



# Geolocation problems. Do we have a solution?

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# 1.5 years ago RFC9092



Internet Engineering Task Force (IETF)  
Request for Comments: [9092](#)  
Category: Standards Track  
Published: July 2021  
ISSN: 2070-1721

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## 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 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

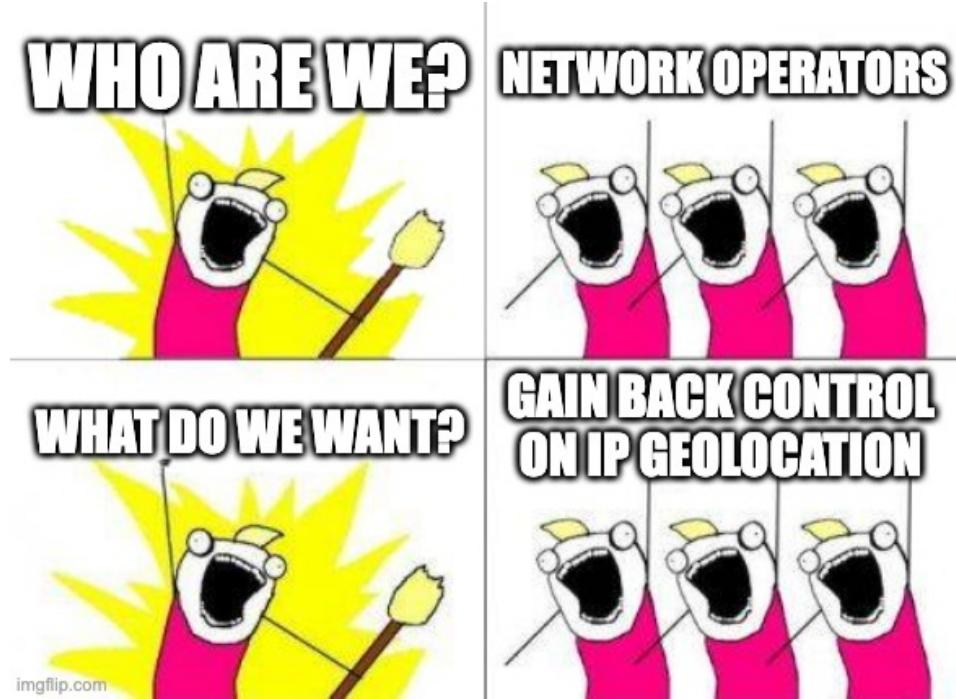
# How often does it happen?



- 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 (or more)
- Easy to maintain
  - Something like... editing a file
  - No emails!



imgflip.com

A series of vertical panels, each containing a silhouette of a person, set against a background that transitions through various colors (red, orange, yellow, green, blue, purple). The panels are separated by thin black vertical lines.

# The solution

- 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 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

# 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,
```

# Add remarks in the RIPE database



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RIPE Database

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RPKI

RPKI Dashboard

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Feedback/Support

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**admin-c**  
JWJS1-RIPE [+] [?]

**tech-c**  
JWJS1-RIPE [+] [?]

**status**  
ASSIGNED PI [+] [?]

**mnt-routes**  
SNIJDERS-MNT [+] [?]

**mnt-domains**  
SNIJDERS-MNT [+] [?]

**remarks**  
Geofeed <https://sobornost.net/geofeed.csv> [+] [?]

**source**  
RIPE [+] [?]

By submitting this form you explicitly express your agreement with the [RIPE Database Terms and Conditions](#)

[Cancel] [Submit]

# 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
```

## Inetnums

**123.1.0.0/16**

**45.1.0.0/20**

## Geofeed file content

**123.1.0.0/16**

**123.1.100.0/24**

**123.1.100.9**

**45.1.1.1**

validates

validates



# Consuming the data

- If in whois (dump/rdap) you find an inetnum with a geofeed, download the file
- The inetnum gives assurance about the ownership of the prefixes in the file
  - In the file, the prefixes outside the parent inetnum MUST be discarded (however, multiple inetnums can point to the same file)
  - The most specific prefix in the most specific inetnum has priority

1. Download <https://github.com/massimocandela/geofeed-finder>
2. Run the binary
3. Import the output file (result.csv) as is
  - Ownership validation already done!
  - Cache whois and geofeed files auto managed
  - ISO codes and format validated

A large window with multiple vertical panes, each showing a silhouette of a person against a bright, overexposed background. The colors of the panes transition from red/orange on the left to blue on the right. The silhouettes are dark and appear to be walking or standing in various poses.

# Adoption

## 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



## Test your Geofeed

If you type an IP or a prefix, you can check if it is covered by a geofeed file and if the file is correct.

165.254.42.200/29  
TEST

### Inetnum with geofeed found:

**NetRange:** 165.254.0.0 - 165.254.255.255  
**NetName:** NTTA-165-254  
**Organization:** NTT America, Inc. (NTTAM-1)  
**Comment:** Geofeed <https://geo.ip.gin.ntt.net/geofeeds/geofeeds.csv>

### Geofeed entries inside the inetnum

Prefix	Country	Region	City
165.254.178.240/28	US	US-NY	
165.254.42.200/29	US	US-VA	
165.254.21.0/29	BR	BR-SP	Sao Paulo

Rows per page: 100    1-3 of 3    <    >

SHARE RESULT ON TWITTER

- › 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>



# Geofeed format, useful links



- IP/prefix,country,region,city,
- Country expressed in 2 letter ISO 3166-1 alpha2
  - <https://www.iso.org/obp/ui/#search>
- Region expressed in ISO 3166-2
  - Go in <https://www.iso.org/obp/ui/#search>
  - Search for the country and click
  - Search for the region code
- City in free UTF-8 text format
  - I recommend the name in the GeoNames dataset
  - <https://public.opendatasoft.com/explore/dataset/geonames-all-cities-with-a-population-1000/table/?disjunctive.country>

# Thank you.

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