most current instances of the object.

Request Format

PerfmonCollectCounterData takes the following parameters:

Parameter	Type	Derived From	Description
Host	xsd:string	xsd:string	Contains the address of the target server from which the client wants to get the counter information
Object	ObjectNameType	xsd:string	Contains the name of the perfmon object

Example

```
<?xml version="1.0" encoding="utf-8" ?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
    <q1:PerfmonCollectCounterData xmlns:q1="http://schemas.cisco.com/ast/soap/">
      <Host xsi:type="xsd:string">nozomi</Host>
      <Object xsi:type="xsd:string">Processor</Object>
    </q1:PerfmonCollectCounterData>
  </soap:Body>
</soap:Envelope>
```

Response Format

PerfmonCollectCounterData returns an `ArrayOfCounterInfo` element, which is an array of `CounterInfo` elements. The data types that this response uses appear similar to the response of `PerfmonCollectSessionData` as explained in the “Response Format” section of the [“PerfmonCollectSessionData” section on page 23](#),

The following example shows a `PerfmonCollectCounterData` response:

Example

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:PerfmonCollectCounterDataResponse
      xmlns:m="http://schemas.cisco.com/ast/soap/">
      <ArrayOfCounterInfo SOAP-ENC:arrayType="m:CounterInfoType[]">
        <CounterInfo>
          <Name>\\nozomi\Processor(0)\% Processor Time</Name>
          <Value>99</Value>
          <CStatus>0</CStatus>
        </CounterInfo>
        <CounterInfo>
          <Name>\\nozomi\Processor(0)\% User Time</Name>
          <Value>0</Value>
          <CStatus>0</CStatus>
        </CounterInfo>
        <CounterInfo>
          <Name>\\nozomi\Processor(0)\% Privileged Time</Name>
```

```

        <Value>0</Value>
        <CStatus>0</CStatus>
    </CounterInfo>
    <CounterInfo>
        <Name>\\nozomi\Processor(0)\Interrupts/sec</Name>
        <Value>525</Value>
        <CStatus>0</CStatus>
    </CounterInfo>
    ...
</ArrayOfCounterInfo>
</m:PerfmonCollectCounterDataResponse>
</SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

Real-Time Information (RisPort)

Selecting Cisco Unified CallManager Real-Time Information

Request Format

SOAP Action and Envelope information

This operation allows clients to perform Cisco Unified CallManager device-related queries. HTTP header should have following SOAP action for these queries.

SOAPAction: "http://schemas.cisco.com/ast/soap/action/#RisPort#SelectCmDevices"

Query information includes an Envelope as follows:

```

1. <?xml version="1.0" encoding="utf-8"?>
2. <soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
3.   xmlns:tns="http://schemas.cisco.com/ast/soap/"
4.   xmlns:types="http://schemas.cisco.com/ast/soap/encodedTypes"
5.   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
6.   xmlns:xsd="http://www.w3.org/2001/XMLSchema">

```

Session ID

This SOAP header will have session ID that is a unique session ID from client.

```

7. <soap:Header>
8. <tns:AstHeader id="id1">
9. <SessionId xsi:type="xsd:string">SessionId</SessionId>
10. </tns:AstHeader>
11. </soap:Header>

```

Selection Criteria

Selection criteria type, which is a Cisco Unified CallManager Selection criteria, follows the SOAP header.

```

12. <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
13. <tns:SelectCmDevice>

```

If the same information is queried over and over again, send `Stateinfo` from the previous request for each repetitive query by client.

```
14. <StateInfo xsi:type="xsd:string" />
15. <CmSelectionCriteria href="#id1"/>
16. </tns:SelectCmDevice><tns:CmSelectionCriteria id="id1"
xsi:type="tns:CmSelectionCriteria">
```

Maximum Devices Specification

The following example specifies how many maximum devices can be returned for search criteria.

```
17. <MaxReturnedDevices xsi:type="xsd:unsignedInt">10</MaxReturnedDevices>
```

Search Device Classes

The following example specifies the device class type to query for real-time status. Device classes include 'Any', 'Phone', 'Gateway', 'H323', 'Cti', 'VoiceMail', 'MediaResources', 'HuntList', 'SIPTrunk', and 'unknown'.

```
18. <Class xsi:type="tns:DeviceClass">Any</Class>
```

