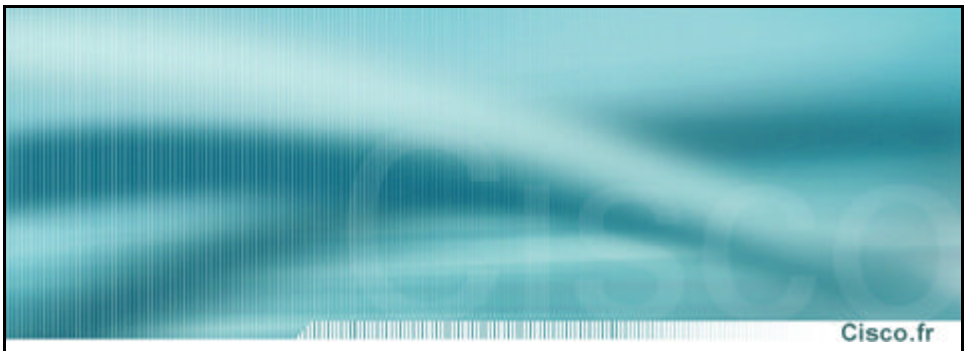

AXL SOAP API

AVVID-XML-Layer for CallManager Provisioning

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Objectives

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- AXL overview – Capabilities and applications
- Review AXL request types
- AXL implementation – HTTP/SOAP, errors, etc.

What is the AXL API?

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- AVVID-XML-Layer – Provides access for discovery and provisioning of CallManager configuration data
- XML over HTTP – Via IIS on CallManager
- The AXL API is an ISAPI Extension (dll).
- It is accessed over HTTP just like accessing a CGI program.

Who will use the AXL API?

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AXL enabled application possibilities:

- Management/monitoring tools – Discover CallManager devices/configuration
- CTI application installation – Automatic CTI application configuration
- CallManager provisioning – Automated user/phone/gateway management tools
- Property Management/Hospitality – Modify individual phone dial-plans automatically based on check-in/check-out

System Requirements

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- **Server-side: AXL is installed by default with CallManager. POST to** http://<CCMaddress>/CCMApi/AXL/V1/soapisapi.dll
- **Client-side: No system requirements! Just be able to send/receive XML over HTTP**

The HTTP Transport

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- **Provides a cross-platform protocol for sending requests and receiving responses.**
- **Security over HTTP is readily available (SSL, etc.)**

HTTP Transport Protocol

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- **Required HTTP Request headers:**

```
POST /CCMApi/AXL/V1/soapisapi.dll
content-type: text/xml
Authorization: Basic <a Base64 string>
content-length: <a positive integer>
```


HTTP POST Method

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- **The POST method is the only method allowed by the AXL API.**
- **All other method types are rejected and a HTTP 405 error is returned.**

Content-Type

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- The Content-Type header field must be present and set to “text/xml”.
- All other content types are rejected and a HTTP 415 error is returned.
- The client sending the request should expect the content-type of the response to be “text/xml” as well.

Content-length

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- This is the length (in bytes) of the AXL request.
- Currently, the content-length cannot exceed 40 kilobytes. If a request is received which is greater than 40 kilobytes, then a HTTP 413 error message is returned.

Authentication

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- The header must include the Authorization field, which specifies the authentication type (Basic) and the Base64 encoding of the user id and password.
- The credentials are validated by the IIS web server security mechanism. By default only Windows Administrators have access

Security - Authentication

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- User Authentication is handled by the HTTP Authentication header.
- The user id and password are joined by the ":" character, then encoded in Base64.
- For example, if the user id is "joe" and the password is "cisco", then the Authentication field would appear as:

```
Authentication: Basic am9lOmNpc2Nv
```

Security – Authentication (cont.)

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- If the user fails to authenticate, then a HTTP 401 Access Denied error is returned.

Security – Data Encryption

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- HTTP sends data to the AXL API in plain text.
- For secure communication, the client must use SSL to encrypt the request, then send to the server using the “https://” protocol.
- The server will then send the response via SSL as well.

Example HTTP Header

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- The following is an example HTTP header that could be used to access the AXL API.

```
POST /CCMApi/AXL/V1/soapisapi.dll
Host: jporche-w2k:80
Accept: text/xml
Authorization: Basic
bGFycnk6Y3VybHkgYW5kIG1vZQ==
Content-type: text/xml
Content-length: 613
```


Example AXL request

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- Example of a “getPhone” request. The HTTP Header and SOAP Elements have been omitted for clarity.

```
<axl:getPhone
xmlns="http://www.cisco.com/AXL/1.0"
xsi:schemaLocation="http://www.cisco.com/AXL/1.0
http://gkar.cisco.com/CCMApi/AXL/V1/axlsoap.xsd"
>
  <phoneName>SEP00112233445566</phoneName>
</axl>
```

Example AXL response

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- **Example of a “getPhone” response.**

```
<axl:getPhoneResponse
xmlns="http://www.cisco.com/AXL/1.0"
xsi:schemaLocation="http://www.cisco.com/AXL/1
.0
http://gkar.cisco.com/CCMApi/AXL/V1/axlsoap.xs
d">
  <device xsi:type="XIPPhone">
          <!-- response content -->
  </device>
</axl>
```


Example AXL request (with SOAP)

