Geolocation problems.
Do we have a solution?

Massimo Candela
Senior Software Engineer
Global IP Network
massimo@ntt.net
@webrobotics

1.5 years ago RFC9092

NTT

Finding and Using Geofeed Data

Abstract

   This document specifies how to augment the Routing Policy
   Specification Language inetnum: class to refer specifically to
   geofeed data comma-separated values (CSV) files and describes an
   optional scheme that uses the Routing Public Key Infrastructure to
   authenticate the geofeed data CSV files.

IP geolocation

- IP geolocation is needed on various occasions
  - To respect country regulations
  - To provide localized content
  - To optimize latencies
  - Troubleshooting
  - Research

What's the problem?

- The lack of…

  - Central repo

    - RIRs are not (and don't want to be) geolocation providers
    - There are several datasets offered by geolocation providers
    - Content providers/CDN have their own fork/enrichments

  - Common strategy

    - Geolocation data can be derived/guessed in several ways whois, rdns, latency
    - Whois geographic hints are **a total mess!**

  - Authoritative data

    - How can I change **my** IP geolocation?

- If the geolocation is wrong you have to contact **many** organizations

Massimo Candela | massimo@ntt.net | @webrobotics

Geographic hints in whois

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- The **geoloc** attribute is supported by RIPE and APNIC. It allows to associate latitude and longitude coordinates to single inetnums.

- The **country** attribute in inetnums is supported by APNIC, LACNIC and RIPE. In all the three it has different or not specified meanings.

> - **"country:"** – This identifies a country using the ISO 3166-2 letter country codes. It has never been specified what this country represents. It could be the location of the head office of a multi-national company or where the server centre is based or the home of the End User. Therefore, it cannot be used in any reliable way to map IP addresses to countries.

Massimo Candela | massimo@ntt.net | @webrobotics

How often does it happen?

- Only in NANOG mailing list 241 emails related to geolocation problems since September 2019

What we want?

- A way to get control on IP geolocation
  - We need to be authoritative for this information
- A way to be flexible
  - From prefixes to single IP
  - From country to city
- Easy to maintain
  - Something like… editing a file
  - No emails!
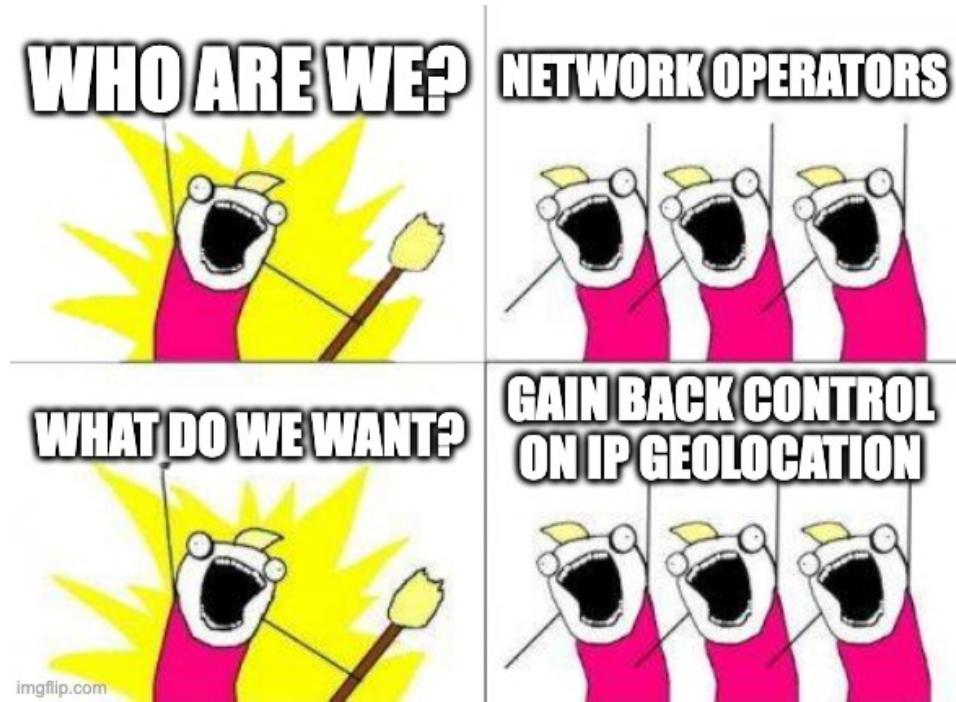
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The solution

RFC9092

- RFC9092 gives to the network operators the power to control the geolocation of their IP resources by linking geofeed files in whois

