# Auto-Detecting Hijacked Prefixes?

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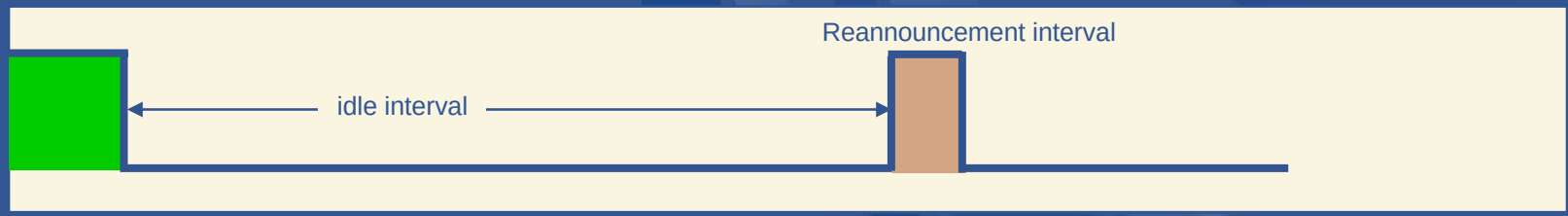
# Address Hijacking

- Is the unauthorized use of an address prefix as an advertised route object on the Internet
  - It's not a bogon
    - the address block has been assigned by an RIR for use
  - It may include identity fraud
    - this may involve misrepresentation of identity in order to undertake a database change
  - It's commonly associated with identity cloaking
    - Spam generation, attack launching platforms, etc
- How prevalent is this?
  - Very hard to isolate hijacking incidents

# What is a hijack signature?

- What address blocks would not be noticed if they were used for a short period?
  - Has been unadvertised for a ‘long time’
  - Is used only for a ‘short time’
  - Uses an entirely different origin AS and first hop AS
  - Is not covered by an aggregate announcement



# Data Collections

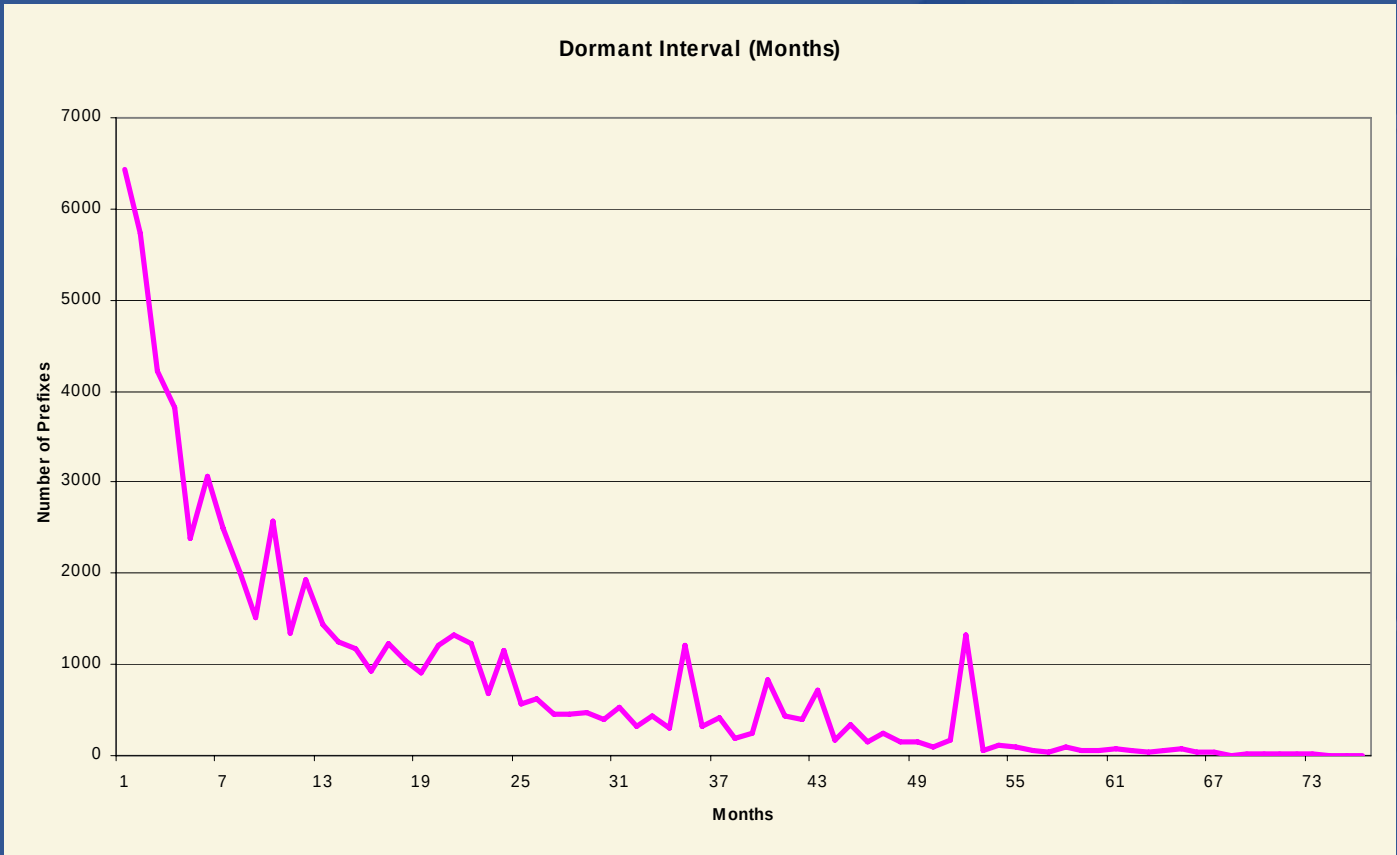
- Aggregated BGP route collection data
- Can provide information for any prefix:
  - When was this prefix advertised and withdrawn?
  - What was the announcing AS?
  - What was the first hop AS?
  - What other prefixes were also advertised at the same time?

