RPKI and Internet Routing Security
~ The regional ISP operator view ~

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Agenda

- Routing practices of the regional ISP today
- How this may change with RPKI and what may improve

Question: Routing Infrastructure today

- What data sources do we trust, to keep “my routing table” a sensible one so I can route my customers packets to their rightful destination and not have angry calls at me?
- Is the data we rely on good enough?
- What actions do we take with those data?
- Are those methods/actions good enough to keep my customers happy?

My view

- What data sources do we trust for routing?
  - Various IRRs
    - RADB, ALTDB, NTTCOM, JPIRR……
  - Registry Databases
  - Projects
    - REX, Team Cymru, Route Views, etc
  - e-mail
  - web or ftp sites
    - Sites provided by IANA, registries, etc.
  - Social gatherings?

My view

- Is the data we rely on good enough?
  - On a regional scale, maybe.
    - JPIRR, an IRR run by JPNIC is very clean.
    - Current methods, plus the effort to keep data sources clear and accurate may work in small countries.
  - Maybe not enough on a global scale.
    - Not all routed ASes are on IRRs.
    - e-mails are full of typo's. IPv6 make things worse. (draft-ietf-6man-text-addr-representation)
    - Many mistakes on IRRs. Resolving problems can be hard on global scale.

My view

- What actions do we take with those data?
  - Mostly a static filter generation. (prefix, as-path, BGP community, etc)
  - We tend to keep filters on the safe side.
- Are these methods/actions good enough to keep my customers happy?
  - The time has come to go one step further.

The possibility that data source may show incorrect data, is holding us from implementing a strong prevention against misuse.

But the internet has worked fine for me… why would I need to do something different?

Why RPKI ?

- Continuous routing incidents, with big impacts
  - YouTube Hijacking, etc.
  - attacks may come from anywhere.
- The hopes for a safe and secure “internet as an infrastructure”.
- Resources depleting.
  - IPv4 address transfers.
    - allows for divide and transfer.
  - smaller route advertising, more bogus routes (not necessarily bogons).

Reliability of resources and routes are in need.

What is RPKI ?

Resource Public Key Infrastructure

- X.509 certificate style
- Number resources (prefix, as-numers)

SSL certs validate domains ⟺ RPKI certs validate IP and ASN

A simple way of understanding this.

A framework to use X.509 Certificates on AS numbers and IP address resources, to make Internet routing secure by means of a trustable data source.

