



BGPalerter: BGP and RPKI monitoring

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BGPalerter

BGPalerter is a tool for analyzing streams of eBGP data

- We developed it for monitoring NTT prefixes
 - hijacks, visibility loss, unexpected changes of configuration
- We released it open-source (BSD-3-Clause)
 - <https://github.com/nttgin/BGPalerter>
- It works in real time
- It's easy to use
 - Includes auto configuration
 - No data collection needed

Motivations

- Monitoring the correctness of BGP is a fundamental activity for any actor operating on the public Internet
- Monitoring BGP is not only useful for identifying hijacks committed by other ASes, but especially for timely identifying what your AS is doing. E.g.
 - Identify a prefix you were not supposed to announce
 - Identify a loss of visibility due to a wrong just-deployed configuration

Motivations

- In an Internet composed of thousands of network players, with different levels of automation and expertise, providing free and easy to use tools for monitoring the correctness of BGP is a key operation in improving the stability of the global Internet

What you can monitor

- Any of your prefixes loses visibility.
- Any of your prefixes is hijacked.
- Your AS is announcing RPKI invalid prefixes.
- Your AS is announcing prefixes not covered by a ROAs.
- Your AS is announcing a new prefix that was never announced before.
- One of the AS path used to reach your prefix matches a specific condition defined by you (regular expression).

Example of BGPalerter notification

visibility

The prefix 165.254.225.0/24 (description 1) has been withdrawn. It is no longer visible from 4 peers.

visibility

The prefix 2a00:5884::/32 (alarig fix test) has been withdrawn. It is no longer visible from 4 peers.

hijack

A new prefix 165.254.255.0/25 is announced by AS4, and AS15562. It should be instead 165.254.255.0/24 (description 2) announced by AS15562

hijack

A new prefix 2a00:5884:ffff:/48 is announced by AS208585. It should be instead 2a00:5884::/32 (alarig fix test) announced by AS204092, and AS45

hijack

The prefix 2a00:5884::/32 (alarig fix test) is announced by AS15563 instead of AS204092, and AS45

newprefix

Possible change of configuration. A new prefix 2a00:5884:ffff:/48 is announced by AS204092. It is a more specific of 2a00:5884::/32 (alarig fix test).



Setup

<https://github.com/nttgin/BGPalerter>

nttgin / BGPalerter

Unwatch

31

Star

285

<> Code

Issues 7

Pull requests

Actions

Projects

Security

Insights

Settings

master 3 branches 14 tags

Go to file

Add file

Code

massimocandela bring back validation cycle period to 100 ms ✓ e890275 4 hours ago 978 commits

.github	Update stale.yml	6 months ago
docs	v1.26.0 release hotfix (#295)	2 days ago
src	bring back validation cycle period to 100 ms	4 hours ago
tests	hotfix vrp file reloading (#298)	6 hours ago
.babelrc	ugraded to babel 7	13 months ago
.eslintrc.json	added mocha support for esling	9 months ago
.gitignore	hotfix vrp file reloading (#298)	6 hours ago
.hound.yml	Update .hound.yml	9 months ago
.npmignore	hotfix vrp file reloading (#298)	6 hours ago
travis.yml	v1.26.0 release hotfix (#295)	2 days ago
AUTHORS	proxv support (#234)	2 months ago

About

Software to monitor streams of BGP data. Pre-configured for real-time detection of visibility loss, RPKI invalid announcements, and hijacks.

bgp

monitoring

Readme

BSD-3-Clause License

Releases 14

v1.26.0 Latest

2 days ago

+ 13 releases

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BGPalerter | INNOG3 Packages

Setup

Latest release

v1.26.0

e890275

Compare

v1.26.0

 massimocandela released this 2 days ago

[features]

- Introduced proxy support.
- Introduced `volume` parameter. It allows to specify a directory that will be used by BGPalerter for reading/writing all needed files.
- Introduced `persistStatus` parameter. If set to true, when BGPalerter is restarted the list of alerts already sent is recovered. This avoids duplicated alerts. [#103](#).
- Introduced reportTelegram.
- Added the possibility to specify an external file for as VRPs list for monitorRPKI.
- Added UDP support on reportSyslog.

