Location Services API Programming Reference Guide

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Videoscape Location Services Users Guide

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Preface

Audience

This guide is intended to be used by System Administrators and Service Providers.

About This Guide

This guide contains instructions for the use of the Videoscape Location Service application. Specifically described is the Application Programming Interface that allows Service Providers to determine various information about the locations of device, subscribers, or server based information on devices, subscribers, or server identifiers.

Document Organization

This document is organized into the following chapters:

Chapter/Appendix	Description
Chapter 1 - Videoscape Location Services Application Overview	Provides a product overview for Videoscape Location Services application.
Chapter 2 - Application Programming Interface for the Videoscape Location Service Application	Provides all API information, as it pertains to the Videoscape Location Services application.
Appendix A - Zone Import File Format Example	Provides an example of the format used in the Zone Import File.

Document Conventions

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination **^D** or **Ctrl-D** means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
bold font	Commands and keywords and user-entered text appear in **bold** font.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
`Courier font`	Terminal sessions and information the system displays appear in `courier` font.
`Bold Courier font`	Bold Courier font indicates text that the user must enter.
[x]	Elements in square brackets are optional.
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
|	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
[x | y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
{x | y}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.

Convention	Description
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Reader Alert Conventions

This document uses the following conventions for reader alerts:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Tip Means *the following information will help you solve a problem.*

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Timesaver Means *the described action saves time.* You can save time by performing the action described in the paragraph.

Warning **Means *reader be warned.* In this situation, you might perform an action that could result in bodily injury.**

Definitions and Acronyms

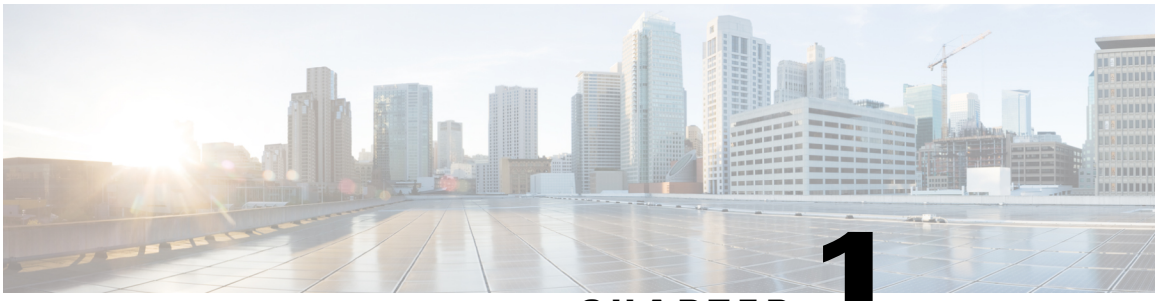
This section provides the definitions and acronyms that are used throughout this guide.

Document Definitions

Definition	Description
Civic Location	Country, Province, City, and so on.
Geodetic Location	Latitude and Longitude
LS Client	Location Service Client - Any Videoscape component or service that invokes the Location Service.

Document Acronyms

Definition	Description
ASN	Autonomous System Numbers
BSG	Broadcast Service Group
CPE	Consumer Premise Equipment
CIDR	Classless Inter-Domain Routing
CMTS	Cable Modem Termination System
CSV	Comma Separated Value (File)
DTA	Digital Transport Adapter
EAS	Emergency Alert System
EC	Explorer Controller
ECS	Explorer Control System
FIPS	Federal Information Processing Standards (US)
LS	Location Service
OOBB	Out of Band Bridge
QPSK	Quadrature Phase-Shift Keying
SGC	Standard Geographical Classification (Canada)
SP	Service Provider



CHAPTER 1

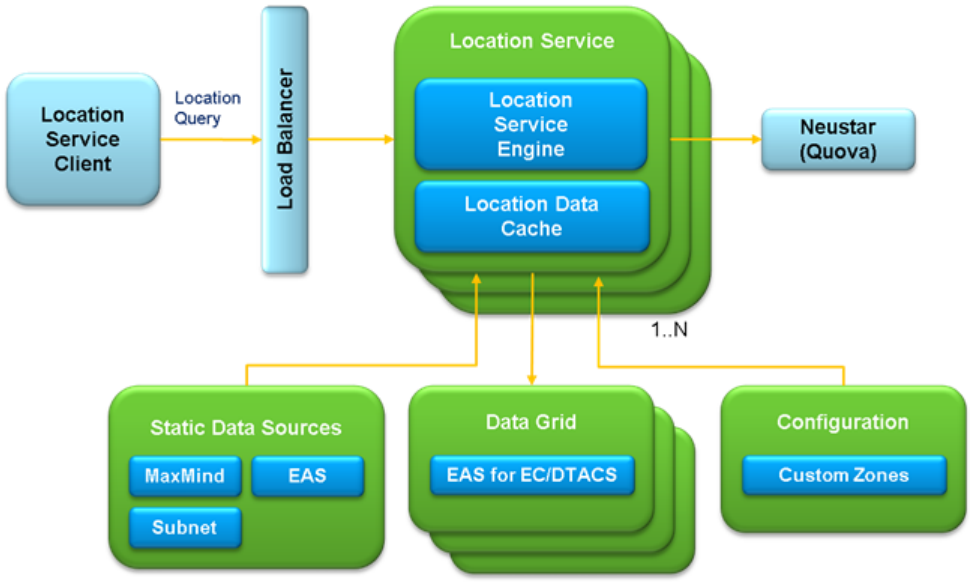
Videoscape Location Services Application Overview

Videoscape Location Services Overview

The Location Service is a horizontally scalable and redundant service capable of providing geodetic, civic, and network access data based on IP subnet data queried and loaded into its databases. It should be noted that the network access data specifically identifies edge network elements of the access network infrastructure. Such elements have geodetic and/or civic and/or network access metadata associated.

The Location Service also supports other types of location information. This information includes Emergency Alert System (EAS) information and application specific Zone definitions.

The following figure illustrates the detailed architecture of the Cisco Location Service.



The Location Service Engine is responsible for handling location service requests from Client applications (identified as Location Service Client). The request from the Location Service Client routes through a load balancer to an available Location Service VM instance.

The Location Service obtains its data through either static configuration or push/pull based interfaces to 3rd party data sources. Static data sources include the MaxMind geolocation data, network subnet data, EAS data, and application specific Zone data. Pull-based interface data sources include Neustar (fka Quova) geolocation data. The Location Service supports push-based data for the EAS data associated with Explorer Controllers (EC) and DTA Control Suite (DTACS). The Location Service stores push-based data inside a data grid so that the data is available to all LS instances.

In order to maximize performance, the Location Service caches the location data in a memory based cache called the Location Data Cache. The Location Service Engine never queries static data directly in order to fulfill a location request. Instead, it always uses the data cached in memory for performance and scalability purposes. For pull based interfaces, if the data is not currently in the Location Data Cache, the Location Service Engine uses the interface to pull the location data from the data source. For data stored in the data grid, the Location Service leverages the caching capabilities of the data grid to achieve performance.

Unlike the MaxMind geolocation data set, Neustar provides its data as an external service. Neustar provides both a Java Client and web service interface. The Location Service currently uses the Java Client to call the Neustar service to obtain the geolocation data.

Location Service API Overview

The Location Service API is a pull based API, where the Location Service Client queries the Location Service each time it needs to retrieve the Target location. This data may be cached by the LS Client if specified in the Location Service response. Although multiple sources of location data may exist (that is, both Neustar and MaxMind provide 3rd party geolocation data), typically only one 3rd party geolocation data source is available to the Location Service in a given deployment.

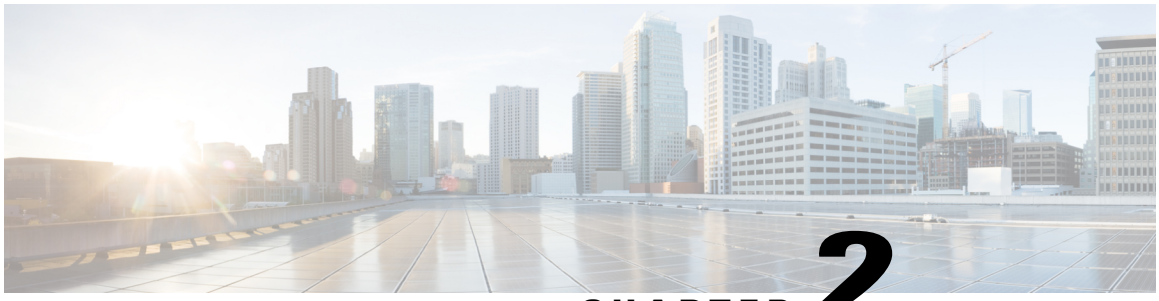
The Location Service Client request must specify the Target IP address in its location query. The Location Service Engine determines the geodetic, civic, and network access data based on the supplied Target IP address. The Location Service searches all data sources in the order specified below. Note that once a match is found, the Location Service terminates its search and returns the matching data. The exception is the Service Provider subnet data, as specified below:

1. Search Location Data Cache for a match against the Service Provider subnet data. If location data is not included with the Service Provider subnet data, the Location Service continues searching 3rd party geolocation sources for location data, but uses Network data from Service Provider subnet data
2. Search the Location Data Cache for a match against the MaxMind subnet data or call the external Neustar service to obtain geolocation data, depending on the data source configuration.
3.

