

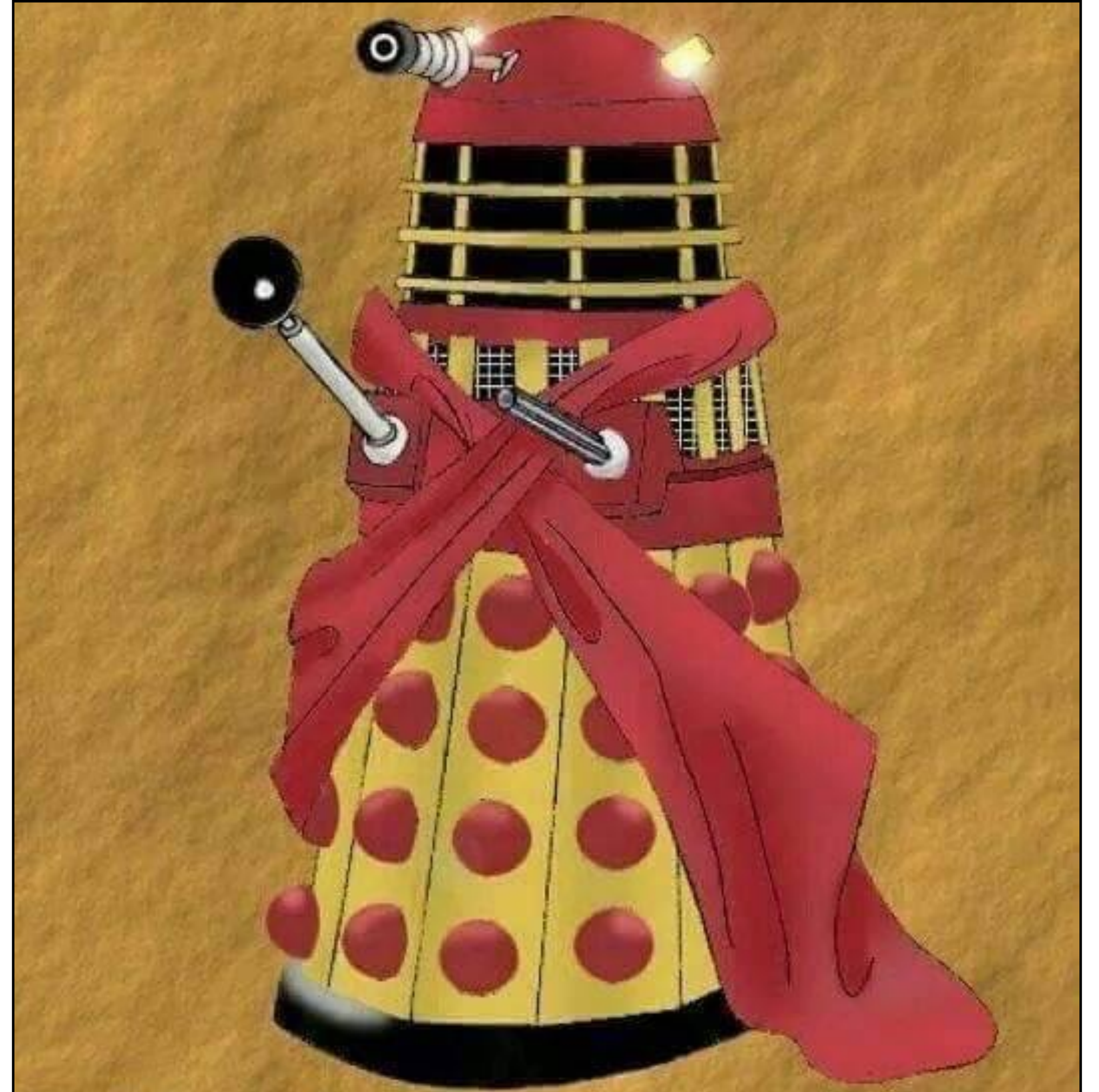
A funny thing happened to me on the way to prisoner.iana.org

A Rabbit Hole in Four Acts

Joe Abley, June 2024

Act I

The AS112 Project



AS112

Unintended Consequences

- In the beginning there was RFC 1034
 - Root Servers, "Reverse DNS" and `IN-ADDR.ARPA`
- RFC 1918 designates certain IPv4 addresses as private-use
 - Private-use addresses still have reverse DNS
 - Lots of local-scope queries start landing on the root servers, which are intended to provide global-scope responses
- AS112 (named after the AS number that happened to be used, see later)