Certificate types and functions at a glance

Certificate types

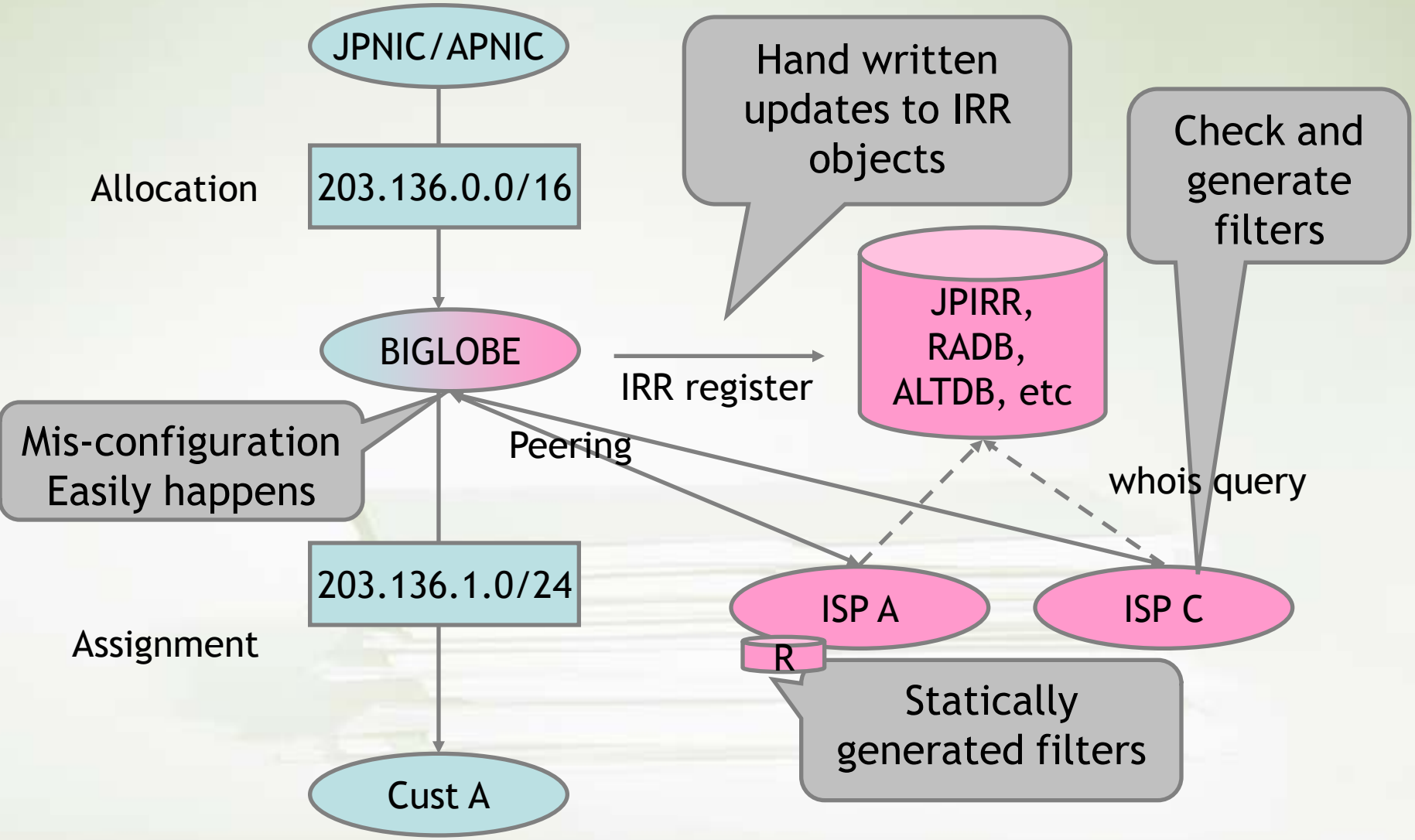
1. Resource Certificate (CA or EE):
   - IPv4/IPv6 prefixes
   - AS numbers

Functions using the Certificates

1. Route Origin Authorization (ROA)
   - Ties between a prefix and an AS number that routes it. Signed by a Cert.

There's more, see IETF SIDR-WG work for more.