An operator may specify application specific zone information. The zone data provides a method to aggregate locations into logical regions that are application to a specific application. For example, one application may be advertising. Another might be peering networks. The Location Service can return the matching zones when performing a location lookup so that the data is available to the LS Client.

The Location Service supports Emergency Alert System (EAS) data. EAS support comes in two flavors: static data mapping geolocation to EAS code or operator configured data mapping EC downstream plant or DTACS multicast information to EAS codes. For the static geolocation mapping, the LS Client specifies a geolocation and the LS returns a set of EAS codes associated with that region. For the EC/DTACS EAS data, the LS Client

specifies an EAS code and the LS returns the EC downstream plants and DTACS multicasts associated with the EAS code.



CHAPTER 2

Application Programming Interface for the Videoscape Location Service

Core Data Services

The Core Data Services include the following:

- Service Provide Subnet Data
- MaxMind Data
- Geolocation Data

Service Provider Subnet Data

The Service Provider (SP) may manage one or more networks that provide "last mile" delivery to the subscriber. When a subscriber uses one of these networks to access content, access is described as "on the SP network" or "on net".

The Videoscape Location Service provides a method to load SP Subnet Data, which specifies the mapping of a set of subnets to each network type managed by the SP. By looking up a TARGET IP address, the LS determines which SP network the subscriber is accessing, if any. For example, an SP may provide Cable/DOCSIS access and LTE access. The SP supplies the subnets that are managed on each network. When a CPE accesses content, the LS uses the IP address of the CPE to determine if it matches one of the supplied IP addresses. If so, it returns the network identifier. Otherwise, it indicates that the CPE is off net.

In addition to identifying the network associated with the subnet data, the SP may also supply civic and geodetic information. Typically, the SP has more accurate location information than the 3rd party geolocation databases. By providing this information to the Location Service, the SP is able to accurately indicate the location of the TARGET. For example, an SP knows which subnets are assigned to each CMTS. The SP also knows the regions serviced by each CMTS. The SP obtains the civic location data (e.g. city, state, country) and an approximate geodetic location of the region serviced by each CMTS. The SP encodes this location in

the data loaded into the SP Subnet Data. Given an IP address, the LS can determine the association of subnet to CMTS and thus to service region.

The LS uses two data sources (SP Subnet and SP Location) to define the SP Subnet Data and the associated Location. These data sources are formatted as comma separated value (CSV) files.

Service Provider Subnet Data File

The SP Subnet Data File specifies the list of subnets assigned to each SP network. At a minimum, the subnet and "on net" name must be supplied. Each unique network managed by the SP must be identified by a unique name. This name is returned by the Videoscape Location Service, as the "on net" identifier. Optionally, the Location Name and ASN may be supplied.

The following is an example of the CSV file field structure:

```
Subnet,Location_Name,OnNetName,ASN
```

The following table describes the fields contained in the previous structure.

Field	Type	Required	Description
SubNet	String	R	Subnet of the device using Classless Inter-Domain Routing (CIDR) notation. For example: `198.51.100.0/22`
LocationName	String	R	Name of the location of the subnet. This references an entry in the SP Location Data File. Note that although a value must be provided, if the SP does not supply the SP Location Data File, this field is ignored.
OnNetName	String	R	Name of the "on net" network. For example, one service provider may specify "MOBILE" and "DOCSIS", another may only have a single "on net" network and may specify "FIXED". The naming convention used is created by the SP.
ASN	Integer	O	The Autonomous System Number (ASN) identifies the network operator, such as an ISP.

* R - required field, O - optional field

Subnet Data Examples:

```
198.51.100.0/22,PA_Lansdale,DOCSIS,6161
192.51.108.0/22,PA_NorthWales,DOCSIS,6161
192.51.112.0/22,PA_Hatfield,DOCSIS,6161
```

Service Provider Location Data File

The SP Location Data File is an optional file that maps the locations specified in the SP Subnet Data File to civic and geodetic locations. The civic locations specify named regions, such as city, state, metro code, and country. The geodetic location data is the latitude and longitude of the centroid of the civic region.

The following is an example of the CSV file field structure:

```
LocationName,Latitude,Longitude,City,State/Province,MetroCode,CountryCode,Timezone
```

The following table describes the fields contained in the previous structure.

Field	Type	Required	Description
LocationName	String	R	Unique name of the location. Zero of more subnet entries may reference this location name.
Latitude	Float	R	Latitude, in degrees of the centroid of the service region.
Longitude	Float	R	Longitude, in degrees of the centroid of the service region.
City	String	R	Name of the city associated with the location.
State/Province	String	R	State or province in which the city is located.
MetroCode	Integer	O	Metro code assigned to the service region.
CountryCode	String	R	Two character country code based on ISO 3166.
Timezone	String	O	Time zone information (for example, EST, PDT, -4, -8, and so on)

* R - required field, O - optional field

Location Data Examples:

```
PA_Lansdale,40.2414,-75.2842,Lansdale,PA,504,US,EST
PA_NorthWales,40.2108,-75.2786,North Wales,PA,504,US,EST
PA_Hatfield,40.2797,-75.2997,Hatfield,PA,504,US,EST
```

From the previous examples, a request from CPE 192.51.108.34 refers to the location PA_NorthWales. The LS would return civic and geodetic data associated with this location from the above example.

Custom Zone Definitions

The Location Service allows a Service or Content Provider to define their own application specific zones. These zones may have different purposes, such as advertising, blackouts, and so on. The logical grouping of a set of zones for a specific application, for a specific provider, is called a Zone Group. Each provider may define zero or more zone groups. Each zone group has a unique name for that provider. The combination of Provider and Zone Group names creates a globally unique namespace for the Zone Group.

Each zone group is composed of a set of zones. A zone is a region, within which all CPEs or subscribers have a common set of application specific attributes. A zone can be constructed by a list of geolocations and different types of geolocation data can be used to define a single zone.

The following is an example set of Providers, each with a multiple Zone Group definitions.

- Provider 1
  - Zone Group - Geographic Ad Zone
    - Zone 1 - PA + NJ + DE
    - Zone 2 - NY + CT
    - Zone 3 - and so on.
  - Zone Group - Political Party
    - Zone 1 - zip codes whose population are 60%+ Democrat

    - Zone 2 - zip codes whose population are 60%+ Republican
    - Zone 3 - remaining zip codes
  - Zone Group - Philly Northern Suburbs Ad Zone
    - Zone 1 - city of Perkasie, city of Quakertown, zip codes for Milford Township
    - Zone 2 - city of Lansdale, zip codes for Montgomeryville
    - Zone 3 - and so on.

- Provider 2
  - Zone Group - ASN Peering Groups
    - Zone 1 - List of ASNs for Verizon
    - Zone 2 - List of ASNs for AT&T
    - Zone 3 - and so on.
  - Zone Group - DMAs
    - Zone 1 - Philly DMA
    - Zone 2 - Boston DMA
    - Zone 3 - and so on.

When performing a geolocation lookup, the LS Client may choose to obtain zone information for a specific zone group or for all zone groups. When the LS receives the geolocation request, it locates all zones in the selected Zone Group (or all Zone Groups) which match the TARGET location. The LS Client can use the returned zone information to apply policy.

Assigning a Namespace to a Zone Group

A provider may have multiple applications or profiles that it wants to apply, and thus may define multiple Zone Groups. The provider must assign a unique name to each Zone Group. Note that the name only needs to be unique for that provider. The combination of unique provider name and unique Zone Group name (within a provider) define a unique namespace for a Zone Group.

A namespace is created by concatenating the provider name, a period, and the Zone Group name:

```
provider_name.zone_group_name
```

For example:

```
cisco.ad_campaign_3
```

Note that since a period is used to define the namespace, a period is an invalid character for the provider name and Zone Group name.