Assets 5

 bgpalerter-linux-x64	61.4 MB
 bgpalerter-macos-x64	61.5 MB
 bgpalerter-win-x64.exe	57.4 MB
 Source code (zip)	
 Source code (tar.gz)	

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Setup

- Download and run. That's all.

```
wget https://github.com/nttgin/BGPalerter/releases/latest/download/bgpalerter-linux-x64
```

```
chmod +x bgpalerter-linux-x64
```

```
./bgpalerter-linux-x64
```

Setup - auto-configuration

```
BGPalerter, version: 1.24.0 environment: production
```

```
Loaded config: /Users/massimocandela/Documents/work/BGPalerter/config.yml
```

```
? The file prefixes.yml cannot be loaded. Do you want to auto-configure BGPalerter?
```

```
Yes
```

```
? Which Autonomous System(s) you want to monitor? (comma-separated, e.g. 2914,3333)
```

```
2914
```

```
? Are there sub-prefixes delegated to other ASes? (e.g. sub-prefixes announced by customers) Yes
```

```
? Do you want to be notified when your AS is announcing a new prefix? Yes
```

Run!

```
BGPalerter, version: 1.26.0 environment: production Loaded  
config: /home/bgpalerter/production/config.yml Monitoring  
165.254.225.0/24  
Monitoring 165.254.255.0/24  
Monitoring 192.147.168.0/24  
Monitoring AS2914
```

- The auto-configuration runs only the first time
- If your prefixes are not covered by ROAs, a warning will ask you to review prefixes.yml by hand

Report on file

```
[massimo@bgpalerter:~$ tail -f logs/reports-2019-09-22.log
2019-09-22T00:47:21.681Z [production] verbose: A new prefix 1.22.84.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.681Z [production] verbose: A new prefix 1.22.72.0/23 is announced by AS45528. It should be instead
2019-09-22T00:47:21.681Z [production] verbose: A new prefix 1.22.84.0/22 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.22.72.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.22.94.0/23 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.23.83.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.22.85.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.22.86.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.23.88.0/24 is announced by AS45528. It should be instead
2019-09-22T00:47:21.682Z [production] verbose: A new prefix 1.23.87.0/24 is announced by AS45528. It should be instead
```

Reports

- Alerts are automatically bundled/throttled
- At the moment alerts can be delivered to:
 - **Files, Email, Slack, Alerta dashboard, Kafka, Syslog, Webex, Mattermost, Telegram, Pushover, any HTTP end-point**
- Users groups allow to deliver alerts about specific resources, or about specific types of issue, to specific set of users/targets
- Also the BGP messages can be sent to files, another monitoring system, or database

Report by email

The prefix 165.254.255.0/24 (Job) is announced by AS2914 instead of AS15562

DETAILS:

```
-----
Monitored prefix:      165.254.255.0/24
Prefix Description:    Job
Usually announced by: AS15562
Event type:           basic-hijack-detection
Now announced by:     AS2914
Now announced with:   165.254.255.0/24
When event started:   2019-08-15 09:10:05 UTC
Last event:           2019-08-15 09:10:05 UTC
Detected by peers:    1
See in BGPlay:        https://stat.ripe.net/widget/bgplay#w.resource=165.254.255.0/24&w.ignoreReannouncements=true&w.starttime=1565859905&w.endtime=1565860205&w.rrcs=0,1,2,5,6,7,10,11,13,14,15,16,18,20&w.type=bgp
```

Report on Slack

visibility

The prefix 165.254.225.0/24 (description 1) has been withdrawn. It is no longer visible from 4 peers.

visibility

The prefix 2a00:5884::/32 (alarig fix test) has been withdrawn. It is no longer visible from 4 peers.

hijack

A new prefix 165.254.255.0/25 is announced by AS4, and AS15562. It should be instead 165.254.255.0/24 (description 2) announced by AS15562

hijack

A new prefix 2a00:5884:ffff:/48 is announced by AS208585. It should be instead 2a00:5884::/32 (alarig fix test) announced by AS204092, and AS45

hijack

The prefix 2a00:5884::/32 (alarig fix test) is announced by AS15563 instead of AS204092, and AS45

newprefix

Possible change of configuration. A new prefix 2a00:5884:ffff:/48 is announced by AS204092. It is a more specific of 2a00:5884::/32 (alarig fix test).

A Dashboard for BGPalerter

The screenshot shows the BGPalerter dashboard in a web browser. The browser address bar shows the URL: `localhost:8081/#/alerts?status=open&environment=Production`. The dashboard has a header with the 'alerta' logo, navigation tabs (Recent, Top 10, Watch), and user information (Configuration, Jane Bloggs, About). Below the header, there are filters for Service, Status (Open), and Environment (Production). A table displays 14 alerts, each with columns for Severity, Status, Last Receive Time, Dupl., Environment, Service, Resource, Event, Value, and Text. The alerts are color-coded by severity: Critical (red), Major (orange), Minor (yellow), Warning (blue), and Indeterminate (grey). At the bottom, a status bar indicates 'Showing 14 out of 14 alerts'.