# Noise reduction in BGP data

- BGP update logs are unhelpful here
  - The high frequency noise of BGP convergence is different from the longer frequency signal of prefix use through network connectivity and prefix advertisement
- Use successive static BGP snapshots
  - Highest frequency component of 2 hours reduces protocol-induced noise

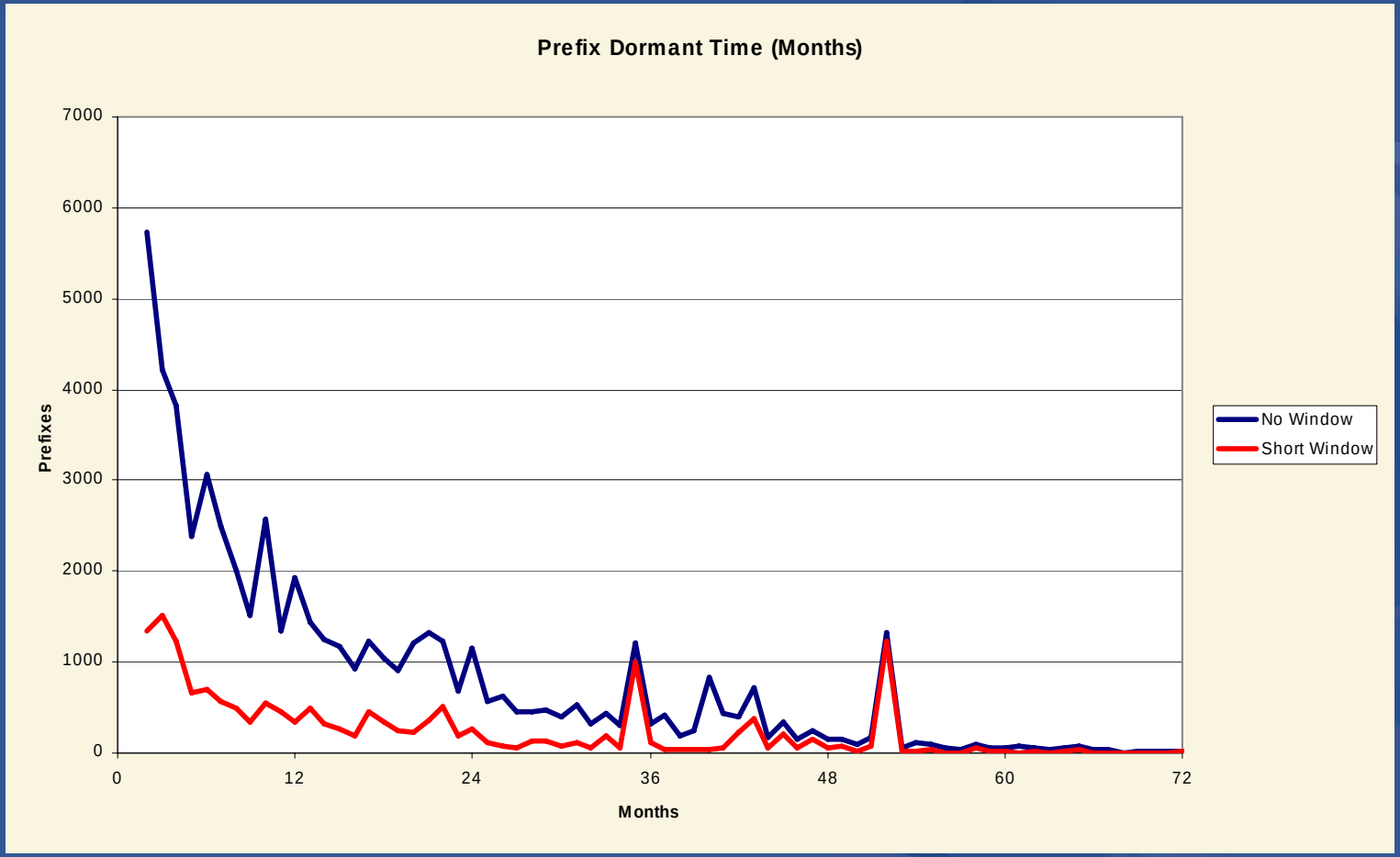
# Initial results

- Readvertisement of prefixes with different Origin AS and First Hop AS



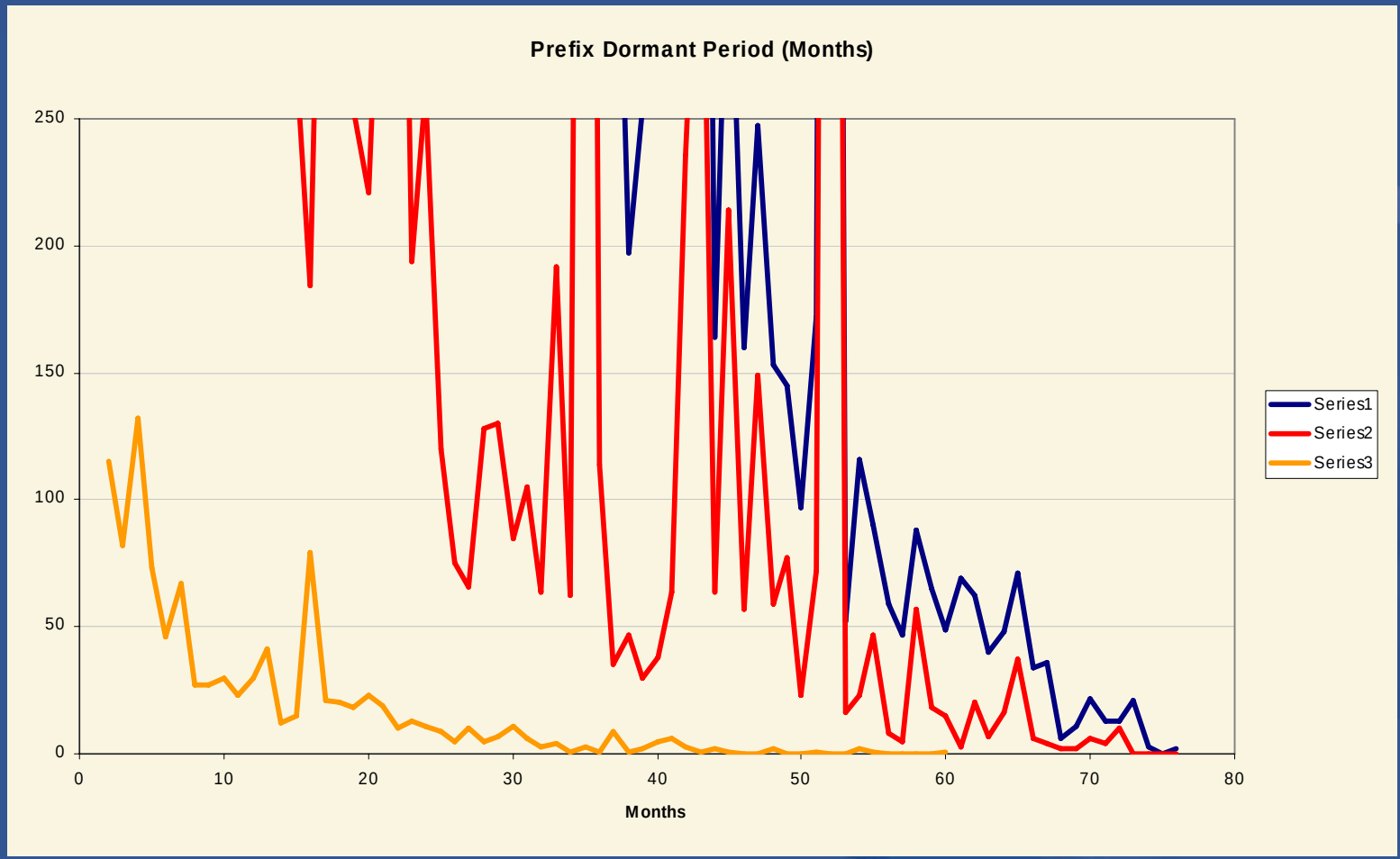
# 2nd Pass

- Very short window announce
  - > 2 months down, < 3 days up, > 1 month down



# 3rd Pass

- Short window
  - > 2 months down, 5 - 14 days up, > 1 month down



# Some comments

- Address announcement patterns do not appear to be a reliable hijack indicator in isolation.
  - There is no clear signature in the patterns of prefix appearance that forms a reliable indicator of misuse.
- Address use profiles can assist in the process of identifying address hijacking for suspect prefixes.
  - Additional information is necessary to reliably identify candidate hijack prefixes.
- Careful checking of the provenance of an address before accepting it into the routing system make good sense