AS112

Deploy some Nameservers

- Acquire some IPv4 address space and an AS number from ARIN
 - 192.175.48.0/24, AS112 (hence the project name)
- Deploy some nameservers to act as sinkholes for this garbage query traffic
 - PRISONER.IANA.ORG (192.175.48.1)
 - BLACKHOLE-1.IANA.ORG (192.175.48.6)
 - BLACKHOLE-2.IANA.ORG (192.175.48.42)
- Chaotic, uncoordinated, libertarian anycast

AS112

Delegate some Zones

- The following DNS zones were delegated to `BLACKHOLE-{1, 2}.IANA.ORG`
 - `10.IN-ADDR.ARPA (RFC1918)`
 - `{16...31}.172.IN-ADDR.ARPA (RFC1918)`
 - `168.192.IN-ADDR.ARPA (RFC1918)`
 - `254.169.IN-ADDR.ARPA (RFC6890)`
- `PRISONER.IANA.ORG` is used in the `SOA.MNAME` of those zones, and hence mainly receives DNS UPDATE traffic

AS112

Documentation (many years later)

- RFC 7534 "AS112 Nameserver Operators"
 - how to set up and operate your own AS112 server
 - also specifies IPv6 addresses for the AS112 nameservers
- Written many years after the fact, and is careful to introduce changes to the historical schemes that are backwards-compatible
 - IPv6 addresses introduced but IPv4-only servers are still fine
 - DNAME redirection option introduced, see next

AS112

Adding Zones to AS112

- Since
 - delegating zones to nameservers that are not configured to serve them results in a lame delegation, which is the opposite of BCP, and
 - the AS112 anycast clouds are anarchic and decentralised by design
- it follows that
 - delegating new zones to AS112 nameservers will result in lame delegations.
- For this reason a separate mechanism was defined using DNAME.