Severity	Status	Last Receive Time	Dupl.	Environment	Service	Resource	Event	Value	Text
Critical	Open	Fri 16 Oct 00:55	0	Production	Tornskel	Ockley	breachOfConfidentiality	n/a	Marfa Godard Banksy voluptate cred. Cray gastrop
Critical	Open	Fri 16 Oct 00:40	0	Production	Notestack	Extremes	inputOutputDeviceError	n/a	Aesthetic chia biodiesel, shabby chic Brooklyn Mar
Major	Open	Fri 16 Oct 00:56	0	Production	Deployinator	kue	dataSetOrModemError	n/a	Nihil crucifix tousled, shabby chic cardigan et me
Major	Open	Fri 16 Oct 00:40	0	Production	Support	stylebot	fileError	n/a	Commodo roof party gluten-free placeat. Forage qu
Major	Open	Fri 16 Oct 00:39	0	Production	Macto	jslint.vim	cableTamper	n/a	Hella squid dolor readymade Banksy, master cleans
Minor	Open	Fri 16 Oct 00:55	0	Production	Firetray	spine.contacts	lanError	n/a	Laboris gastropub artisan occaecat, tattooed VHS
Minor	Open	Fri 16 Oct 00:39	0	Production	Phnx	cssSandpaper	communicationsProtocolError	n/a	Church-key veniam commodo, put a bird on it try-ha
Warning	Open	Fri 16 Oct 00:55	0	Production	Friar	PxLoader	communicationsSubsystemFailure	n/a	Odio minim laborum, cupidatat Shoreditch biodiese
Warning	Open	Fri 16 Oct 00:55	0	Production	Yschool	bbb	adapterError	n/a	Sustainable PBR cardigan Brooklyn, listicle elit o
Indeterminate	Open	Fri 16 Oct 00:56	0	Production	Jsconfus	webglreport	adapterError	n/a	Neutra vegan tilde, proident keytar swag dreamcatc
Indeterminate	Open	Fri 16 Oct 00:55	0	Production	Photoswipe	RealTimeMonitor	dteDceInterfaceError	n/a	Roof party listicle cillum, enim Tumblr DIY artisa
Indeterminate	Open	Fri 16 Oct 00:55	0	Production	Wireit	currency.io	configurationOrCustomizationError	n/a	Biodiesel labore 8-bit, odio eu American Apparel
Indeterminate	Open	Fri 16 Oct 00:55	0	Production	Zia	openstreetbugs	proceduralError	n/a	Sustainable selvage slow-carb brunch bespoke odio
Indeterminate	Open	Fri 16 Oct 00:55	0	Production	Nodelint	LightFace	ouputDeviceError	n/a	Meh qui brunch, twee mixtape Shoreditch dolor Pi

What if my BGPalerter is noisy?

- Probably you are using BGPalerter for quite some time
 - Update BGPalerter
 - Update config.yml
 - See <https://github.com/nttgin/BGPalerter/blob/master/config.yml.example>
 - Check “thresholdMinPeers”
 - Exclude prefixes in prefixes.yml

```

1 connectors:
2   - file: connectorRIS
3     name: ris
4     params:
5       carefulSubscription: true
6       url: ws://ris-live.ripe.net/v1/ws/
7       perMessageDeflate: true
8       subscription:
9         moreSpecific: true
10        type: UPDATE
11        host:
12        socketOptions:
13          includeRaw: false
14
15 monitors:
16   - file: monitorHijack
17     channel: hijack
18     name: basic-hijack-detection
19     params:
20       thresholdMinPeers: 2
21
22   - file: monitorNewPrefix
23     channel: newprefix
24     name: prefix-detection
25     params:
26       thresholdMinPeers: 2
27
28   - file: monitorPath
29     channel: path
30     name: path-matching
31     params:
32       thresholdMinPeers: 0
33
34   - file: monitorVisibility
35     channel: visibility
36     name: withdrawal-detection
37     params:
38       thresholdMinPeers: 20
39