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- **A complete AXL request with SOAP envelope.**

```
<SOAP-ENV:Envelope xmlns:SOAP-
ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
   <SOAP-ENV:Body>
      <axl:getPhone
xmlns:axl="http://www.cisco.com/AXL/1.0"
xsi:schemaLocation="http://www.cisco.com/AXL/1.0
http://gkar.cisco.com/schema/axlsoap.xsd" sequence="1234">
         <phoneName>SEP000000050002</phoneName>
      </axl:getPhone>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

AXL API Methods

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- **Users of the AXL API will be able to perform ADD, UPDATE, REMOVE, and GET methods on the following:**

- Phones/Gateways/MGCP/Voicemail/DNs/CTI RPs
- Locations/Regions
- Users
- Device Profiles
- Device Pools/Device Profiles
- Dial Plans/Dial Plan Tags
- System Methods/Service Parameters
- Route Partitions/Translation Patterns/Digit Discard Instructions/Route Lists/Route Groups/Route Filters
- CallManager/ CallManager Groups
- Call Park/Call Pickup Groups/ Calling Search Spaces

AXL API Methods

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- **Users will also be able to carry out a LIST method on most of the entities discussed in the previous slide.**
- **AXL also provides the following miscellaneous methods:**
  - doDeviceLogin
  - doDeviceLogout
  - doDeviceReset
  - createAutogeneratedProfile
  - getNumDevices

WSDL

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- WSDL (Web Service Description Language) document provided with AXL
- WSDL is a standardized language used by many tools on the market to automatically generate code to use a web service.
- The AXL WSDL lists all available AXL methods and their parameters.

The <error> Element (cont.)

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- Error Codes
  - Codes below 5000 directly correspond to DBL (Cisco Database Layer) Exception codes.
  - Codes 5000 and above are AXL errors.
  - Specific error information can be found in the AXL API documentation.

When Errors Occur

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1. Check the HTTP response code.
2. If HTTP response is 200 OK, then check for a SOAP-FAULT within the XML.
3. If no SOAP-FAULT, check for an <error> element within the XML.

HTTP Response Codes

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- The following is a sub-set of the possible HTTP Response codes.
  - 200 OK: The Request was successfully delivered over HTTP and handled by the AXL API (though not necessarily successfully handled by the AXL API).
  - 413 Request Entity Too Large: If the content length of the AXL Request exceeds 40 kilobytes.
  - 415 Unsupported Media Type: If the content-type header is not “text/xml”.
  - 405 Method Not Allowed: If the request method is any method other than POST.

The SOAP Elements

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- Simple Object Access Protocol
- An industry-standard Remote Procedure Call (RPC) protocol using XML.

The SOAP Elements (cont.)

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- The Header is optional but the Body is required.
- The real “meat” of the AXL request is represented inside the Body element.
- Typically SOAP Envelopes are used to declare XML namespaces.

Example SOAP Message

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- **Example SOAP Envelope with SOAP Body.**

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
   <SOAP-ENV:Body>
      <axl:getPhone>
       </axl>
   </SOAP-ENV:Body>

</SOAP-ENV:Envelope>
```


AXL Errors

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- **As stated earlier, if an error occurs while AXL is handling the request, then an <error> element is returned inside a SOAP-FAULT. The AXL defined errors are:**
  - **5000 Unknown Error: Caused by unknown errors occurring on the server.**
  - **5001 Parse Error: This error occurs if an error occurred while parsing the XML request.**
  - **5002 Unknown Request Error: Occurs if the user agent submits a request method that is unknown to AXL.**
  - **5003 Invalid Value Exception: Occurs if an invalid value is detected within the XML request.**
  - **5005 Unexpected Node Exception: The errors are cause by malformed requests that do not adhere to the AXL Schema definition.**

SOAP-FAULT Element

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- **If an error occurs before the AXL API can begin handling the Request, then a SOAP-FAULT is returned.**
  - **The SOAP-FAULT element is the first child of the SOAP-BODY, taking the place of the AXL request element or <error> element.**
  - **A SOAP-FAULT is usually returned because an error was detected in the XML while parsing.**
  - **A SOAP-FAULT is also returned when an unknown error occurs on the server.**

Example AXL error (with SOAP)

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```
<SOAP-ENV:Envelope  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/" SOAP-
    ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
            <SOAP-ENV:Body>
               <SOAP-ENV:Fault>
                  <faultcode>SOAP-ENV:Client</faultcode>
                  <faultstring>Item not valid: The specified phone was not found.</faultstring>
                  <detail  xmlns:axl="http://www.cisco.com/AXL/1.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
         instance" xsi:schemaLocation="http://www.cisco.com/AXL/1.0 http://sw081a-cm1/CCMApi/AXL/V1/axlsoap.xsd">
                     <error sequence="1234">
                        <code>2</code>
                        <message> <![CDATA[Item not valid: The specified phone was not found.]]>
                        </message>
                        <request>getPhone</request>
                     </error>
                  </detail>
               </SOAP-ENV:Fault>
            </SOAP-ENV:Body>
         </SOAP-ENV:Envelope>
```

AXL Request/Response Logging

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- AXL will log every request to the local disk: C:\Program Files\Cisco\Trace\AXL
  - Time that the request was received.
  - Request ID number.
  - Request contents.
  - Response contents
- Number of log files is limited to 50.
- Once a log file is over 1 MB, the next request will be logged in a new file.
- Restarting the WWW Service will cause log files to reset. So any new requests will begin to over-write the old log files.

IIS Error Logs

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- You can always check the IIS Error Logs for more information.

AXL: Beta/Controlled Release Status

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- Presently in Beta stage
- Expected to be a “controlled-release” for CallManager version 3.3(3)
- Throttling mechanism introduced: limits Add/Update/Remove/List requests to 30-60 per minute – controls call processing impact

Summary

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- The AXL API provides a cross-platform solution for accessing and provisioning CallManager configuration data
- Uses simple HTTP for request/response protocol.
- Authentication handled by web server, support for encryption with SSL.