  - But thorough checks of a prefix's history of use as a precondition to accepting it into the local routing session as a valid advertisement consume time and increase an ISPs' operating overhead costs

It’s not a very reassuring answer.

# Address and Routing Security

The basic routing payload security questions that need to be answered are:

- Is this a valid address prefix?
- Who injected this address prefix into the network?
- Did they have the necessary credentials to inject this address prefix?
- Is the forwarding path to reach this address prefix an acceptable representation of the network's forwarding state?

# Address and Routing Security

What we have today is a relatively insecure system that is vulnerable to various forms of deliberate disruption and subversion

Address hijacking is just one aspect of the insecurity of the Internet's routing system

# What I really would like to see…

The use of a public key infrastructure to support attestations that allow automated validation of:

- the **authenticity of the address object** being advertised
- **authenticity of the origin AS**
- the **explicit authority** given from the address to AS that permits a routing announcement

# What would also be good…

- If the attestation referred to the address allocation path
  - use of an RIR issued certificate to validate the attestation signature chain
- If the attestation was associated with the route advertisement
  - Such attestations to be carried in BGP as an Update attribute
- If validation these attestations was treated as a route object preference indicator
  - Attestation validation to be a part of the BGP route acceptance process



# But…

We are nowhere near where we need to be:

- We need more than “good router housekeeping” – it’s trusting the protocol payload as well as trusting the protocol’s operation and the routing engines
- We need so much more than piecemeal distributed 2nd hand bogon and martian lists, filters and heuristics about use patterns for guessing at ‘bad’ addresses and ‘bad’ routes
- We need to adopt some basic security functions into the Internet’s routing domain:
  - **Injection of reliable trustable data**
    - Address and AS certificate PKI as the base of validation of network data
  - **Explicit verifiable mechanisms for integrity of data distribution**
    - Adoption of some form of certification mechanism to support validation of distributed address and routing information

# Oh yes, and about address hijacking…

- This type of resource security framework would make address hijacking much harder to perform!

# Questions?