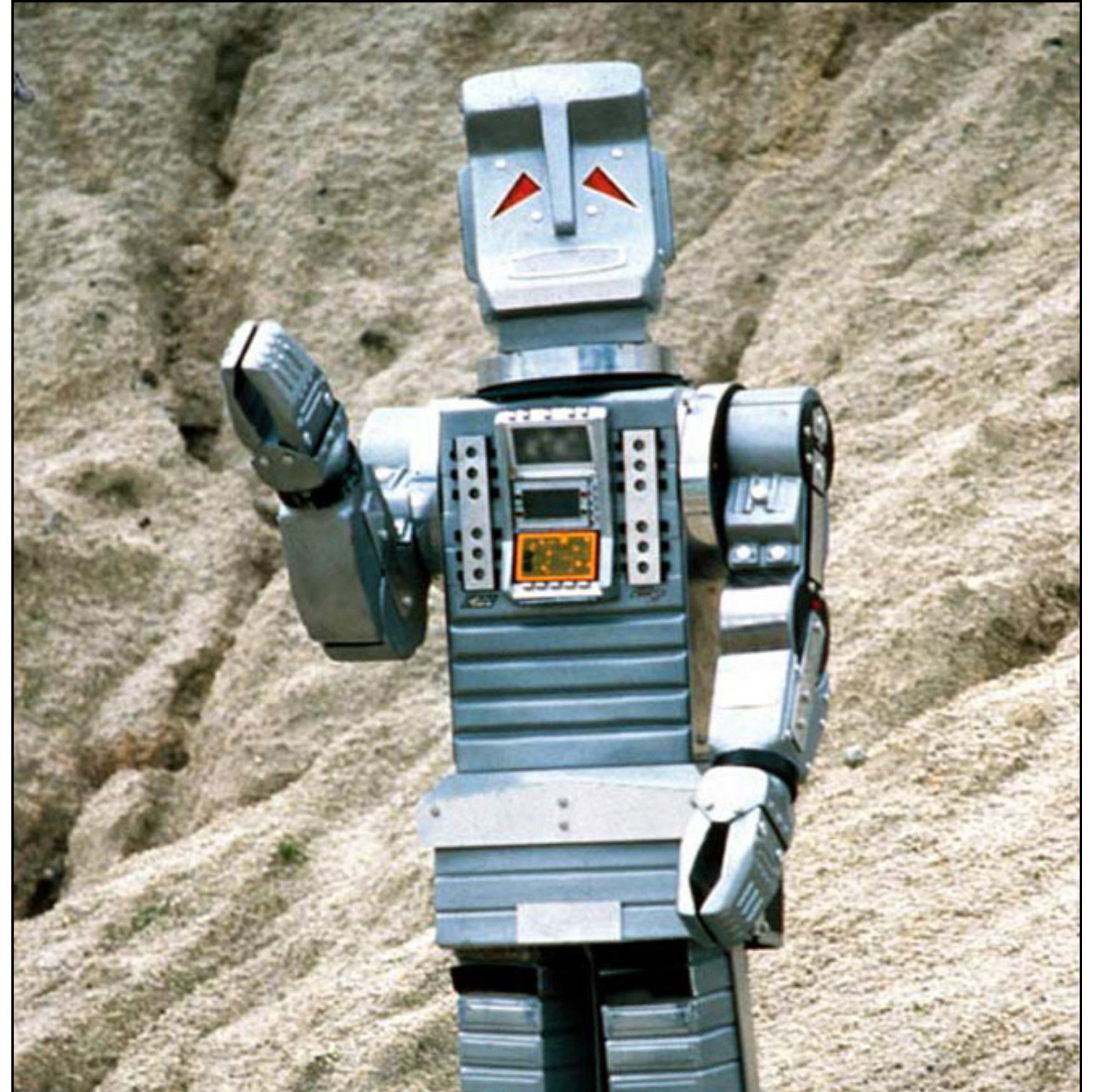
AS112

DNAME Redirection

- Deploy a new anycast nameserver
 - `BLACKHOLE.AS112.ARPA (192.31.196.1, 2001:4:112::1)`
- Delegate the zone `EMPTY.AS112.ARPA` to that server and host it as an empty zone
- Instead of delegating new zones to AS112, use DNAME
 - `NEWZONE.EXAMPLE.ORG. IN DNAME EMPTY.AS112.ARPA.`
- Ta-dah! No lame delegations

