



# Exploring NRPM History with Git

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# What is the NRPM?

The Number Resource Policy Manual (NRPM) is ARIN's policy document. It contains the entirety of all current ARIN number resource policy.

It *does not* include problem statements, slides, mailing list traffic, floor discussions or other contextual artifacts from the discussion that surrounded the adoption of a specific policy item.

Current version is at

<https://www.arin.net/participate/policy/nrpm/>



# Why is history important?

We are at the point in ARIN's organizational maturity where there is policy language that has potentially outlived its usefulness or refers to situations that have been overtaken by events (such as IPv4 runout).



# Why is history important?

There are cleanup efforts underway both from community-submitted policy proposals and Advisory Council working groups.

The historical context of why a given policy item is there can inform current discussion:

- When we are considering modification of existing policy language
- When we are considering deletion of existing policy language



# What is the PDP?

The Policy Development Process (PDP) is how changes to the NRPM are proposed, discussed by the community, and ultimately discarded or applied to the NRPM.

The PDP can be found at

<https://www.arin.net/participate/policy/pdp/>

# CliffsNotes™ PDP



- Proposal (prop-xxx)
- Draft policy (arin-YYYY-NN) (*community discussion*)
- Recommended Draft Policy (*community discussion*)
- AC meeting, motion to forward to the Board
- Board action validating that the public policy process has been followed

**Result:** edits and new NRPM version published

# Last two steps bunch stuff up

- *AC meeting, motion to forward to the Board*
- *Board action validating that the public policy process has been followed*

The final two steps in the timeline result in a small number of changes to the NRPM per year. In other words, fewer PDP changes per year than policy proposals. Finding out which version of the NRPM introduced or changed text is a good jumping off point for finding historical context.



# Other avenues into the NRPM



Special Policy Actions (Emergency PDP and Policy Suspension) are covered in Part Two Section 10 of the PDP. The PDP petition process is covered in Part Three of the PDP.

- We have had one case of emergency policy enactment (2009 transfer policy) and two cases of emergency policy suspension (2017? Renumbering-for-aggregation policy and 2019 waitlist suspension)
- Details of this avenue are out of scope for this discussion, but you can read the PDP at <https://www.arin.net/participate/policy/pdp/>

# Board action required

**Bottom line:** Board action is required for a change to the published PDP. You can get context by reading the Board minutes for the meeting preceding a change.

**Caveat:** How have Special Policy Actions been reflected in the published NRPM and git repo?

Special Policy Actions *may not result in a published change* to the NRPM because:

- They are intended to be temporary and ratified by the community at a future PPM
- “Publish an updated Number Resource Policy Manual” is not specifically called out as a step in PDP Part 2 Section 10 as it is in Part 2 Section 9 for the (regular) Policy Development Process.

# OK, so how do we find it?

- Can't just search for NRPM text in policy proposal archives.
- Line breaks pose a problem.

Before the first version of the PDP in 2009, there was the Internet Resource Policy Evaluation Process (IRPEP), which evaluated policy differently and did not require specific policy language.

History of the IRPEP, for the curious, can be found at:

[https://www.arin.net/vault/participate/meetings/reports/ARIN\\_XXII/PDF/tuesday/einar\\_OPH\\_IRPEP\\_History\\_LA.pdf](https://www.arin.net/vault/participate/meetings/reports/ARIN_XXII/PDF/tuesday/einar_OPH_IRPEP_History_LA.pdf)

The first version of the PDP was published on 7 January 2009. Various versions of the IRPEP and PDP can be found at

<https://www.arin.net/participate/policy/pdp/archive/>

# The Question

When probing history, the question we are trying to answer is:

***In what version of the NRPM  
did “this text” first appear?***

When we have that information, we can find out what policy proposal caused the text to be inserted, which leads to slide decks, mailing list discourse, etc.



# Good news, less work

A binary search\* of all archived versions of the NRPM would be possible, but painful.

Since 2018, the NRPM has been available in Markdown format as a Git repository.

*\* Binary search just means start in the middle of the timeline to see if the changes are more recent or less recent, then iterate until one finds the change.*

*Credit to Owen DeLong for making the suggestion and Sean Hopkins for all the hard work necessary to make NRPM-in-Git happen*



# What is Markdown?

- Markup language (i.e. basic text formatting) for use with a plain text editor
- Intended to be appealing to human readers in its source code form
- Not what-you-see-is-what-you-get (i.e. Word or Google Docs)
- Popular for use in online forums and wikis
- Developed in 2004 by John Gruber (daringfireball) and Aaron Swartz
- Examples on Wikipedia: <https://en.wikipedia.org/wiki/Markdown>



# What is Git?

- Version control system for programmers
- Use case was intended for Linux kernel developers
- Lots of mindshare in general use — most popular version control system today
- Works on text documents (like programs or Markdown) — not suited for binary file formats such as Word or PDF.
- Not really intended for timeline analysis of a single document, but it still works!