- This allows geolocation databases and content providers to automatically discover the geofeed files and to import them from a format they are already familiar with

  - *and to to validate them!*

How does it work

1. Create a CSV file with the prefixes/IPs you want to correct/geolocate
   - Each entry like: **204.141.120.0/22,US,US-VA,Ashburn,**

2. Publish that CSV file somewhere, possibly over https

3. Add a remark/comment to the related inetnum/NetRange
   - "Geofeed https://your/file.csv"
   - Multiple inetnum can point to the same geofeed file

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Example of Geofeed file


```
83.231.214.172/30,RO,RO-B,Bucharest,
83.231.214.212/30,RO,RO-SB,Sibiu,
212.119.27.192/30,IT,IT-21,Turin,
5.158.213.8/30,IE,IE-D,Dublin,
83.231.214.228/30,CH,CH-GE,Genève,
83.231.214.196/30,FI,FI-18,Helsinki,
83.231.214.112/30,IT,IT-MI,Milan,
213.198.77.176/30,RO,RO-TM,Timisoara,
165.254.178.240/28,US,US-NY,,
202.68.64.0/20,AU,AU-NSW,Sydney,
103.13.80.0/22,AU,AU-NSW,Sydney,
153.254.80.0/22,AU,AU-NSW,Sydney,
198.107.141.0/24,US,US-CA,,
128.241.0.128/29,US,US-CA,,
116.51.31.96/30,SG,,Singapore,
209.212.229.0/24,HK,,,
165.254.42.200/29,US,US-VA,,
209.212.233.0/24,AU,AU-NSW,Sydney,
209.212.228.0/24,JP,JP-13,Tokyo,
209.212.236.0/24,KR,,Seoul,
209.212.234.0/24,MY,,,
209.212.232.0/24,SG,,Singapore,
```

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Add remarks in the RIPE database

Result


```
% IANA WHOIS server
% for more information on IANA, visit http://www.iana.org
% This query returned 1 object

refer:          whois.ripe.net

inetnum:        83.0.0.0 - 83.255.255.255
organisation:   RIPE NCC
status:         ALLOCATED

whois:          whois.ripe.net

changed:        2003-11
source:         IANA

# whois.ripe.net

inetnum:        83.231.214.0 - 83.231.214.255
netname:        VERIO-DE-INFRA
descr:          NTTEO DE frankfurt facility
country:        DE
admin-c:        NERA4-RIPE
tech-c:         NAIA1-RIPE
status:         ASSIGNED PA
remarks:        INFRA-AW
remarks:        Abuse/UCE: abuse@us.ntt.net
remarks:        Network: noc@us.ntt.net
remarks:        Security issues: security@us.ntt.net
remarks:        Geofeed https://geo.ip.gin.ntt.net/geofeeds/geofeeds.csv
mnt-by:         MAINT-VIPAR
created:        2013-12-10T17:18:59Z
last-modified:  2020-09-08T18:21:39Z
source:         RIPE # Filtered
```

Massimo Candela | massimo@ntt.net | @webrobotics

Don't forget the link!

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Inetnums

123.1.0.0/16

45.1.0.0/20

Geofeed file content

123.1.0.0/16

validates

123.1.100.0/24

123.1.100.9

validates

45.1.1.1

Massimo Candela | massimo@ntt.net | @webrobotics

A utility to set up geofeed files

- Available at https://packetvis.com/geofeed (not an NTT service)
- It simplifies the entire process

PacketVis Geofeed Tool - Location
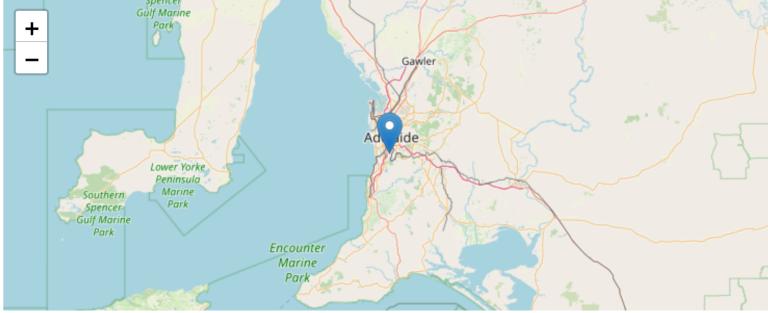
PacketVis Geofeed Tool - Inetnum

It looks like everything is ok here and nothing has to be done in the inetnum

inetnum:	213.198.56.0 - 213.198.56.255
netname:	NTT-MASSIMO
mnt-by:	MAINT-VIPAR

Contains the following remarks

remarks:	Geofeed https://geofeeds.packetvis.com/b84e0_213.csv

Hosted by

PACKETVIS ⬤ MYSELF

‹ PREV   SAVE AND TEST

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PacketVis Geofeed Tool - Inetnum validation

It looks like everything is ok here and nothing has to be done in the inetnum

inetnum:	213.198.56.0 - 213.198.56.255
netname:	NTT-MASSIMO
mnt-by:	MAINT-VIPAR

Contains the following remarks

remarks:	Geofeed https://geofeeds.packetvis.com/b84e0_213.csv

Hosted by

PACKETVIS ◯ MYSELF

⊘ Your geofeed deployment is working properly! Nothing else to do.