Assigning Classifiers to a Zone Group

A Classifier is an identifier used to associate an application specific zone lookup with a specific zone group. For example, the LS Client may not have access to the namespace but instead has access to some type of

identifier associated with the zone group. Each zone group may be assigned a set of Classifiers. A Classifier can be specified by the LS Client, allowing the Videoscape LS to find the zone group associated with that Classifier, and thus find the appropriate zone group to search for matching zones.

For example, a Service Provider has a white label CDN, and content providers use that CDN to deliver their content. A Service Broker, which has CDN selection rules, receives a content request from a CPE for a particular content URL. The CDN Selection rules may reference zone groups defined for their respective content providers. However, the Service Broker has no method to associate a content URL with a Zone Group Namespace, and thus, cannot specify the namespace to the LS. Instead, when defining the zone groups, the domain of the content URL is used as a Classifier. Once specified, the Service Broker passes in the domain of the URL it receives, which the LS uses to identify the zone group in order for it to return the correct zone information to the Service Broker.

A classifier may be a simple string or it may be a regex expression. Simple strings must match (case insensitive) the classifier string specified in the geolocation query.

Since the classifier is meant to identify a Zone Group across multiple providers, the classifier value must be a unique string across all Zone Group definitions. Duplicate Classifier values will be rejected. Thus, the Location Service accepts the first instance of that Classifier that it finds and ignores the duplicate values on subsequent Zone Group definitions. Note that it is possible to create different regex expressions that generate the same results. The Location Service cannot statically detect this condition. Therefore, the first matching Zone Group is used at run time

Creating Zones for a Zone Group

Each Zone Group is composed of one or more geographic regions called Zones. These zones have relevance only to the zone group in which they reside. Thus, the zones defined for one zone group do not impact any other zone group. The zones within a zone group are each assigned a name that is unique within that zone group. Note that a zone name may be duplicated in different zone groups.

A Zone is defined by a set of one or more location elements. The location could be a DMA, zip code, country code, and so on. Different location types may be specified for a given zone. Thus, a zone may be defined by a particular DMA plus five different zip-codes. The following is a list of location types that can be used to define a zone:

- OnNetName
- CountryCode
- State
- City
- MetroCode
- ASN
- PostalCode
- Subnet

With a couple of exceptions, these names correspond to the Videoscape LS "Get Location" API response. The PostalCode represents the Postal Code or Zip Code of a TARGET IP address. The subnet can be any subnet value defined using the Classless Inter-Domain Routing (CIDR) notation.

Note that even though the zone definition is flexible, the geolocation data available to the LS may only have a subset of the above location types available. For example, if using 3rd party geolocation source, if the Service

Provider does not choose the data source option that includes a postal code, then any zone defined using postal codes would never match a TARGET location.

The LS does not enforce any constraints on the region definition of a Zone. Thus, zones may overlap even within a zone group. Zones may also be disjoint, specifying only a subset of the coverage area.

TARGET Location Zone Matching

When a Location Service Client queries the Location Service for the TARGET location, the client can request matching Zone information in the response. The LS Client must specify either the zone namespace, zone classifier value, or request all zone groups.

The Location Service determines the candidate Zone Groups to search, based on the LS Client request. If the request specified a zone namespace, the candidate Zone Group list contains either the Zone Group matching the namespace or no Zone Groups (in case there is no namespace match). If the request specified a Classifier, the Location Service compares the specified Classifier with all Zone Group Classifiers (either a case insensitive compare or regex compare). The first matching Zone Group is added to the candidate list. If the request specifies all zone groups, then all zone groups are added to the candidate list.

The Location Service determines the location of the TARGET based on the TARGET IP address. Thie location includes geolocation, civic, and network location. The Location Service then searches through the Zone definitions from Zone Groups in the candidate list to find all Zones that match the TARGET location. If the TARGET location matches ANY of the location parameters defined for a Zone, that Zone is considered a match.

When a LS Client queries the LS for the TARGET location, the LS optionally returns the matching zone information. The LS determines the location of the TARGET based on the TARGET IP address, and then searches the zone definitions to find all zones that match the TARGET location. If the TARGET location matches any of the location parameters defined for a zone, that zone is considered a match. Thus, the zone definition is treated as a union of the locations that comprise that zone. If the TARGET location intersects that zone at any point, the TARGET is considered within that zone and thus the zone is a match. Thus, the Zone definition is treated as a union of the locations that comprise that Zone. If the TARGET location intersects that Zone at any point, the TARGET is considered within that Zone and thus the Zone is a match

For example, if a Zone X is defined as DMA 200 and State NY, if the TARGET is either in DMA 200 or is located in the state of NY, then the TARGET is considered within Zone X.

The Location Service returns all Zone definitions that match the TARGET location from the Zone Groups in the candidate list. Thus, zero or more Zones is returned in the LS response.

Zone Import File Format

Listed below is the import file format to support providers, Zone Groups, and Zones. The service provider may use a file or the Zone API to define zones. When using a file import, the file must contain all provider, zone group and zone definitions. The Location Service does not support incremental updates when using an import.

Element: ZoneDefinitions

Children: ProviderNameList (0..N)

ZoneGroupList (0..N)

Element: ProviderNameList

Children: ProviderName (0..N)

Element: ProviderName

Children: None

Type	R/O	Description
String	R	The unique name of the provider.

Element: ZoneGroupList

Children: ZoneGroup (0..N)

Element: ZoneGroup

Children: Classifier (0..N)

Zone (0..N)

Attribute	Type	R/O	Description
Name	String	R	The unique name of the Zone Group.
Provider	String	R	The Provider that defined the Zone Group.
The Classifier includes a type attribute to identify whether it is a simple string compare or a regex expression. It also includes a data portion with the actual classifier data.			

Element: Classifier

Children: None

Attribute	Type	R/O	Description
Name	String	R	Indicates whether the Classifier is a simple string or a regex expression. Valid values include: simple | regex
	String	R	Classifier data, which is either a string to match or a regex expression.

Element: Zone

Children: OnNetName (0..N), CountryCode (0..N), State (0..N), City (0..N), MetroCode (0..N), ASN (0..N), PostalCode (0..N), Subnet (0..N)

Attribute	Type	R/O	Description
Name	String	R	A unique Zone Name within this Zone Group.

Element: OnNetName

Children: None

Type	R/O	Description

String	R	This is the "on net" network name, which is specified in the SP Subnet File. The LS source data must include SP Subnet File data in order to use this location type in the Zone definition.

Element: Country Code

Children: None

Type	R/O	Description
String	R	The two character, country code based on ISO 3166. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova) or location data in the SP Subnet File.

Element: State

Children: None

Type	R/O	Description
String	R	The abbreviation for the state or province. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova) or location data in the SP Subnet File.

Element: City

Children: None

Type	R/O	Description
String	R	The name of the city. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova) or location data in the SP Subnet File.

Element: MetroCode

Children: None

Type	R/O	Description
String	R	The metro code assigned to the city. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova) or location data in the SP Subnet File.

Element: ASN

Children: None

Type	R/O	Description

String	R	The Autonomous System Number (ASN) that identifies the network operator, such as an ISP. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova) or location data in the SP Subnet File.

Element: PostalCode

Children: None

Type	R/O	Description
String	R	The zip-code or postal code. The LS source must include either 3rd party geolocation data (for example, MaxMind, Quova).

Element: Subnet

Children: None

Type	R/O	Description
String	R	The subnet of the device using Classless Inter-Domain Routing (CIDR) notation. For example: 198.51.100.0/22

Refer to Zone Import File Format Example, on page 39 for a sample import file.

Neustar Geolocation Data

For detailed Neustar specifications, refer to the following Neustar web site:

http://extranet.quova.com

Neustar provides access to the geolocation data through an API on the Neustar GeoDirectory Server. The GeoDirectory Server runs on the following platforms:

- Microsoft Windows Server 2003
- Microsoft XP Professional, Server 2008
- Red Hat Enterprise Linux 3, 4 or 5 (including AMD 64-bit)
- Sun Solaris 8, 9 or 10 Operating Environment (SPARC processors only)

The LS communicates with the GeoDirectory Server over TCP, using a Java API.

The following table describes the data provided by the geolocation API.

Field	Example	Description
Continent	North America	Neustar supports the following continents: • Africa • Antarctica • Asia • Australia • Europe • North America • South America
Country	US	Neustar supplies the country of origin for the IP address connection, identified using the International Standard Organization (ISO) two letter country codes defined in ISO-3166.
Country CF	99	The Country Confidence Factor (CF) is a number from 0-99 that provides an indication of the likelihood that the user is in the same country that is assigned to the IP address. The higher the number, the more the evidence points to the user being in the same location as the IP address.
Region	Mid Atlantic	The region includes generic regional information (for example, Northwest) and some country-specific regions (for example, Northern Ireland). Region information is currently available for the following: • US • UK • Brazil • Denmark • France • Philippines
State	PA	Neustar provides information for States and Provinces (that is, the first level administration division) in all countries where they exist.
State CF	99	The State Confidence Factor (CF) is a number from 0-99 that provides an indication of the likelihood that the user is in the same state that is assigned to the IP address. The higher the number, the more likely the user being in the same location as the IP address.
City	Philadelphia	Neustar locates users to their individual cites and recognizes over 95,000 distinct international locations.
City CF	80	The City Confidence Factor (CF) is a number from 0-99 that provides an indication of the likelihood that the user is in the same city that is assigned to the IP address. The higher the number, the more the evidence points to the user being in the same location as the IP address.