The following example specifies the Model of the device—255 specifies all models.

```
19. <Model xsi:type="xsd:unsignedInt">255</Model>
```

DEVICE/ ENUM VALUEDEVICE DESCRIPTION

```
-----
MODEL_30SPP = 1, // Cisco 30 SP+
MODEL_12SPP = 2, // Cisco 12 SP+
MODEL_12SP = 3, // Cisco 12 SP
MODEL_12S = 4, // Cisco 12 S
MODEL_30VIP = 5, // Cisco 30 VIP
MODEL_TELECASTER_BID = 6, // Cisco 7910
MODEL_TELECASTER_MGR = 7, // Cisco 7960
MODEL_TELECASTER_BUSINESS = 8, // Cisco 7940
MODEL_IP_CONFERENCE_PHONE = 9, // Cisco 7935
MODEL_VGC_PHONE = 10, // Cisco VGC Phone
MODEL_VGC_BOX_PHONE = 11, // Cisco VGC Virtual Phone
MODEL_ATA_186 = 12, // Cisco ATA 186
MODEL_SCCP_PHONE = 20, // SCCP Phone
MODEL_VEGA = 30, // Analog Access
MODEL_TITAN1 = 40, // Digital Access
MODEL_TITAN2 = 42, // Digital Access+
MODEL_LENNON = 43, // Digital Access WS-X6608
MODEL_ELVIS = 47, // Analog Access WS-X6624
MODEL_CHALICE = 48, // VGC Gateway
MODEL_CONF_BRIDGE = 50, // Conference Bridge
MODEL_YOKO_CONF_BRIDGE = 51, // Conference Bridge WS-X6608
MODEL_DIXIELAND_CFB = 52, // Cisco IOS Conference Bridge (HDV2)
MODEL_SUMMIT_CFB = 53, // Cisco Conference Bridge (WS-SVC-CMM)
MODEL_H323_PHONE = 61, // H.323 Phone
MODEL_H323_GATEWAY = 62, // H.323 Gateway
MODEL_MUSIC_ON_HOLD = 70, // Music On Hold
MODEL_DEVICE_PILOT = 71, // Device Pilot
MODEL_CTI_PORT = 72, // CTI Port
MODEL_CTI_ROUTE_POINT = 73, // CTI Route Point
MODEL_UONE = 80, // Voice Mail Port
MODEL_DIXIELAND_SW_MTP = 83, // Cisco IOS Media Termination Point (HDV2)
```

```

MODEL_SUMMIT_APP_CFB = 84, // Cisco Media Server (WS-SVC-CMM-MS)
MODEL_FLINT_CONF_BRIDGE = 85, // Cisco Video Conference Bridge (IPVC-35xx)
MODEL_ROUTE_LIST = 90, // Route List
MODEL_LOAD_SIMULATOR = 100, // Load Simulator
MODEL_MTP = 110, // Media Termination Point
MODEL_YOKO_MTP = 111, // Media Termination Point Hardware
MODEL_DIXIELAND_MTP = 112, // Cisco IOS Media Termination Point (HDV2)
MODEL_SUMMIT_MTP = 113, // Cisco Media Termination Point (WS-SVC-CMM)
MODEL_MGCP_STATION = 120, // MGCP Station
MODEL_MGCP_TRUNK = 121, // MGCP Trunk
MODEL_GATEKEEPER = 122, // GateKeeper
MODEL_14_BUTTON_SIDECAR = 124, // 14-Button Line Expansion Module
MODEL_TRUNK = 125, // Trunk
MODEL_ANN = 126, // Tone Announcement Player
MODEL_SIP_TRUNK = 131, // SIP Trunk
MODEL_SIP_GATEWAY = 132, // SIP Gateway
MODEL_UNKNOWN_MGCP_GATEWAY = 254, // Unknown MGCP Gateway
MODEL_UNKNOWN = 255, // Unknown
MODEL_CISCO_IP_PHONE_7905 = 20000, // Cisco 7905
MODEL_7920 = 30002, // Cisco 7920
MODEL_UBIQUITY_I = 30004, // Ubiquity I
MODEL_IP250D = 30005, // IP250D
MODEL_CISCO_7970 = 30006, // Cisco 7970
MODEL_CISCO_7912 = 30007, // Cisco 7912
MODEL_CISCO_7902 = 30008, // Cisco 7902
MODEL_CISCO_SOFTPHONE_SE_M = 30016, // Cisco IP Communicator
MODEL_SAMPLEPHONE = 30017, // SamplePhone
MODEL_CISCO_7965 = 30018, // Cisco 7965
MODEL_CISCO_7936 = 30019, // Cisco 7936
MODEL_TANDBERG_VIDEO_PHONE = 30020 // Tandberg Video Phone

