Geographic Location Extension to Ripe-181

1. Introduction

This document describes two proposals for specifying geographic location of a database objects such as an Autonomous System (AS). This information could be used by mapping tools that provide geographic maps of the Internet topology. Two alternatives are documented here, the first proposal uses a new attribute added to a database object. The attribute provides longitude, latitude and size information. The second method also uses a new location attribute added to the database object, this new attribute contains the name of a location object that we propose. The two methods describe direct and indirect location information respectively.

2. Format of Location String

The format of the geographic ‘‘location string’’ or LocString will be a single string consisting of the latitude, longitude and optionally the size. The latitude and longitude are each represented by one to three integers corresponding to degrees, minutes and seconds, with a direction appended to the final integers of the latitude and longitude. If minutes and/or seconds are not provided values of 0 will be assumed and size will default to 0, a point. The directions are north, south, east and west.
For example, the LocString for Irvine, California is:

33 40 10n 117 49 20w 10m

Representing 33 degrees, 40 minutes and 10 seconds north latitude, and 117 degrees, 49 minutes and 20 seconds west longitude with a 10 meter encompassing circle. Informally the LocString would be of the form:

"LA [MM [SS]](n|s) LO [MM [SS]](e|w) [SIm]"

Where, LA and LO are integers representing the degrees latitude and longitude, respectively. MM is an integer representing the number of minutes. SS is an integer representing the number of seconds. The characters ’n’, ’s’, ’e’, ’w’ and ’m’ are literals corresponding to north, south, east, west and meters, respectively.

3. Proposals for AS Geographic Location

The following proposals are similar, the first suggests a new attribute to the Ripe-181[1] aut-num object, the second also suggests new aut-num attribute and a new ‘‘location’’ object. The following examples use the aut-num object, however, they may be equally applied to the as-macro, inet-rtr or route objects as well. Attributing locations to these other database objects would provide the geographic topology internal to an AS, which may represent reality more accurately.

3.1 Direct Location

This method proposes a new aut-num attribute, ‘‘location’’. This attribute is a single, optional attribute:

\[
\begin{align*}
\text{aut-num:} & \quad \text{[mandatory] [single]} \\
\text{...} & \quad \\
\text{location:} & \quad \text{[optional] [single]}
\end{align*}
\]

The ‘‘location’’ attribute will contain a LocString. For example, say AS8800 is an ISP in Irvine, California, it’s aut-num could contain the following:

\[
\begin{align*}
\text{aut-num:} & \quad \text{AS8800} \\
\text{location:} & \quad 33 40 10n 117 49 20w \\
\text{...} & \quad
\end{align*}
\]

3.2 Direct and Indirect Location

This method proposes the addition of a ‘‘location’’ attribute to the aut-num as in 3.1. This attribute could directly hold the LocString, or
the name of a ‘‘location’’ object. The location object could be defined as:

```plaintext
location: [mandatory] [single]
loc-string: [mandatory] [single]
descr: [optional] [multiple]
notify: [optional] [multiple]
mnt-by: [optional] [multiple]
changed: [mandatory] [multiple]
source: [mandatory] [single]
```

Using the example in section 3.1, we would have the following:

```plaintext
aut-num: AS8800
location: IrvineCA
...
```

and the object ‘‘IrvineCA’’ would be:

```plaintext
location: IrvineCA
loc-string: 33 40 10n 117 49 20w 10m
descr: Example location object in Irvine, CA.
notify: eddy@isi.edu
mnt-by: MAINT-EXAMPLE
changed: eddy@isi.edu 960220
source: EXAMPLE
```

The loc-name could be any string desired by the creator.

4. Problems

One obvious problem with using geographic layout inherent to networks, is that they often span large geographic areas, this is true of many ISPs. When attributing a location to an AS, one must pick a single location to be representative of the AS. The internal topology of an AS may be mapped geographically when a location attribute has been added to the inet-rtr or route objects.

5. Conclusion

The motivation for providing geographic locations was prompted by the development of the Internet Routing Registry (IRR) visualization tool (IRRV) as a possible method for topological layout. Methods for obtaining the LocString are beyond the scope of this document, however, it should be noted that RFC 1876[2] specifies a means for containing location information in Domain Name System. Also worth noting is a ‘‘Geographic Nameserver’’ at http://www.mit.edu:8001/geo, that derives its information from the Geographic Nameserver database on martini.eecs.umich.edu.
Work in this area will proceed if the community finds this feature useful.

6. Thanks

Although we have never spoke, I would like to thank, Juergen Schoenwaelder (schoenw@ibr.cs.tu-bs.de) for the development of scotty/tkined, which IRRv is based on and the example geographic layout script. Thanks also to Cengiz Alaettinoglu for suggestions that led to these proposals.


Author’s Present Address

Rusty Eddy
Information Sciences Institute
University of Southern California
Marina del Rey, CA 90292
e-mail: eddy@isi.edu