Field	Example	Description
DMA	504	Designated Market Areas (DMAs) are groupings of United States counties that are reached by a specific groups of television stations, as specified by Nielsen Media Research. DMAs are often used by advertisers to segregate and target specific areas of the country. There are 210 DMAs in the United States.
MSA	37980	Metropolitan and Micropolitan Statistical Areas (MSAs) are geographical boundaries of United States counties or towns, as defined by the United States Office of Management and Budget (OMB) from data gathered by the United States Census Bureau. The OMB defines the combination of Metropolitan and Micropolitan Statistical areas as Core Based Statistical Areas (CBSAs). There is extensive demographic information available for these areas, and Neustar provides these to help customers understand the demographics of their populations. There are currently approximately 1000 CBSAs covering approximately 93% of the United States population.
Carrier	Airband Communications Inc.	The Carrier field provides the name of the organization that owns the Autonomous System Number (ASN). This field provides a more readable representation of information than the information provided in the ASN field.
ASN	18990	The ASN is a globally unique number assigned to a group of networks administered by a single entity such as an ISP or very large organization. Using the ASN provides more consistency than using an ISP name because while ISP names and ownerships change, ASNs remain static.
Connection Type	Fixed Wireless	Users can connect to the Internet in several different ways. Neustar categorizes connections into the following types: • Dialup • Cable, DSL • Fixed Wireless • Mobile Wireless • Satellite • ISDN • Frame Relay • OCX (Optical Connections, that is fiber optics) • TX (leased lines, that is T1, T2, T3 and T4)
Connection Speed	Medium	The connection speed is based on the connection type, Neustar indicates the speed of the connection to the Internet into high, medium, or low.
Special Routing Type	No	The special routing type is an indication of what kind of Internet Routing Type (IPRT) designation Neustar has for the IP address. A Yes means that the IP address is associated with an IPRT that suggests the user could be in a different location than the IP address. For example, an IPRT of "regional proxy" indicates that the user could be anywhere in the country, so the Special Routing Type is Yes.

Location Services Application Regions

The Location Services application regions include the following codes and interfaces:

- Core Location Service Interface
- Custom Zone Definitions
- Zone Definition Interface
- Emergency Alert System
- EAS Location Service Interface

Core Location Service Interface

The core LS interface uses the HTTP GET Location parameters to return LS client requested information.

Get Location - HTTP GET

The HTTP GET command returns geolocation data for the TARGET based on information from its data sources. The LS Client must specify the IP address of the TARGET.

The LS Client may optionally request the LS to return matching zone information. The LS Client must specify either the Zone Group Namespace, Zone Group Classifier, or a flag indicating the LS should search all Zone Groups.

The Location Service first searches the SP Subnet File followed by the 3rd party geolocation data in order to find the TARGET IP address. The response indicates whether or not the location data was found. Future versions of this interface may indicate whether the search is in progress (such as for a mobile location lookup).

If the location is available, the location data specifies a combination of civic, geodetic, and network location data. The network location is only “on net” if SP Subnet Data has been provided. If the TARGET is “on net”, the Location Service returns the OnNetName specified in the SP Subnet Data. Otherwise, the Location Service returns the value as “OFFNET”.

If the LS Client requested Zone data, and matching Zones were found, the LS returns the list of matching Zones in the response.

The response data may be cached by the LS Client if the response includes the HTTP header Cache-Control: max-age. This value indicates the maximum duration, in seconds, that the LS Client can cache the results.

Format

```
http://<hostname>/loc/ipvideo/Location?<name>=<value>&...
```

Request

The following table provides a list of query parameters:

Query Parameters	Type	R/O	Description
IpAddress	String	R	IP address of the TARGET.
ZoneNamespace	String	O	Namespace of the desired Zone Group.

Query Parameters	Type	R/O	Description
ZoneClassifier	String	O	Classifier associated with a Zone Group definition.
AllZoneGroups	Boolean	O	Flag requesting the LS to return all matching Zone information from all Zone Groups. By default, this value is false.

Request Example

```
GET /loc/ipvideo/Location?IpAddress=64.102.249.8 HTTP/1.1
GET /loc/ipvideo/Location?IpAddress=64.102.249.8&
 ZoneNamespace=cisco.adzone3 HTTP/1.1
```

Request Response - Codes

The following is a list request responses:

- 200 - OK
- 400 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data with the location information. The root element is *Location*, as shown below.

The Location Service returns a 404 Not Found if the specified TARGET IP address is not in any of its databases.

For all other errors, the Location Service returns an appropriate HTTP status code.

Element: Location

Children: ZoneMatch (0..N)

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
onNet	String	R	Indicates whether the TARGET is on Service Provider's network. If "on net", the LS returns the OnNetName from the SP Subnet Data. Otherwise, the LS returns "OFFNET".
countryCode	String	R	Two character country code, based on ISO 3166.
state	String	O	Abbreviation for the State or Province.
city	String	O	Name of the City.
metroCode	Integer	O	Metro code assigned to the City.
msa	Integer	O	US Metropolitan Statistical Area
postalCode	String	O	Postal code or zip code associated with the city. Although many cities have more than one postal code, the geolocation data may only use a single postal code per city. For Canada, the postal code may be only the first 3 characters.
asn	Integer	O	Autonomous System Number (ASN) identifies the network operator, such as an ISP. When using MaxMind, a separate MaxMind ASN database must be loaded.

Attribute	Type	R/O	Description
ispName	String	O	ISP Name or organization owning the ASN. For MaxMind, this is only provided if ISP name data is specifically configured to be loaded into LS.
connectionType	String	O	Type of network connection. Examples include “cable” and “isdn”.
connectionSpeed	String	O	Indicates the estimated performance of the network based on the ISP and connection method. Valid values include: LOW | MEDIUM | HIGH. Configuration parameters are used to map the different network types into the speeds shown previously. This may be used for policy based decisions.
proxyServer	String	O	Specifies how the connection is routed through the internet and can be used to determine how close the user is to the public IP address. Valid values include: Private, Active, or Suspect. If a value is omitted, the default value is None.
latitude	Float	O	Latitude in degrees.
longitude	Float	O	Longitude in degrees.
locationName	String	O	Name of the location specified in the Service Provider subnet file.
ipAddressStart	String	R	Geolocation data is tracked by IP address range. Thus, all IP addresses in that range have the same geolocation data. This is the starting IP address of that range.
ipAddressEnd	String	R	Geolocation data is tracked by IP address range. Thus, all IP addresses in that range have the same geolocation data. This is the ending IP address of that range.

The following ZoneMatch element is only included if the LS Client specified the Zone Group matching criteria and if the LS determined that the TARGET was within a Zone Group that was identified in the request (or any Zone Group if all Zone Groups were requested). There is one ZoneMatch element for each matching Zone. Multiple ZoneMatch elements may have the same namespace if the Zone Group has overlapping Zones and the TARGET resides within his overlapping region.

Element:ZoneMatch

Children: None

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
namespace	String	R	Namespace of the Zone Group.
name	String	R	Name of the matching Zone, within the Zone Group identified by the namespace.

The following are example responses.

No Zones

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 225
```

```
Cache-Control: Max-Age=3600

<ns2:Location
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc"
 asn="109"
 city="san jose"
 connectionSpeed="high"
 connectionType="tx"
 countryCode="us"
 ipAddressEnd="171.71.150.1"
 ipAddressStart="171.71.150.1"
 latitude="37.33053"
 longitude="-121.83823"
 metroCode="807"
 msa="41940"
 onNet="OFFNET"
 postalCode="95122"
 proxyServer="fixed"
 state="ca"/>
</ns2:Location>
```

Matching Zone

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 225
Cache-Control: Max-Age=3600

<ns2:Location
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc"
 asn="109"
 city="San Leandro"
 countryCode="US"
 ipAddressEnd="171.71.150.255"
 ipAddressStart="171.71.150.0"
 latitude="37.7156"
 locationName="4232"
 longitude="-122.1602"
 metroCode="807"
 msa="0"
 onNet="OFFNET"
 postalCode="94577"
 state="CA">
   <ZoneMatch nameSpace="cisco.adzone3" name="city_segment"/>
   <ZoneMatch nameSpace="us_regions" name="west_oast"/>
</ns2:Location>
```

Zone Definition Interface

Zone Definition interface provides a means to authenticate operators. This interface assumes that the Zone Definitions will be configured by an administrator for the Service Provider.