```

Device Status in Search Criteria

Specify registered/unregistered status devices. The following example shows status 'Any', 'Registered', 'UnRegistered', 'Rejected', and 'Unknown.'

```
20. <Status xsi:type="tns:CmDevRegStat">Registered</Status>
```

The following example specifies the server name where the search needs to be performed. If no name is specified, a search in all servers in a cluster results.

```
21. <NodeName xsi:type="xsd:string" />
```

Specify the Selection type as IP Address/Name.

```
22. <SelectBy xsi:type="tns:CmSelectBy">Name</SelectBy>
```

Array of Items for Which Search Criteria Are Specified

The following example specifies an array that contains the IP Address or Device Name of the items for which a real-time status is required.

```

23. <SelectItems href="#id2" />Name or IP</tns:CmSelectionCriteria
24. <soapenc:Array id="id2" soapenc:arrayType="tns:SelectedItem[2]">
25. <Item href="#id3"/><Item xsi:null="1"/>
26. </soapenc:Array>
27. <tns:SelectedItem id="id3" xsi:type="tns:SelectedItem">
28. <Item xsi:type="xsd:string"/></tns:SelectedItem>
29. </soap:Body>
30. </soap:Envelope>

```

Response Format

The Response follows the following schema and contains information for one to many servers for each server and contains a sequence of search information that is found on the search criteria.

```
<complexType name='SelectCmDeviceResult'>
  <sequence>
    <element name='TotalDevicesFound' type='xsd:unsignedInt' />
    <element name='CmNodes' type='tns:CmNodes' />
  </sequence>
</complexType>
```

CMNodes provides a list of CMNodes that are given in search criteria.

```
<complexType name='CmNodes'>
  <complexContent>
    <restriction base='SOAP-ENC:Array'>
      <sequence>
        <element name='CmNode' type='tns:CmNode' minOccurs='0' maxOccurs='unbounded' />
      </sequence>
    </restriction>
  </complexContent>
</complexType>
```

Each CMNode contains a sequence of devices and their registration status.

```
<complexType name='CmNode'>
  <sequence>
    <element name='ReturnCode' type='tns:RisReturnCode' />
    <element name='Name' type='xsd:string' />
    <element name='NoChange' type='xsd:boolean' />
    <element name='CmDevices' type='tns:CmDevices' />
  </sequence>
</complexType>

<complexType name='CmDevices'>
  <complexContent>
    <restriction base='SOAP-ENC:Array'>
      <sequence>
        <element name='CmDevice' type='tns:CmDevice' minOccurs='0' maxOccurs='200' />
      </sequence>
    </restriction>
  </complexContent>
</complexType>
```

The CMDevice information contains the following information:

```
<complexType name='CmDevice'>
  <sequence>
    <element name='Name' type='xsd:string' />
    <element name='IpAddress' type='xsd:string' />
    <element name='DirNumber' type='xsd:string' />
    <element name='Class' type='tns:DeviceClass' />
    <element name='Model' type='xsd:unsignedInt' />
    <element name='Product' type='xsd:unsignedInt' />
    <element name='BoxProduct' type='xsd:unsignedInt' />
    <element name='Httpd' type='tns:CmDevHttpd' />
    <element name='RegistrationAttempts' type='xsd:unsignedInt' />
    <element name='IsCtiControllable' type='xsd:boolean' />
    <element name='LoginUserId' type='xsd:string' />
    <element name='Status' type='tns:CmDevRegStat' />
    <element name='StatusReason' type='xsd:unsignedInt' />
    <element name='PerfMonObject' type='xsd:unsignedInt' />
    <element name='DChannel' type='xsd:unsignedInt' />
    <element name='Description' type='xsd:string' />
```

```

<element name='H323Trunk' type='tns:H323Trunk' />
<element name='TimeStamp' type='xsd:unsignedInt' />
</sequence>
</complexType>

```

Choosing CTI Real-Time Information

Request Format

SOAP Action

This operation allows client to perform a CTI manager-related query.