‹ PREV   CHECK WHERE GEOLOCATION PROVIDERS SAY IT IS ›

FIX ANOTHER IP ›

Massimo Candela | massimo@ntt.net | @webrobotics

PacketVis Geofeed Tool - Current status

We check the geolocation of your prefix across all the geolocation providers below, and we will let you know once the geolocation is updated.

Provider	Country	City	Update method	Last check
BigData Cloud	🇳🇱 NL ⊗	Amsterdam ⊗	automatic	2023-05-08 01:37 UTC
fastah	🇬🇧 GB ⊗	Kent ⊗	automatic	2023-05-08 01:37 UTC
ipinfo.io	🇺🇸 US ✓	Pasadena ✓	automatic	2023-05-08 01:37 UTC
ipregistry	🇺🇸 US ✓	Pasadena ✓	automatic	2023-05-08 01:37 UTC
IPWHOIS.IO	🇺🇸 US ✓	Pasadena ✓	automatic	2023-05-08 01:37 UTC
ipdata	🇺🇸 US ✓	Pasadena ✓	automatic	2023-05-08 01:37 UTC
apiip.	🇬🇧 GB ⊗	Kent ⊗	manual ⓘ	2023-05-08 01:37 UTC
MAXMIND	🇬🇧 GB ⊗	Hornchurch ⊗	manual ⓘ	2023-05-08 01:37 UTC
ipgeolocation	🇺🇸 US ⊗	Greenwood Village ⊗	manual ⓘ	2023-05-08 01:37 UTC
WhoisXMLAPI	N/A	N/A	N/A	now
ipstack	🇩🇪 DE ⊗	Frankfurt am Main ⊗	manual ⓘ	2023-05-08 01:37 UTC
IP2LOCATION	N/A	N/A	N/A	now
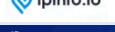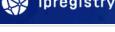
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Massimo Candela | massimo@ntt.net | @webrobotics

Adoption

https://geolocatemuch.com

Geolocate much?

RFC9092 gives to the network operator the power to control the geolocation of its IP resources.

It works by linking geofeed files in whois. This allows geolocation databases and content providers to automatically discover the geofeed files and to import them from a format they are already familiar with. It can be used to set the geolocation of entire prefixes or specific IPs.

It works by simply editing a text file. No need to open tickets or send emails.

At the moment there are 63035 prefixes with geofeeds.

READ MORE   TEST YOUR GEOFEED ⊙

Adoption

Name	File format ⓘ	Auto-discovery v4 ⓘ	Auto-discovery v6 ⓘ	Reactivity ⓘ	Share
IPInfo.io	✓	✓	✓	1 day	🐦
IP2Location	✓	✓	✓	1 day	🐦
IPRegistry.co	✓	✓	✓	1 day	🐦
WhoisXMLAPI	✓	✓	✓	2 days	🐦
BigDataCloud	✓	✓	✓	4 days	🐦
Fastah	✓	✓	✓	5 days	🐦
IPData.co	✓	✓	✓	7 days	🐦
IPGeolocation.io	✓	✗	✗	N/A	🐦

Test your geofeed

More info

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> How does it work?

> The Geofeed format

> How adoption is calculated?

> What about geoloc/country in the RIR databases?

> How to find the geofeed files?

> What to do if it doesn't work?

SHARE ON TWITTER 🐦

Download all validated feeds at once

https://geolocatemuch.com/geofeeds/validated-all.csv 📋

Recap

- Utility to set up and test a geofeed easily:

  - https://packetvis.com

- To check adoption numbers, test, and read more info

  - https://geolocatemuch.com/

- RFC9092

  - https://datatracker.ietf.org/doc/html/rfc9092

Thank you.

Massimo Candela
Senior Software Engineer, Network Information Systems Development
Global IP Network
massimo@ntt.net
@webrobotics

www.gin.ntt.net
@GinNTTnet   #globalipnetwork   #AS2914