The Zone Definition interface uses the following commands:

- Get Provider Name List
- Get Zone Group List
- Get Zone Group
- Get Zone

Get Provider Name List

The HTTP GET command used with this command returns a list of Providers defined on the Location Service.

Format

```
http://<hostname>/loc/zone/ProviderNameList
```

Request Example

```
GET /loc/zone/ProviderNameList HTTP/1.1
```

Request Response - Codes

The following is a list of HTTP Status Code responses:

- 200 - OK
- 403 - Forbidden
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data with a list of provider names. The root element is *ProviderNameList*, as shown below.

The LS returns a 404 Not Found if no providers are defined.

For all other errors, the LS returns an appropriate HTTP status code.

Element:**ProviderNameList**

Children: **ProviderName (1..N)**

Element:**ProviderName**

Children: **None**

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
	String	R	Unique name of the Provider.

The following is an example response.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 213

<ProviderNameList
 xmlns="urn:com:cisco:videoscape:conductor:loc">
   <ProviderName>cisco</ProviderName>
   <ProviderName>company2</ProviderName>
   <ProviderName>company5</ProviderName>
</ProviderNameList>
```

Get Zone

The HTTP GET command used with this command returns a specific Zone definition. The LS returns the Zone definition details, including all of the location definitions that comprise the Zone.

Format

```
http://<hostname>/loc/zone/Zone?<name>=<value>&...
```

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
Provider	String	R	The provider that defined the Zone Group.
ZoneGroup	String	R	The name of the Zone Group.
Zone	String	R	Name of the Zone.

Request Example

```
GET /loc/zone/Zone?Provider=cisco&ZoneGroup=adzone3&Zone=region1 HTTP/1.1
```

Request Response - Codes

The following is a list of HTTP Status Code responses:

- 200 - OK
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data, with the complete definition for the requested segment. The root element is *Zone*, which is detailed in the Zone Import File Format, on page 10 section of this guide.

The LS returns a 404 Not Found if the specified Zone cannot be found.

For all other errors, the LS returns an appropriate HTTP status code.

The following is an example response.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 242

<Zone
 xmlns="urn:com:cisco:videoscape:conductor:loc"
 name="region1">
 <MetroCode>504</MetroCode>
 <MetroCode>512</MetroCode>
 <MetroCode>511</MetroCode>
 <PostalCode>19101</PostalCode>
 <PostalCode>18936</PostalCode>
</Zone>
```

Get Zone Group

The HTTP GET command used with this command returns a specific Zone Group definition. The LS Client must specify both the Provider and Zone Group names. The LS returns all classifiers and all zones associated with the specified Zone Group.

Format

```
http://<hostname>/loc/zone/ZoneGroup?<name>=<value>&...
```

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
Provider	String	R	The provider that defined the Zone Group.
ZoneGroup	String	R	The name of the Zone Group.

Request Example

```
GET /loc/zone/ZoneGroup?Provider=cisco&Zone=adzone3 HTTP/1.1
```

Request Response - Codes

The following is a list of HTTP Status Code responses:

- 200 - OK
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data, with the complete definition for the requested Zone Group. The root element is *ZoneGroup*, which is detailed in the Zone Import File Format, on page 10 section of this guide.

The LS returns a 404 Not Found if no Zone Group cannot be found.

For all other errors, the LS returns an appropriate HTTP status code.

The following is an example response.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 561

<ZoneGroup
 xmlns="urn:com:cisco:videoscape:conductor:loc"
 name="ad_zone_3"
 provider="cisco">
 <Classifier type="regex">
  /http:\/\/cdn\.cisco\.com.*/
 </Classifier>
   <Zone name="region1">
  <MetroCode>504</MetroCode>
  <MetroCode>512</MetroCode>
  <MetroCode>511</MetroCode>
  <PostalCode>19101</PostalCode>
  <PostalCode>18936</PostalCode>
 </Zone>
   <Zone name="region2">
  <CountryCode>CA</CountryCode>
 </Zone>
   <Zone name="region3">
  <State>NY</State>
  <State>MA</State>
  <MetroCode>506</MetroCode>
 </Zone>
</ZoneGroup>
```

Get Zone Group List

The HTTP GET command used with this command returns a list of Zone Group names. The LS Client may specify a Provider name to filter the list based on a specific content or service provider. If no provider is specified, then all Zone Group names are returned.

Note that only the Provider and Zone Group names are returned in the list. The list does not contain the actual Zone definitions.

Format

```
http://<hostname>/loc/zone/ZoneGroupList?<name>=<value>&...
```

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
Provider	String	R	Optional name of the provider. If specified, the LS only returns Zone Group names for the specified Provider.

Request Example

```
GET /loc/zone/ZoneGroupList?Provider=cisco HTTP/1.1
```

Request Response - Codes

The following is a list of HTTP Status Code responses:

- 200 - OK
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data with a list of Zone Group names and associated providers. The root element is *ZoneGroupList*, which is detailed in the Zone Import File Format, on page 10 section of this guide. Note that the ZoneGroup elements do not have any child elements associated with them.

The LS returns a 404 Not Found if no Zone Groups are defined that match the specified criteria.

For all other errors, the LS returns an appropriate HTTP status code.

The following is an example response.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 185

<ZoneGroupList
 xmlns="urn:com:cisco:videoscape:conductor:loc">
   <ZoneGroup name="adzone3" provider="cisco"/>
   <ZoneGroup name="peering_zone" provider="cisco"/>
</ZoneGroupList>
```

Create Classifiers

The HTTP POST command, used with this command, is used to create or replace all classifiers for a particular Zone Group. If this method is called and the Zone Group namespace does not exist, then the Zone Group namespace is created. All previous classifiers associated with this Zone Group are replaced by the specified list of classifiers. If no classifiers are specified in the request, the LS deletes all classifiers associated with the Zone Group.

Format

```
http://<hostname>/loc/zone/Classifiers
```

Request Elements

The request must include the *ZoneGroup* element as the root element and all *Classifier* child elements as defined in the Zone Import File Format, on page 10 section of this guide.

Note The request cannot include any Zone elements.

Request Example

```
POST /loc/zone/Classifiers HTTP/1.1
Content-Type: application/xml
```

```
Content-Length: 238

<ZoneGroup
 xmlns="urn:com:cisco:videoscape:conductor:loc"
 name="asn_zone"
 provider="provider2">
 <Classifier type="simple">images.provider2.com</Classifier>
 <Classifier type="simple">cdn.provider2.com</Classifier>
</ZoneGroup>
```

Request Response - Codes

The following is a list of HTTP Status Code responses:

- 204 - No Content
- 403 - Forbidden
- 500 - Internal Server Error

No XML data is included in the response. On a successful response (204 No Content), the response only consists of the HTTP header.

The LS returns a 403 Forbidden if the LS Client is not authorized to create/replace classifiers for the specified provider.

For all other errors, the LS returns an appropriate HTTP status code.

Emergency Alert System

The Emergency Alert System (EAS) is country specific. The following are the currently supported codes:

- United States - uses a FIPS code, which is based on state and county boundaries.
- Canada - uses the Standard Geographical Classification (SGC) code.

FIPS State and Territory Code

The United States EAS message system uses the FIPS State and Territory code format. A FIPS code is a 5-digit number that consists of a 2-digit state code, followed by a 3-digit county code. A complete list of FIPS codes can be found at http://www.itl.nist.gov/fipspubs/co-codes/states.htm.

In some cases, it is easier to map a Client location using a zip code instead of a county. A mapping of zip code to FIPS code can be extracted from a 1999 database, located at http://www.census.gov/geo/www/tiger/zip1999.zip. Note that this information can be out of date, as zip codes are added or change more frequently than counties.

The LS supports a lookup of FIPS code based on county and zip code. When specifying a county as the key, the LS Client must also specify the associated state, since county names are not unique across states. The LS returns a single FIPS code when the LS Client specifies a county. Zip codes can span county boundaries. In fact, a zip code may span up to 5-counties. If you are using a zip code as the key, the LS returns all of the FIPs codes associated with the counties that intersect that zip code.