The HTTP header should have following SOAP action:

SOAPAction: http://schemas.cisco.com/ast/soap/action/#RisPort#SelectCtiItems

Envelope Information

The query information should have an Envelope as follows:

```

1.  ?xml version="1.0" encoding="utf-8"?>
2.  <soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
3.  xmlns:tns="http://schemas.cisco.com/ast/soap/"
4.  xmlns:types="http://schemas.cisco.com/ast/soap/encodedTypes"
5.  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
6.  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

```

Session ID

This example shows a SOAP header that contains a session ID. The client sets a unique session ID.

```

7.  <soap:Header>
8.  <tns:AstHeader id="id1">
9.  <SessionId xsi:type="xsd:string">jSessionId</SessionId>
10. </tns:AstHeader>
11. </soap:Header>
12.
13. <soap:Body soap:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
14. <tns:SelectCtiItem><StateInfo xsi:type="xsd:string" /><CtiSelectionCriteria
    href="#id1" /></tns:SelectCtiItem>
15. <tns:CtiSelectionCriteria id="id1" xsi:type="tns:CtiSelectionCriteria">

```

Maximum Device Information

The following example specifies the maximum number of devices that this search needs to return:

```

16. <MaxReturnedItems xsi:type="xsd:unsignedInt">10</MaxReturnedItems>

```

CTI Application/Device/Line Specification

This example specifies on which CTI manager class Line/Device/Provider a search is provided:

```

17. <CtiMgrClass xsi:type="tns:CtiMgrClass">Line</CtiMgrClass>

```

Status of CTI Item Search

The following example specifies the Status of class on which to search:

```

18. <Status xsi:type="tns:CtiStatus">Any</Status>

```

Server Name for Search

The following example specifies the server name on which the search is performed:

```

19. <NodeName xsi:type="xsd:string" />

```

Type of Search

The following example specifies the type of selection:

```
20. <SelectAppBy xsi:type="tns:CtiSelectAppBy">AppIpAddress</SelectAppBy>
```

List of Items That Needs to be Searched

The following example specifies an array for items for which the real-time status is required:

```
21. <AppItems href="#id2" />Name /IP</tns:CtiSelectionCriteria>
22. <soapenc:Array id="id2" soapenc:arrayType="tns:SelectAppItem[2]">
23. <Item href="#id3" /><Item xsi:null="1" /></soapenc:Array>
24. <tns:SelectAppItem id="id3" xsi:type="tns:SelectAppItem">
25. <AppItem xsi:type="xsd:string"/>
26. </tns:SelectAppItem>
27. </soap:Body>
28. </soap:Envelope>
```

Response format

The Response includes a sequence of CMNodes with sequences of CTI devices and lines real-time information.

```
<complexType name='CtiItem'>
<sequence>
<element name='AppId' type='xsd:string' />
<element name='ProviderName' type='xsd:string' />
<element name='UserId' type='xsd:string' />
<element name='AppIpAddr' type='xsd:string' />
<element name='AppStatus' type='tns:CtiStatus' />
<element name='AppStatusReason' type='xsd:unsignedInt' />
<element name='AppTimeStamp' type='xsd:unsignedInt' />
<element name='CtiDevice' type='tns:CtiDevice' />
<element name='CtiLine' type='tns:CtiLine' />
</sequence>
</complexType>
```

CTI Device real-time information contains the following sequence of information:

```
<complexType name='CtiDevice'>
<sequence>
<element name='AppControlsMedia' type='xsd:boolean' />
<element name='DeviceName' type='xsd:string' />
<element name='DeviceStatus' type='tns:CtiStatus' />
<element name='DeviceStatusReason' type='xsd:unsignedInt' />
<element name='DeviceTimeStamp' type='xsd:unsignedInt' />
</sequence>
</complexType>
```

CTI Line contains the following sequence of information:

```
<complexType name='CtiLine'>
<sequence>
<element name='DirNumber' type='xsd:string' />
<element name='LineStatus' type='tns:CtiStatus' />
<element name='LineStatusReason' type='xsd:unsignedInt' />
<element name='LineTimeStamp' type='xsd:unsignedInt' />
</sequence>
</complexType>
```

Interface to Get Server Names and Cluster Name

The interface to get cluster name `getServiceParameter`, interface to get configured servers in cluster `listProcessNodeByService`, and interface to get configured devices in cluster `listDeviceByNameAndClass` get defined as part of the AXL-DB WSDL file. Send your queries to API question mailer on these interfaces.