# NRPM + Markdown + Git

We can use Git to search for a section heading or a particular string being added to or subtracted from a file (in this case, there is only one file — the NRPM).



# Let's play with Git and NRPM

## Prerequisites and assumptions:

Because web and GUI-based Git repository explorers are varied in their features (Bitbucket is particularly lacking, unfortunately), and in the interests of making this tutorial be as cross-platform as possible, the following assumptions hold:

- You have at least enough comfort with using a command line shell to follow a cookbook approach
- You are running MacOS or Windows Subsystem for Linux (WSL2 Ubuntu flavor on Windows 10 or 11). If you're the kind of person who runs Linux on your laptop, you probably already have Git installed.



# How to install Git (Mac)

Git doesn't come installed on the Mac by default. If you don't have developer tools already installed, the quickest way to get Git installed is to open a terminal window and type:

```
xcode-select --install
```

Follow the pop-up window to install command line tools. This is a sizeable download and takes some time to run.

# How to install git (Linux)

For Ubuntu/Debian-flavored WSL2 on Windows or for actual Linux on laptop:

```
sudo apt-get update
```

```
apt-get install git
```

should do the trick



# Quick Git / NRPM tutorial

Let's see this in action with a research question:

**“We’re talking about removing the Autonomous System Originations field from Whois. When did that requirement go into the NRPM?”**



# Cloning the NRPM repository

```
git clone https://bitbucket.org/arin-rir/number-resource-policy-manual.git
```

```
barenfang:~ rs$ cd number-resource-policy-manual
barenfang:number-resource-policy-manual rs$ ls -l
total 208
-rw-r--r-- 1 rs staff 102171 Nov 4 16:41 nrpm.md
-rw-r--r-- 1 rs staff 1280 Nov 4 16:41 readme.md
barenfang:number-resource-policy-manual rs$
```

Note that there are only two files here, the NRPM itself and a “readme” file, which by convention tells you about what’s in the repo.

# Updating your clone

If you did your clone in the past, run

```
git pull
```

inside the NRPM directory to make sure you're up to date with the latest version.



# Let's do some searching

We're going to use the `git log` command to search for two kinds of event:

- "string/regexp instance appears in file"
- "string/regexp instance disappears from file"

Today we are going to be working just with strings.

You can find more info on regexps (regular expressions) in the advanced/protips additional slides.



# Example Search/Results



```
barenfang:number-resource-policy-manual rs$ git log -S "Autonomous System  
Originations" --source --all
```

```
commit 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed refs/tags/2007.1  
(tag: 2007.1)
```

```
Author: Sean Hopkins sean@arin.net
```

```
Date: Wed Sep 5 09:19:42 2018 -0400
```

```
2007.1
```

```
barenfang:number-resource-policy-manual rs$
```

# What does this look for?

- It finds changes with that string either appearing or disappearing.
- It does *not* find changes within a section with that title!
- Remember that Git knows nothing about Markdown (or any other text formatting or programming language).
- Git knows about line by line and that's it



# Let's deconstruct...

```
barenfang:number-resource-  
policy-manual rs$ git log  
-S "Autonomous System  
Originations" --source --all
```

```
commit  
29b7162a823405d7c2dd3aea7ed3  
bb3e3dc079ed  
refs/tags/2007.1  
(tag: 2007.1)  
Author: Sean Hopkins  
sean@arin.net  
Date: Wed Sep 5 09:19:42  
2018 -0400
```

2007.1

```
barenfang:number-resource-  
policy-manual rs$
```

- Date is the actual date Sean committed the text into the git repo, not the "real date when the changes were made"
- For changes that were pre-2018, these are the dates (in 2018) that Sean built the Git repo.
- For more recent dates, they are a short period of time after the Board meeting, but to-the-day correctness for commit showing when a policy went into effect should not be relied upon.
- We will use the commit identifier (long hex number after "commit") in a moment. By convention, the commit comments and tags reflect the version of the NRPM for this change (2007.1).

# So what changed?

```
git format-patch --stdout -1 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed
```

- Output in "unified diff" format
- Ancient format intended for computers
- Still human-friendly
- Shows its age by starting its output with email headers. You can ignore these since you're not emailing them.