Act II

IETF Standards Process



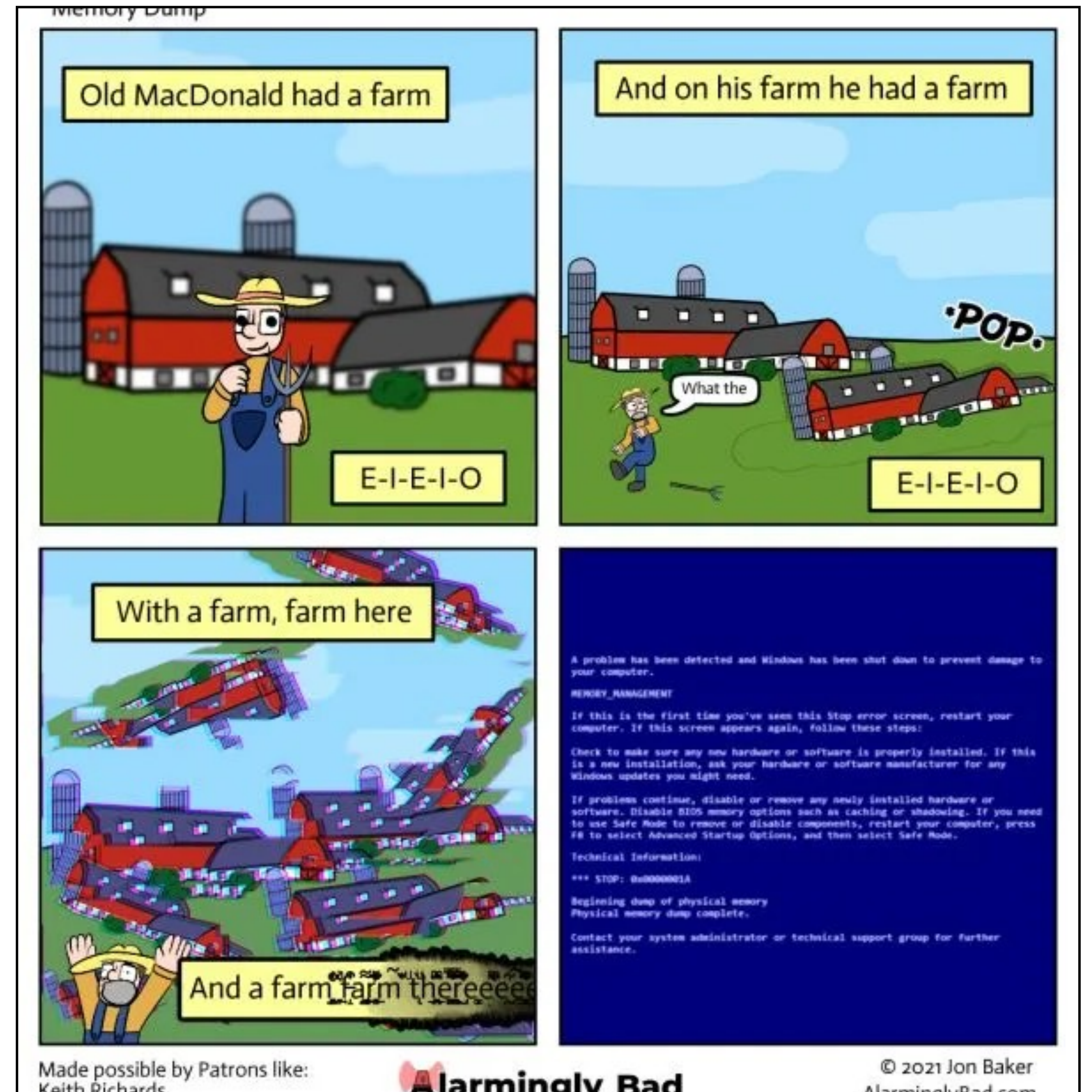
IETF

People Notice AS112 Exists

- RFC 7788 defines the use of `HOME.ARPA` and directs the IANA to delegate the zone to `BLACKHOLE-1.IANA.ORG` and `BLACKHOLE-2.IANA.ORG`
 - small facepalm
- RFC-to-be draft-ietf-dnssd-srp-25 defines the use of the `SERVICE.ARPA` zone and directs the IANA to delegate the zone to... you get the idea
- These seem like mistakes, but two mistakes start to look like a trend
 - Suggested during the late stage of draft-ietf-dnssd-srp publication process that the authors change the text to specify `DNAME`, not delegations

Act III

IANA



IANA

Computer says No

- The IANA observed that specifying DNAME instead of delegation would result in a DNAME being provisioned in the `arpa` zone
 - The `arpa` zone is served by root servers (not all the root servers)
 - The root servers have never been asked to serve a DNAME before
 - The root zone is served by root servers (not all the root servers)
 - The root zone is special and important
 - The IANA does not want to make a request to root server operators to do a thing that might be difficult
- The IANA says no

IANA

Actually, it's complicated

- The organisation that has administrative authority over the ARPA top-level domain is the IAB (RFC 3172)
- The IANA has been talking to the IAB for quite some time about a plan to move the ARPA zone off the current nameservers (12 of the 13)
 - this has mainly been a philosophical exercise, but now there is a use case
 - that conversation is scheduled for revitalisation
- The IANA is not actually saying no, they are saying they are not the right people to say yes or no

Act IV

RSSAC, RZERC, ICANN



If the root zone could use DNAME

Then maybe this would solve the problem?

- Other novel RRTYPEs have appeared in the root zone
 - nobody really asked about AAAA, mainly just looked the other way
 - DNSSEC RRs were inserted as part of agreement between DoC NTIA, RZM and IANA
 - RZERC recommended ZONEMD
- DNAME has been discussed in the root zone before, in the context of mechanisms that might be used to support variants
 - ICANN commissioned an independent report to try to identify any concerns about its use, and none were found
 - Wait, somebody said "variants", this is Godwin's Law for the root zone

Act IV (b)

The Root Server System



The Root Server System

No Fear of DNAME

- Informally, various people affiliated with root server operators who were speaking as individuals and not on-the-record, certainly not expressing any opinions about what might or not be possible said
 - "DNAME seems fine"
 - "The IANA should ask us whether DNAME is fine and we will say yes"
- But see before, it's not just a matter of that, maybe
 - It's complicated

Next Steps

There is actually a glimmer of light at the end of this inconsequential and obscure tunnel



Recipe for Success

For Great and Glorious Future AS112

1. IANA revitalises its conversation with the IAB, and maybe there can be new servers for ARPA that are not root servers, or
2. Root Server Operators tell IANA that they are happy to serve an ARPA zone that includes one or more DNAME RRs, or some variant thereby
3. Write an applicability statement for AS112 in the RFC series that specifies the use of DNAME for the kinds of reasons that gave us HOME.ARPA and SERVICE.ARPA and provides clear guidance for how to ask for it
4. Write a clean-up document in the RFC series that updates RFC 7788 and whatever draft-ietf-dnssd-srp-25 becomes and directs the IANA to replace the delegations from ARPA with DNAME

Future Ambition

Because Pain is Gain

- Figure out how to do the same with the original AS112 zones, 10.IN-ADDR.ARPA and friends, maybe? Or maybe not.
- Consider whether to specify DNAME redirection for other zones, perhaps those specified as locally-served in RFC 6303
- Figure out what interesting measurement opportunities there are in a future transition from delegation of those zones to redirection
- Reconsider life-choices as relates to spare time
- Therapy

Fin