As previously stated, a zip code may span multiple EAS regions. The Client Directory obtains the set of EAS regions from the LS, based on locality. The Client Directory then makes a Client subscription request to the Alert Manager for each of these EAS regions. The mapping of county to FIPS code is generally static. There is one FIPS code per county. The mapping of zip code to FIPS code is also relatively static, although the US Postal Service does occasionally adjust the zip code to county mapping. The *ZIP*Data*™ product provides a zip code to county and FIPS mapping. In the *ZIP*Data*™ product, the *County Name Database* provides a

mapping of FIPS code to county name while the *Zip/County Database* provides the mapping of 5 digit zip code to FIPS code.

The *ZIP*Data*™ product is updated monthly. The LS provides an import capability to reload the data when an updated data file is deployed onto the system. Note that this is a non-service impacting import. The LS loads the latest data in the background, validates it, and then begins using it without requiring a restart. The format of the relevant databases in *ZIP*Data*™ data is shown below.

The highlighted fields will be used by the Location Service to populate its Location Data Cache. Note that the data is supplied per zip code. A zip code may appear multiple times since it may map to multiple counties. These import files will be in ASCII format with fixed length records.

The ASCII file is named "cnty.dat". The format of each line of the *County Name Database* in the *ZIP*Data*™ product is shown in the table below and is supplied per zip code. Each record is terminated by a CR/LF.

Field	Type	Length	Description
FIPS Code *	Numeric	5 digits	County FIPS Code
County Name *	String	25 chars	County Name
State	String	2 chars	State abbreviation
Time Zone	Numeric	2 digits	Number of hours past GMT
County Type	String	1 char	Code describing the county
County Seat	String	28 chars	County government capital
Name Type	String	1 char	Code assigned to the name of the county
Elevation	Numeric	5 digits	Elevation of county seat in feet above sea level
Persons Per HH	Numeric	4 digits	Average number of persons per household, last two digits are decimal digits
Population	Numeric	8 digits	Estimated county population
Area	Numeric	8 digits	County area in square miles
Households	Numeric	8 digits	Number of households in the county
White	Numeric	8 digits	Estimate of White population in county
Black	Numeric	8 digits	Estimate of Black population in county
Hispanic	Numeric	8 digits	Estimate of Hispanic population in county
Avg Income	Numeric	8 digits	Average annual household income
Avg House Value	Numeric	8 digits	Average value of a home within the county
CR/LF	EOL	2 chars	Carriage return / line feed

* Fields are used by the LS to populate its Location Data Cache.

The following is an example with several records.

```
42015BRADFORD                  PA 5CTOWANDA                     C  7372.57   62761  1151
24453   61471     251     398   33723   51500
42017BUCKS                     PA 5ADOYLESTOWN                  C  3402.73  597635   608
218725  552588   19495   14005   55244  139000
42019BUTLER                    PA 5CBUTLER                      C 10112.64  174083   789
65862  170302    1367    1016   41654   62800
42021CAMBRIA                   PA 5BEBENSBURG                   C 21402.52  152598   688
60531  146183    4322    1352   29755   39500
```

The ASCII file is named zipcnty.dat. The format of each line of the *County - ZIP Code Database*™ data is shown in the following below. Note that each record is terminated by CR/LF.

Field	Type	Length	Description
Zip Code	Numeric	5 digits	Zip Code
FIPS Code	Numeric	5 digits	County FIPS Code
Percentage	String	6 chars	Percentage of deliverable addresses that reside in a county FIPS code for a ZIP Code. Last two digits are decimal positions.
Count	Numeric	6 digits	Number of records used to determine the percentage.
CR/LF	EOL	2 chars	Carriage return / line feed

For example:

```
1945442017 13.59   389
1945442091 86.41  2474
1945542091100.00     2
1945642091100.00   188
1945742029100.00    69
1946042029 92.65  3429
```

Standard Geographical Classification Codes

The Canadian alerting systems utilize codes defined in the Standard Geographical Classification (SGC). The SGC codes are made up of a one to ten digit value. Numbers are assigned from a regional level all the way down to a metropolitan area. The layout of an SGC code and an example is as follows.

SGC Format

```
X = Region, example 2 = Quebec
XY = Province or Territory, example 24 = Quebec
XY ZZ = Census Division, example 24 66 = Montreal
XY ZZ AAA = Census Subdivision, example 24 66 102 = Kirkland
XY ZZ AAA BBB = Census Metropolitan Area, example 24 66 102 462 Kirkland V (where V indicates
 'ville' and French only)
```

The SGC codes used extend only to the Census Subdivision level (i.e. the "XY ZZ AAA" level), and thus only seven digits of the SGC is required to be supported in a prospective EAS solution.

EAS Location Service Interfaces

The EAS Location Services interfaces use the HTTP GET EAS Location parameters to return LS client country specific requested information.

Get EAS Location - HTTP GET

The HTTP GET command returns a list of EAS codes associated with a TARGET location. Since EAS is country specific and may have multiple keys that can be used to locate the EAS region, the LS Client must specify query parameters that identify the EAS type and lookup method.

The LS Client must indicate the type of EAS data that it requires. This can be done by specifying either the country code or the EAS type. If specifying a country code, the following mapping of country code to EAS type is used:

- United States - FIPS
- Canada - SGC

No other country code has default mapping. Therefore, for other countries, the LS Client must explicitly specify the EAS type. Typical EAS types include "FIPS" and "SGC". The data import for the Explorer Controller EAS mapping provides support for other EAS types to support other countries.

The Location Service supports a number of different lookup methods to obtain the EAS codes. The supported lookup methods include:

- County Name - Used to obtain the FIPS code in the US
- Postal Code or Zip Code
- Out of Band Bridge - EAS support for ECs for settop boxes and CableCARDs
- Broadcast Service Group - EAS support for ECs for DTAs

The following table shows the different lookup methods and the query parameters that the LS Client must supply:

Lookup Method	State	County	PostalCode	ControllerId	OOBBId	BSGid
County	X	X				
Postal Code			X			
Out of Band Bridge				X	X	
Broadcast Service Group				X		X

In order to support EAS for IP client devices, the LS Client cannot supply an IP Address to obtain the EAS region. The primary reason is that IP address to location typically provides city level accuracy for the IP client location. This is insufficient for EAS purposes. Therefore, the LS Client should consult a subscriber database (such as UPM or Client Directory) to obtain the locality information.

The Location Service only searches its internal databases associated with the specified EAS type or country code (which maps to a default EAS type). Therefore, if country code or EAS type is omitted, or an unsupported country code or unknown EAS type is specified, the Location Service will return an error.

If the LS Client does not specify the parameters required for a particular lookup method, the Location Service will return an error.

If the LS Client supplies query parameters such that multiple lookup methods are in play, then the LS will only select one of the lookup methods (based on whatever is programmed into the LS) and return the EAS codes for that particular method. (In other words, the LS Client needs to supply only the required query parameters for a particular lookup method or unexpected results may be returned.)

The response data may be cached by the LS Client if the response includes the HTTP header Cache-Control: max-age. This value indicates the maximum duration in seconds that the LS Client can cache the results.

Format

```
http://<hostname>/loc/ipvideo/Locality2EAS?<name>=<value>&...
```

Request

The following table provides a list of query parameters:

Query Parameters	Type	R/O	Description
CountryCode	String	O	The two character country code based on ISO 3166 specified in the request. The country code defines the type of EAS data that will be returned: US ->FIPS CA ->SGC. Either CountryCode or EASType needs to be specified.
EASType	String	O	The type of EAS data to return. Typical values include: FIPS, SGC, or Other (value depends on country). Either CountryCode or EASType needs to be specified. If both are specified, EASType takes precedence.
State	String	O	Two character state abbreviation, as specified in the Zip-Data-manual.
County	String	O	Name of the county (used to lookup FIPS code). This data is case insensitive.
PostalCode			Postal code or zip code. US zip codes are truncated to 5 digits (since that is the zip code size from the data source).
ControllerType	String	R	Controller Type: Valid values include: EC and DTACS Field must be specified with OOBBId or GroupAddress.
ControllerId	Integer	R	Id of controller. This value must be specified if either OOBBId or GroupAddress is specified.
OOBBId	Integer	O	Out of band bridge Id. This value is used for settop boxes and CableCARDS.
GroupAddress	String	O	Mutlicast group address. This value is used for DTAs.
SourceAddress	String	O	Address of the multicast source. This value is only used for IPv6 and DTAs.

Note All query parameters of type String are case insensitive.