```

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```
14
15 monitors:
16   - file: monitorHijack
17     channel: hijack
18     name: basic-hijack-detection
19     params:
20       thresholdMinPeers: 2
21
22   - file: monitorNewPrefix
23     channel: newprefix
24     name: prefix-detection
25     params:
26       thresholdMinPeers: 2
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28   - file: monitorPath
29     channel: path
30     name: path-matching
31     params:
32       thresholdMinPeers: 0
33
34   - file: monitorVisibility
35     channel: visibility
36     name: withdrawal-detection
37     params:
38       thresholdMinPeers: 20
39
40   - file: monitorAS
41     channel: misconfiguration
42     name: asn-monitor
43     params:
44       thresholdMinPeers: 2
45
46   - file: monitorRPKI
47     channel: rpki
48     name: rpki-monitor
49     params:
50       vrpProvider: ntt
51       thresholdMinPeers: 1
52       checkUncovered: false
53       preCacheROAs: true
54       refreshVrpListMinutes: 15
55
```

```

55 reports:
56   - file: reportFile
57   channels:
58     - hijack
59     - newprefix
60     - visibility
61     - path
62     - misconfiguration
63     - rpki
64   params:
65     persistAlertData: false
66     alertDataDirectory: alertdata/
67
68 # - file: reportEmail
69 #   channels:
70 #     - hijack
71 #     - newprefix
72 #     - visibility
73 #     - path
74 #     - misconfiguration
75 #     - rpki
76 #   params:
77 #     showPaths: 5 # Amount of AS_PATHs to report in the alert
78 #     senderEmail: bgpalserter@xxxx
79 #     # BGPalerter uses nodemailer.
80 #     # The smtp section can be configured with all the parameters available at https://nodemailer.com/smtp/
81 #     # the following are just the most useful one
82 #     smtp:
83 #       host: localhost
84 #       port: 25
85 #       secure: false # If true the connection will use TLS when connecting to server. If false it will be still possible doing connection upgrade via STARTTLS
86 #       ignoreTLS: false # If true TLS will be completely disabled, including STARTTLS. Set this to true if you see certificate errors in the logs.
87 #       auth:
88 #         user: username
89 #         pass: password
90 #         type: login
91 #       tls:
92 #         rejectUnauthorized: true # Reject unauthorized certificates
93 #     notifiedEmails:
94 #       default:
95 #         - joe@example.org
96 #         - noc@example.org
97
98 # - file: reportSlack
99 #   channels:
100 #     - hijack
101 #     - newprefix

```