# Taxonomy

@@	Specifies a range of lines for context. Patching program needs this, you can safely ignore it.
- - - or +++	Versioned filename for diff. You can safely ignore this.
[blank space]	Existing line surrounding changes. Useful to humans.
+ or -	Line that was added (+) or removed in this commit

Note that the changes are handled a line at a time; even the most trivial change to a line will result in a + and a - to show the change. It is also presented a screen at a time; hitting the spacebar will take you to the next screenful.

# So what changed?

```
barenfang:number-resource-policy-manual rs$ git format-patch --stdout -1 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed
From 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed Mon Sep 17 00:00:00 2001
From: Sean Hopkins <sean@arin.net>
Date: Wed, 5 Sep 2018 09:19:42 -0400
Subject: [PATCH] 2007.1
```

```
---
nrpm.md | 40 ++++++++++++++++++++++++++++++++++++++-----
1 file changed, 33 insertions(+), 7 deletions(-)
```

```
diff --git a/nrpm.md b/nrpm.md
index 58bc5d8..01ee95a 100644
--- a/nrpm.md
+++ b/nrpm.md
@@ -1,6 +1,6 @@
 ARIN Number Resource Policy Manual

-Version 2006.3 - 20 December 2006
+Version 2007.1 - 28 March 2007
```

## Abstract

```
@@ -22,6 +22,12 @@ This is ARIN's Number Resource Policy Manual (NRPM). It is available at: http://
## 3.3. Privatizing POC Information
## 3.4. Routing Registry
### 3.4.1. Acceptable use policy
+## 3.5 Autonomous System Originations
+### 3.5.1 Collection
+### 3.5.2 Publication
+#### 3.5.2.1 Description of data
+#### 3.5.2.2 Bulk publication of data
+#### 3.5.2.3 Other formats
# 4. IPv4
```

# Changes emphasized



```
barenfang:number-resource-policy-manual rs$ git format-patch --stdout -1 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed
From 29b7162a823405d7c2dd3aea7ed3bb3e3dc079ed Mon Sep 17 00:00:00 2001
From: Sean Hopkins <sean@arin.net>
Date: Wed, 5 Sep 2018 09:19:42 -0400
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## Abstract

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# 4. IPv4
```



# Looking for Board action

Now that we know when the changes were made, we can go looking for Board minutes, which will likely tell us what proposal resulted in the changes:

<https://www.arin.net/about/welcome/board/meetings/>

Pre-2019 in the vault:

[https://www.arin.net/vault/about\\_us/bot/index.html](https://www.arin.net/vault/about_us/bot/index.html)

# Policy Proposals and Drafts

Indices at:

<https://www.arin.net/participate/policy/proposals/>

<https://www.arin.net/participate/policy/drafts/>

Note that drafts above lists prop-numbers and that one must expand to show draft numbers

*We should make a request for ARIN staff to modify the presentation on the website so that it's all expanded and trivially searchable with browser search.*

# ...or just use a search engine

It turns out that “Autonomous System Originations” was a result of 2006-3.

A Google search for “arin 2006-3” will find slide decks from ARIN meetings.

Likewise, a search for “inurl:lists.arin.net 2006-3” will find mailing list discussions.



# Review presentations / mail

A lot of insight can be gained as to what problem was being solved by reviewing slide decks and email threads on the Public Policy Mailing List, etc.

These can inform current discussions and offer insight as to what problems policy authors were attempting to solve years before.





Thanks!

Any

Questions?



# PROTIP SLIDES

# Regular Expressions

use **-G** instead of **-S** to search for a regular expression  
(if that's what you want):

```
barenfang:number-resource-policy-manual rs$ git log -G '^## 8.3' --source -all  
commit f5000b23854b4641631e6915cfb4322a386598dc refs/tags/2019.1 (tag: 2019.1)  
Author: Sean Hopkins sean@arin.net  
Date: Thu Mar 7 11:20:49 2019 -0500  
    2019.1
```

```
commit c9aa2d768b48cc3d75c1530ad28f4b4e0d176915 refs/tags/2012.3 (tag: 2012.3)  
Author: Sean Hopkins sean@arin.net  
Date: Wed Sep 5 09:28:33 2018 -0400  
    2012.3
```



# Diffs over Time

- So far we have only looked at changes for a single commit.
- We can see all the commits with just `git log` and can see all the changes between two commits by simply specifying both of them.

```
git diff f5000b23854b4641631e6915cfb4322a386598dc HEAD
```

(HEAD is shorthand for the most recent commit)