Request Example - Postal Code

```
GET /loc/ipvideo/Locality2EAS?CountryCode=US&PostalCode=18951 HTTP/1.1
```

Request Example - County

```
GET /loc/ipvideo/Locality2EAS?EASType=FIPS&State=PA&County=Montgomery HTTP/1.1
```

Request Example - Out of Band Bridge ID

```
GET /loc/ipvideo/Locality2EAS?CountryCode=CA&ControllerId=11&OOBBId=142 HTTP/1.1
```

Request Example - Broadcast Service Group ID

```
GET /loc/ipvideo/Locality2EAS?EASType=SGC&ControllerId=9&BSGId=17 HTTP/1.1
```

Request Response - Codes

The following is a list request responses:

- 200 - OK
- 400 - Bad Request
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the LS returns XML data with a list of EAS locations associated with the specified locality. The root element is *EASLocation*, as shown below.

If the request is missing the country code or EAS type or an unsupported country code is specified, the LS returns a 400 Bad Request response. If the request is missing query parameters such that a valid lookup method cannot be determined, the LS returns a 400 Bad Request response.

The Location Service returns a 404 Not Found if the locality ID is not in the EAS database associated with the specified country code and locality type.

For all other errors, the Location Service returns an appropriate HTTP status code.

Element: EASLocation

Children: EASRegion (1..N)

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
dataType	String	R	Type of EAS Region. Valid values include: FIPS | SGC Other EAS types may be returned if those were specified in the EAS import file for the Explorer Controller.

Element:EASRegion

Children: None

The following table provides a list of attributes that are associated with this element.

Type	R/O	Description
String	R	EAS region identifier: FIPS - value is the 5 digit FIPS code SGC - value is the 6 digit SGC code *Other* - Depends on import file Note that ZIP*Data only provides a 5 digit FIPS code but the EAS import file for the Explorer Controller can specify a 6 digit FIPS code.

The following are example responses.

FIPS

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 164
Cache-Control: Max-Age=3600

<EASLocation
 xmlns="urn:com:cisco:videoscape:conductor:loc"
 dataType="FIPS">
   <EASRegion>42017</EASRegion>
   <EASRegion>42091</EASRegion>
</EASLocation>
```

SGC

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 202
Cache-Control: Max-Age=3600

<EASLocation
 xmlns="urn:com:cisco:videoscape:conductor:loc"
 dataType="SGC">
   <EASRegion>1002010</EASRegion>
   <EASRegion>1107001</EASRegion>
   <EASRegion>1107003</EASRegion>
</EASLocation>
```

Get EAS Alert Target

The Get EAS Alert Target method is used to obtain a list of EAS Alert Targets (for example, OOBB or multicasts). This can be used by the UI to obtain a list of Alert Targets by Controller in order to populate the UI to allow the operator to specify the EAS Code mappings.

This can also be used by the ECS to obtain the EAS Alert Targets for a specific EAS Code. The operator must have already configured the Alert Target to EAS Code mapping using the UI. See the Set EAS Alert Target Map for additional details.

The response data may be cached by the LS Client if the response includes the HTTP header Cache-Control: max-age. This value indicates the maximum duration in seconds that the LS Client can cache the results.

Format

```
http://<hostname>/loc/eas/EASAlertTargets?<name>=<value>&...
```

Request

The following table provides a list of query parameters:

Query Parameters	Type	R/O	Description
ControllerType	String	O	Controller Type: Valid values include: EC and DTACS This value must be specified to get EAS Alert Targets from controller.
ControllerId	Integer	O	Id of controller. This value must be specified to get EAS Alert Targets from controller.
EASType	String	O	EAS Type: Valid values include: FIPS, SGC, and other (depending on mapping). This value must be specified to get EAS Alert Targets mapped to an EAS Code.
EASCode	String	O	EAS Region Identifier: Valid values include: FIPS (value is the 5-6 digit FIPS code), SGC (value is the 1-7 digit SGC code), and other (depending on mapping). This value must be specified to get EAS Alert Targets mapped to an EAS Code.

Note All query parameters of type String are case insensitive.

Request Example - Controller

```
GET /loc/eas/EASAlertTargets?ControllerType=EC&ControllerId=12 HTTP/1.1
```

Request Example - EAS Code

```
GET /loc/eas/EASAlertTargets?EASType=SGC&EASCode=1107003 HTTP/1.1
```

Request Response - Codes

The following is a list request responses:

- 200 - OK
- 400 - Bad Request
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the Location Service returns XML data with a list of EAS Alert Targets associated with the specified Controller or EAS Code. The root element is EASAlertTargets shown below.

If the request is missing query parameters such that a lookup cannot be performed, the LS returns a 400 Bad Request response.

The Location Service returns a 404 Not Found if a match cannot be found for the specified Controller or EAS Code.

For all other errors, the Location Service returns an appropriate HTTP status code.

Element: EASAlertTargets

Children: Controller (1..N)

Element: Controller

Children: OOBB (0..N)

Multicast (0..N)

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
type	string	R	Controller Type: Valid values include: EC and DTACS
Id	Integer	R	Signed integer Id of the controller.

Element: OOBB

Children: None

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
Id	Integer	R	Id of the out of band bridge. The OOBB Id is unique for a given controller.

Element: Multicast

Children: None

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
groupAddress	String	R	Multicast group address.
sourceAddress	String	O	If using IGMPv3, the controller may specify the address of the multicast source.

The following are example responses.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 276
Cache-Control: Max-Age=3600

<ns2:EASAlertTargets
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="EC" id="3">
  <OOBB id="14"/>
  <OOBB id="15"/>
 </Controller>
 <Controller type="DTACS" id="9">
  <Multicast groupAddress="231.21.0.3"/>
 </Controller>
</ns2:EASAlertTargets>
```

Get EAS Alert Target Map

This Get EAS Alert Target Map method is used obtain the mapping of a single EAS Alert Target to set of EAS Codes. This is used by the UI for configuring the mapping of EAS Code to target region. The caller must specify the Controller and either the OOBB or Multicast information. Both the Controller Type and Controller

ID are used to identify the Controller associated with the alert target. The UI must then specify either the OOBB ID or Group Address. Note that if the system is using IGMPv3 and the UI is querying for the multicast mapping, the UI must also specify the source address of the multicast.

The Location Services returns a complete list of EAS codes that are currently mapped to the specified alert target.

Format

```
http://<hostname>/loc/eas/EASAlertTargetMap?<name>=<value>&...
```

Request

The following table provides a list of query parameters:

Query Parameters	Type	R/O	Description
ControllerType	String	R	Controller Type: Valid values include: EC and DTACS This value must be specified to get EAS Alert Targets from controller.
ControllerId	Integer	R	Id of controller. This value must be specified to get EAS Alert Targets from controller.
OOBBId	Integer	O	Out of band bridge Id. This value is used for settop boxes and CableCARDS.
GroupAddress	String	O	Mutlicast group address. This value is used for DTAs.
SourceAddress	String	O	Address of the multicast source. This value is only used for IPv6 and DTAs.

Note All query parameters of type String are case insensitive.

Request Example - OOBB

```
GET /loc/eas/EASAlertTargetMap?ControllerType=EC&ControllerId=12& OOBBId=4 HTTP/1.1
```

Request Example - Multicast

```
GET /loc/eas/EASAlertTargetMap?ControllerType=DTACS&ControllerId=6& GroupAddress=228.0.23.1
 HTTP/1.1
```

Request Response - Codes

The following is a list request responses:

- 200 - OK
- 400 - Bad Request
- 404 - Not Found
- 500 - Internal Server Error

On a successful response, the Location Service returns XML data with a list of EAS codes that have been mapped to the target region. The root element is EASAlertTargetMap shown below. Note that it is valid for the LS to return zero EASCode elements. This simply indicates that no mapping information exists for this alert target.

If the request is missing query parameters such that a lookup cannot be performed, the LS returns a 400 Bad Request response.

The Location Service returns a 404 Not Found if a match cannot be found for the specified alert target (OOBB or Multicast) associated with the specified Controller.

For all other errors, the Location Service returns an appropriate HTTP status code.

Element: EASAlertTargetMap

Children: Controller (1..N)

OOBB (1) and Multicast

EASCode (0..N)

The Controller, OOBB, and Multicast elements are defined in the Get EAS Alert Targets section of this guide. Note that no child elements of the Controller element are specified

Element: EASCode

Children: None

The following table provides a list of attributes that are associated with this element.

Attribute	Type	R/O	Description
countryCode	String	R	Two character country code based on ISO 3166 specified in the request. The country code defines the type of EAS data that will be returned.
dataType	String	O	EAS Region Type: Valid values include: FIPS, SGC, and other (specified to support countries). If the data type is omitted, the default data type for the specified country code is used. The default data for type for the "US" is "FIPS" and the default data type for Canada is "SGC".

Value Type	R/O	Description
String	R	EAS Region Identifier: Valid values include: FIPS (value is the 5-6 digit FIPS code), SGC (value is the 1-7 digit SGC code), and other (depending on country).

The following are example responses.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 340

<ns2:EASAlertTargetMap
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="EC" id="3"/>
 <OOBB id="14"/>
  <EASCode countryCode="CA" dataType="SGC">1002010</EASCode>
  <EASCode countryCode="CA" dataType="SGC">1107001</EASCode>
  <EASCode countryCode="CA" dataType="SGC">1107003</EASCode>
</ns2:EASAlertTargetMap>
```

Setting EAS Alert Targets

The Set EAS Alert Targets method is used by the EC or DTACS to specify the Controller to Alert Target information. The EC specifies a list of out of band bridge (OOBB) IDs, while the DTACS specifies a list of multicast groups and optionally multicast source addresses (for IGMPv3 support).