```

170 #     visibility: "visibility::${prefix}@${asn}"
171 #     urls:
172 #         default: _YOUR_ALERTA_API_URL_
173
174 # - file: reportWebex
175 #     channels:
176 #         - hijack
177 #         - newprefix
178 #         - visibility
179 #         - path
180 #         - misconfiguration
181 #         - rpki
182 #     params:
183 #         hooks:
184 #             default: _YOUR_WEBEX_WEBHOOK_URL_
185
186 # - file: reportHTTP
187 #     channels:
188 #         - hijack
189 #         - newprefix
190 #         - visibility
191 #         - path
192 #         - misconfiguration
193 #         - rpki
194 #     params:
195 #         templates: # See here how to write a template https://github.com/nttgin/BGPalerter/blob/master/docs/context.md
196 #             default: '{"text": "${summary}"}'
197 #         headers:
198 #             isTemplateJSON: true
199 #         showPaths: 0 # Amount of AS_PATHs to report in the alert
200 #         hooks:
201 #             default: _YOUR_WEBHOOK_URL_
202
203 # - file: reportTelegram
204 #     channels:
205 #         - hijack
206 #         - newprefix
207 #         - visibility
208 #         - path
209 #         - misconfiguration
210 #         - rpki
211 #     params:
212 #         showPaths: 0 # Amount of AS_PATHs to report in the alert
213 #         botUrl: https://api.telegram.org/bot<\_BOT\_ID\_>/sendMessage
214 #         chatIds:
215 #             default: _CHAT_ID_

```

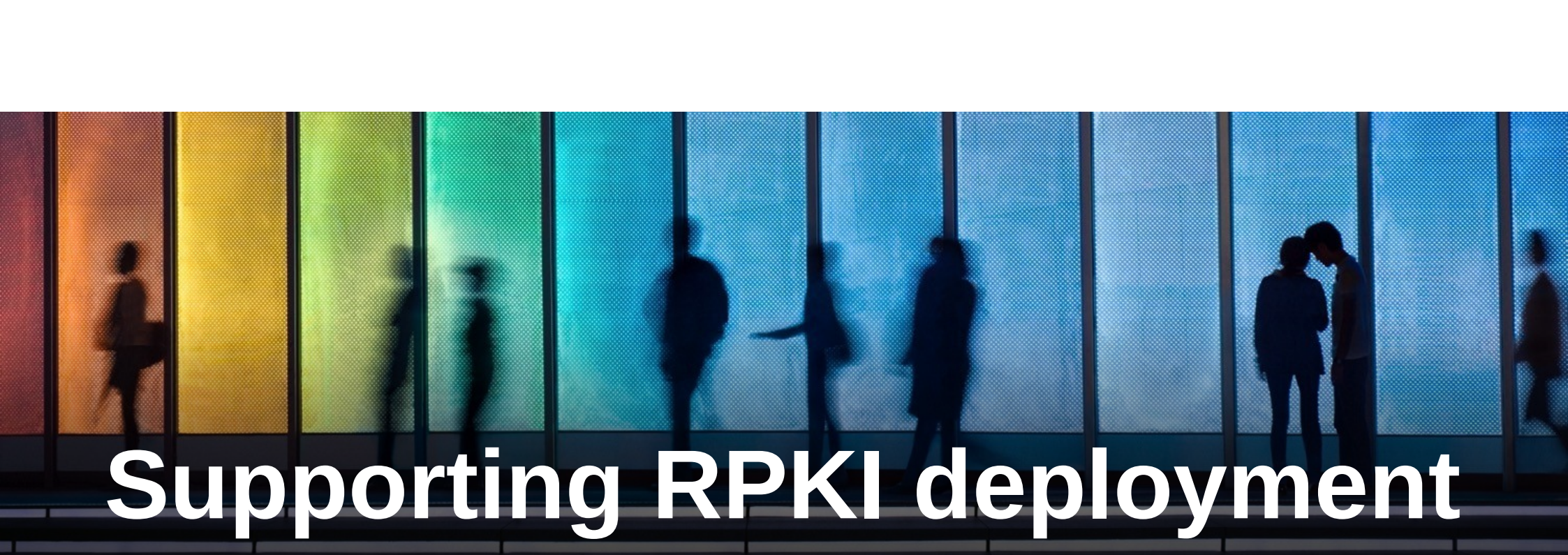
```
216
217 #####
218 # Notification settings:
219 # - notificationIntervalSeconds
220 #     Defines the amount of seconds after which an alert can be repeated. An alert is repeated only if the event that
221 #     triggered it is not yet solved.
222 # - persistStatus
223 #     Persist the status of BGPalerter. If the process is restarted, the list of alerts already sent is recovered
224 #     and they are not repeated. The process must be able to write on disc, this option will create a file inside .cache/
225
226 notificationIntervalSeconds: 14400
227 persistStatus: true
228
229 logging:
230   directory: logs
231   logRotatePattern: YYYY-MM-DD
232   backlogSize: 1000 #Advanced option, read the doc
233   maxRetainedFiles: 10
234   maxFileSizeMB: 15
235   compressOnRotation: false
236
237 checkForUpdatesAtBoot: true
238
239 #####
240 # Process monitoring settings:
241 # Uncomment or add classes under processMonitors if you want to monitor or send logs about the status of the BGPalerter process
242
243 #processMonitors:
244 # - file: uptimeApi
245 #   params:
246 #     useStatusCodes: true
247 #     host: null
248 #     port: 8011
249 #
250 # - file: uptimeHealthcheck
251 #   params:
252 #     url: url_to_poll
253 #     intervalSeconds: 300
254 #     method: get
255 #
256 # - file: sentryModule
257 #   params:
258 #     dsn: https://<key>@sentry.io/<project>
259
```

```

216 #####
217 # Notification settings:
218 # - notificationIntervalSeconds
219 #     Defines the amount of seconds after which an alert can be repeated. An alert is repeated only if the event that
220 #     triggered it is not yet solved.
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239 # Process monitoring settings:
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241
242 processMonitors:
243   - file: uptimeApi
244     params:
245       useStatusCodes: true
246       host: null
247       port: 8011
248
249   - file: uptimeHealthcheck
250     params:
251       url: url_to_poll
252       intervalSeconds: 300
253       method: get
254
255   - file: sentryModule
256     params:
257       dsn: https://<key>@sentry.io/<project>
258
259

```