Address Allocation and Routing today

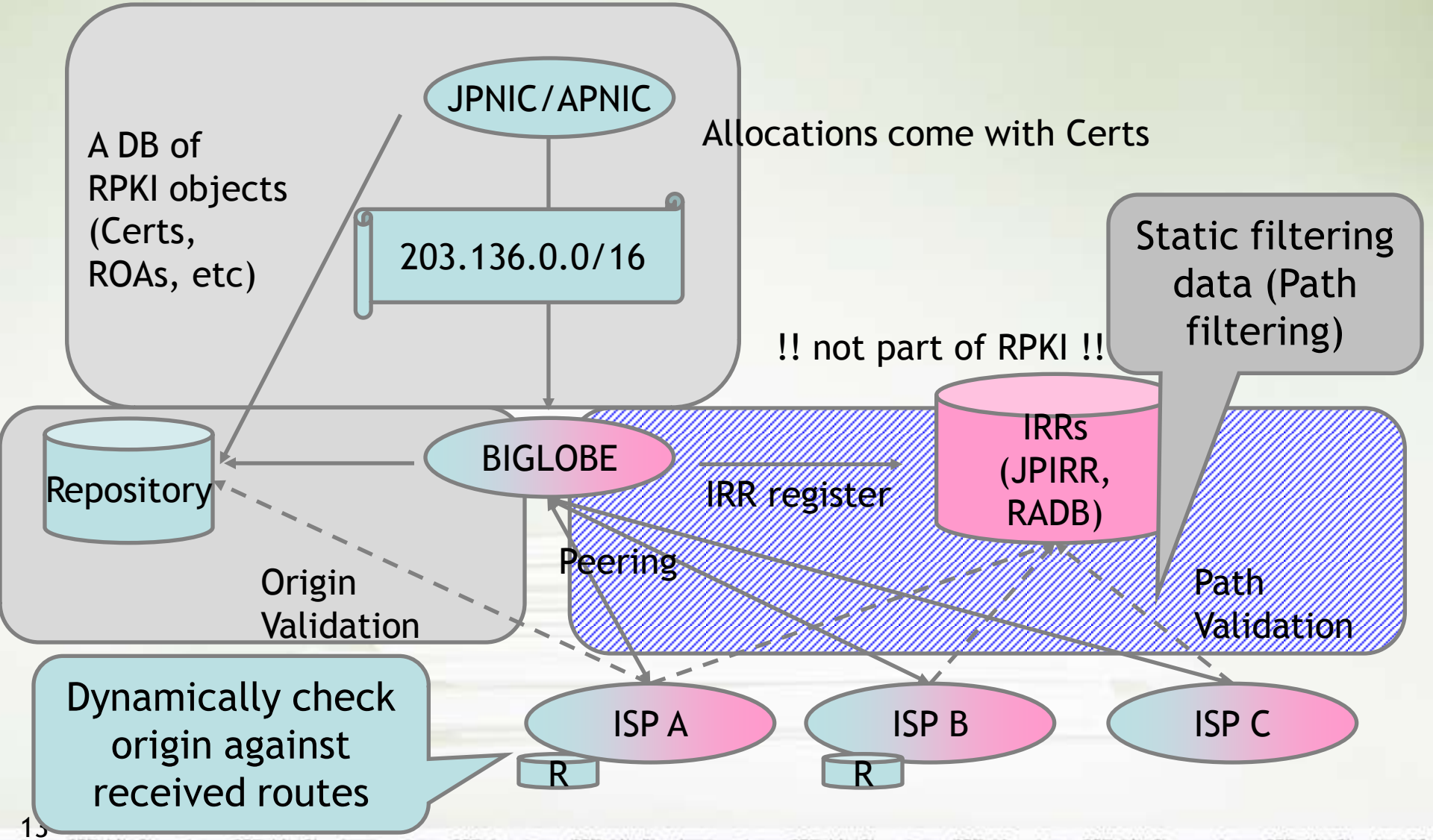


Key aspects of the RPKI architecture

- RIRs will give you a Certificate showing you the rightful owner.
  - Cannot transfer resource without proper transactions.
- The rightful prefix owner only, can associate an AS number with the prefix.
  - No one else can do this. Requires a valid cert.
- Check against received routes.
  - Router can query the RPKI data to see if the origin and AS number do actually match with a signed object.

Disclaimer : This hasn't happened yet. The following slides are my imagination of what may happen.

Imagination: So what's it going to be like?



Imagination: What will change for ISPs?

- Address management teams will have to deal with certificates.
  - If you have customers, then you may have to issue certs.
  - Key management may become part of job.
- Routing team will have to create new objects (ROAs), manage them, and possibly create them for customers as well.
- Routers may have to be configured to accept data collected from the repositories to validate routes against ROAs.
- PIs will need Certificates and ROAs also.

Imagination: Players involved

- Routing operators
  - If you use IRR as part of your job, you have something new to play with.
  - IRR will stick around for a while, but we should stop the “e-mail” culture and rely more on these tools.
- Address management team
  - Get used to PKI, or find someone who’s good with it.
- Customer support
  - If you have BGP customers, you may need to have a user interface to cover for RPKI.
- NOC
  - The top level engineers should be aware of RPKI.

What should ISPs do?

- Don’t panic
  - NIRs have not even started.
  - Just having a certificate will not do much just yet.

- Where is all the talk happening?
  - IETF (sidr-WG)
  - RIRs

- What should I do now?
  - Do the best that you can do
    - Use IRRs properly, don’t hijack people’s route, be aware of hijacked routes, be aware of reachability of your prefixes, use tools, etc
  - Get interested in RPKI. Try it out.