The Controller must supply its complete list of Alert Targets. There are no incremental updates since this list should be small. If the Controller sends a list of Alert Targets, and a previous alert target is not in the new list, the Location Service will delete that Alert Target along with all of the associated EAS codes. For example, an EC sends a Create EAS Alert Target message with an OOBB ID of 10 in the first message and the operator assigns an SGC value of 1001200 to that OOBB ID. If the next message from the EC is missing OOBB ID 10, the LS deletes the OOBB ID 10 along with the associated SGC mapping from its data.

Format

```
http://<hostname>/loc/eas/EASAlertTargets
```

Request

The root element is EASAlertTargets. This element and its child elements are specified in the Get EAS Alert Targets section of this guide. Note that although multiple Controllers can be listed under an EASAlertTargets element, a given EC or DTACS will only send a single element to the Location Service.

The Controller element specifies an EC or DTACS instance. The combination of controller type and controller ID must be unique.

Request Example - EC

```
POST /loc/zone/Provider HTTP/1.1
Content-Type: application/xml
Content-Length: 184

<ns2:EASAlertTargets
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="EC" id="3">
  <OOBB id="14"/>
  <OOBB id="15"/>
 </Controller>
</ns2:EASAlertTargets>
```

Request Example - DTACS

```
POST /loc/zone/Provider HTTP/1.1
Content-Type: application/xml
Content-Length: 184

<ns2:EASAlertTargets
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="DTACS" id="4">
  <Multicast groupAddress="231.21.0.3"/>
  <Multicast groupAddress="232.21.0.12"/>
  <Multicast groupAddress="231.14.2.8"/>
 </Controller>
</ns2:EASAlertTargets>
```

The following is a list request responses:

- 204 - No Content
- 400 - Bad Request
- 500 - Internal Server Error

No XML data is included in the response. On a successful response (204 No Content), the response only consists of the HTTP header.

For all other errors, the Location Service returns an appropriate HTTP status code.

Get Controller List

The Get Controller List method is used by the UI to obtain a list of Controllers that are currently defined in the system. The Controllers is created using the method specified in the Set EAS Alert Targets section of this guide.

The LS returns a complete list of Controllers (both EC and DTACS) configured in the system.

Format

```
http://<hostname>/loc/eas/ControllerList
```

Request

There are no parameters for this request.

Request Example

```
GET /loc/eas/ControllerList HTTP/1.1
```

Request Example - DTACS

The following is a list request responses:

- 200 - OK
- 500 - Internal Server Error

On a successful response, the Location Service returns XML data with a list of Controllers configured on the Location Service. The root element is ControllerList shown below. Note that if no Controllers are defined, the LS returns a list with zero Controller elements.

For all other errors, the Location Service returns an appropriate HTTP status code.

Element: ControllerList

Children: Controller (0 .. N)

The Controller element is defined in the Get EAS Alert Targets section of this guide. Note that no child elements of the Controller element are returned.

The following is an example responses.

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: 167

<ns2:ControllerList
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="EC" id="3"/>
 <Controller type="DTACS" id="9"/>
</ns2:ControllerList>
```

Set EAS Alert Target Map

The Set EAS Alert Target Map method is used by the UI to configure the EAS Alert Target to EAS Code mapping. The UI must specify a full list of EAS Codes for a given OOBB or Multicast. This request directs the Location Service to discard the previous mapping data and replace it with the new alert code mapping information. Thus, the Set command can be used to create an initial mapping, update a previous mapping (by replacing all of the previous entries), or delete all mapping information (by specifying an empty list of mapping data).

The UI must specify the Controller and either the OOBB or Multicast that is being updated. The LS rejects any request that has insufficient parameters. The LS will also reject any request if the specified Controller and OOBB/Multicast combination cannot be found.

Format

```
http://<hostname>/loc/eas/EASAlertTargetMap
```

Request

The root element is EASAlertTargetMap. The EASAlertTargetMap element and the EASCode element are defined in the Get EAS Alert Target Map section of this guide. The Controller, OOBB, and Multicast elements are defined in Section 4.37.3 Get EAS Alert TargetsGet EAS Alert Targets. Note that no child elements of the Controller element are specified.

```
POST /loc/zone/Provider HTTP/1.1
Content-Type: application/xml
Content-Length: 340

<ns2:EASAlertTargetMap
 xmlns:ns2="urn:com:cisco:videoscape:conductor:loc">
 <Controller type="EC" id="3"/>
 <OOBB id="14"/>
  <EASCode countryCode="CA" dataType="SGC">1002010</EASCode>
  <EASCode countryCode="CA" dataType="SGC">1107001</EASCode>
  <EASCode countryCode="CA" dataType="SGC">1107003</EASCode>
</ns2:EASAlertTargetMap>
```

Request Response - Codes

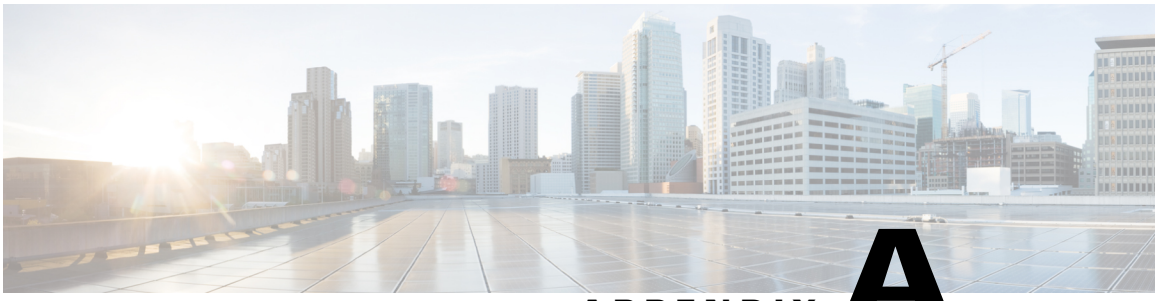
The following is a list request responses:

- 204 - No Content
- 400 - Bad Request
- 404 - Not Found
- 500 - Internal Server Error

No XML data is included in the response. On a successful response (204 No Content), the response only consists of the HTTP header.

The Location Service returns a 404 Not Found if a match cannot be found for the specified alert target (OOBB or Multicast) associated with the specified Controller.

For all other errors, the Location Service returns an appropriate HTTP status code.



APPENDIX A

Zone Import File Format Example

Zone Import File Format Example

```
Example Import File:
<ZoneDefinitions
   xmlns="urn:com:cisco:videoscape:conductor:loc">
   <ProviderNameList>
       <Provider>cisco</Provider>
       <Provider>provider2</Provider>
   </ProviderNameList>
       <ZoneGroupList>
          <ZoneGroup
             name="ad_zone_3"
             provider="cisco">
             <Classifier type="regex">
                /http:\/\/cdn\.cisco\.com.*/
             </Classifier>
             <Zone name="region1">
                <MetroCode>504</MetroCode>
                <MetroCode>512</MetroCode>
                <MetroCode>511</MetroCode>
                <PostalCode>19101</PostalCode>
                <PostalCode>18936</PostalCode>
             </Zone>
             <Zone name="region2">
                <CountryCode>CA</CountryCode>
             </Zone>
             <Zone name="region3">
                <State>NY</State>
                <State>MA</State>
                <MetroCode>506</MetroCode>
             </Zone>
          </ZoneGroup>
          <ZoneGroup
             name="asn_zone"
             provider="provider2">
             <Classifier type="simple">images.provider2.com</Classifier>
             <Classifier type="simple">cdn.provider2.com</Classifier>
             <Zone name="company1">
                <ASN>109</ASN>
                <ASN>3943</ASN>
                <ASN>16417</ASN>
             </Zone>
             <Zone name="company2">
                <ASN>15169</ASN>
                <ASN>16591</ASN>
```

Zone Import File Format Example

```
                    <ASN>19448</ASN>
                    <ASN>22577</ASN>
                </Zone>
            </ZoneGroup>
        </ZoneGroupList>
    </ZoneDefinitions>
```