Authentication

The following sections describe the currently used authentication.

Basic

Basic authentication uses Base64 to encode and decode the credential information. Because Base64 is a two-way function, which requires no key, this protocol implements a clear-text authentication that is not secure. Basic authentication provides an advantage because it is widely implemented by many platforms, and most HTTP client agents support it. Basic authentication can be secure if encryption, such as SSL, gets used.

Secure

When you install/upgrade Cisco Unified CallManager, the HTTPS self-signed certificate, `httpscert.cer`, automatically installs on the IIS default website that hosts the Cisco Unified CallManager virtual directories.

Hypertext Transfer Protocol over Secure Sockets Layer (SSL), which secures communication between the browser client and the IIS server, uses a certificate and a public key to encrypt the data that is transferred over the internet. HTTPS also ensures that the user login password transports securely via the web. The following Cisco Unified CallManager applications support HTTPS, which ensures the identity of the server: Cisco Unified CallManager Administration, Cisco Unified CallManager Serviceability, the Cisco Unified IP Phone User Option Pages, the Bulk Administration Tool (BAT), TAPS, Cisco CDR Analysis and Reporting (CAR), Trace Collection Tool, and the Real Time Monitoring Tool.

For more information, refer to the *Cisco Unified CallManager Security Guide*, Release 4.2(3).

Authorization

Each LDAP user gets checked against an MLA configuration for permissions. If the LDAP user in basic authentication does not have permission to "Read and Execute," access to SOAP APIs gets denied.

Rate Control

The AXL-Serviceability Interface includes a request rate control mechanism that monitors the request rates for the complete system. If the request rate is more than supported, a "SOAP Fault" gets sent to the client, and the request gets blocked. Requests rates get tracked for the system. This rate control gets

enabled for "Real-time Data requests" and "Perfmon Data Requests." These rates get controlled through "Enterprise parameters" as shown in Figure 1. The system provides Help for these parameter configurations as shown in Figure 2.

Figure 1 *Rate Control Enterprise Parameters*

Parameter Name	Parameter Value	Suggested Value
Allowed Performance Queries Per Minute*	50	50
Allowed Device Queries Per Minute*	15	15
Performance Queue Limit*	100	100
Maximum Performance Counters Per Session*	100	100

* indicates required item
[Click for more information.](#)

Figure 2 *Help for Rate Control Parameters*

CCM Web Services Parameters

Allowed Performance Queries Per Minute : This parameter specifies the maximum number of AVVID XML Layer (AXL) performance counter queries that are allowed per minute for the system. Clients such as Voice Health Monitoring and Gateway Statistic Utility (GSU) will receive a slow response if applications send more queries than the limit imposed by this parameter. This is a required field. Default: 50. Minimum: 1. Maximum: 80.

Allowed Device Queries Per Minute : This parameter specifies the maximum number of AVVID XML Layer (AXL) Device queries that are allowed per minute for the system. Clients such as Voice Health Monitoring and Gateway Statistic Utility (GSU) will receive a slow response if applications send more queries than the limit imposed by this parameter. This is a required field. Default: 15. Minimum: 1. Maximum: 18.

Performance Queue Limit : This parameter controls the queue size that handles performance counter queries. If the queue size grows more than this limit then the performance request will be dropped and a timeout message will be sent to the clients. This is a required field. Default: 100. Minimum: 20. Maximum: 1000.

Maximum Performance Counters Per Session : This parameter specifies the maximum number of performance counters that are allowed in a session-based request. This is a required field. Default: 100. Minimum: 20. Maximum: 1000.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

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http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

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Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

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Cisco Technical Support Website

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<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

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<http://www.cisco.com/packet>
- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:
<http://www.cisco.com/go/iqmagazine>
- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
<http://www.cisco.com/ipj>
- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>

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