```
▼ {  
  "warning": false,  
  "connectors": [  
    ▼ {  
      "name": "ConnectorRIS",  
      "connected": true  
    }  
  ]  
}
```

The background of the slide features a large window with several vertical panels in different colors: red, orange, yellow, green, and blue. Silhouettes of several people are visible, walking or standing in front of the window. The text "Supporting RPKI deployment" is overlaid in white on the lower part of the image.

Supporting RPKI deployment



RPKI monitoring

- Monitor if your AS is announcing prefixes RPKI invalid or not covered by ROAs
 - You can also monitor only specific prefixes



incoming-webhook APP 14:18

rpki

The route 194.32.71.0/24 announced by AS15562 is not RPKI valid. Accepted with AS path: [31313,6830,2914,15562]. Valid ROA: origin AS0 prefix 194.32.71.0/24 max length 24

rpki

The route 209.24.0.0/24 announced by AS15562 is not RPKI valid. Accepted with AS path: [31313,6830,2914,15562]. Valid ROA: origin AS0 prefix 209.24.0.0/24 max length 24

RPKI monitoring

- Particularly useful:
 - Before RPKI deployment, since it will let you “test” what announcements will be invalid after signing the ROAs.
 - During RPKI deployment, since it will let you know if any of your announcements are invalid.
 - After you deployed RPKI, in order to be sure that all future BGP configurations will be covered by ROAs.

```

14
15 monitors:
16   - file: monitorHijack
17     channel: hijack
18     name: basic-hijack-detection
19     params:
20       thresholdMinPeers: 2
21
22   - file: monitorNewPrefix
23     channel: newprefix
24     name: prefix-detection
25     params:
26       thresholdMinPeers: 2
27
28   - file: monitorPath
29     channel: path
30     name: path-matching
31     params:
32       thresholdMinPeers: 0
33
34   - file: monitorVisibility
35     channel: visibility
36     name: withdrawal-detection
37     params:
38       thresholdMinPeers: 20
39
40   - file: monitorAS
41     channel: misconfiguration
42     name: asn-monitor
43     params:
44       thresholdMinPeers: 2
45
46   - file: monitorRPKI
47     channel: rpki
48     name: rpki-monitor
49     params:
50       vrpProvider: ntt
51       thresholdMinPeers: 1
52       checkUncovered: false
53       preCacheROAs: true

```

massimo@ninet: /mnt/usb/innog3\$ cat /etc/innog3/monitors.conf

Generate your VRPs JSON file

- Using external VRPs list is quick and easy, but you are essentially trusting somebody else writing such VRPs correctly
- You can generate your JSON file periodically and BGPalerter will load it

rpki-client

- You can download rpki-client from
 - <https://www.rpki-client.org/>
 - Or <https://pkgs.org/search/?q=rpki-client>
- You also need jq for manipulating the JSON
 - <https://stedolan.github.io/jq/>
 - Or e.g. “apt-get install jq”, “brew install jq”
- Periodically run in crontab (e.g. every 15 min)
 - `rpki-client -j test/ && cat test/export.json | jq .roas > test/vrps.json`

rpki-client



```

14
15 monitors:
16   - file: monitorHijack
17     channel: hijack
18     name: basic-hijack-detection
19     params:
20       thresholdMinPeers: 2
21
22   - file: monitorNewPrefix
23     channel: newprefix
24     name: prefix-detection
25     params:
26       thresholdMinPeers: 2
27
28   - file: monitorPath
29     channel: path
30     name: path-matching
31     params:
32       thresholdMinPeers: 0
33
34   - file: monitorVisibility
35     channel: visibility
36     name: withdrawal-detection
37     params:
38       thresholdMinPeers: 20
39
40   - file: monitorAS
41     channel: misconfiguration
42     name: asn-monitor
43     params:
44       thresholdMinPeers: 2
45
46   - file: monitorRPKI
47     channel: rpki
48     name: rpki-monitor
49     params:
50       vrpFile: test/vrps.json
51       thresholdMinPeers: 1
52       checkUncovered: false
53       preCacheROAs: true
54       thresholdMinPeers: 10
55

```

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Generate your VRPs JSON file

- You can use BGPalerter to do some tests before to deploying RPKI
- You can add in vrps.json some ROA that you plan to sign but you didn't yet
- You can leave it running and check if any of your announcements are going to be RPKI invalid and/or if you organisation is able to stick to the “signed” ROAs

Content of vrps.json

```
1  [
2    {
3      "asn": "13335",
4      "prefix": "103.21.244.0/24",
5      "maxLength": 24
6    },
7    {
8      "asn": "2914",
9      "prefix": "123.4.5.0/14",
10     "maxLength": 24
11   }
12 ]
```

Contribute!

- Source code on GitHub
 - <https://github.com/nttgin/BGPalerter>



Questions?

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