

#### RIPE NCC Measurements and Tools

**Training Course** 

Training Services | RIPE NCC | July 2019

#### **Schedule**



09:00 - 09:30Coffee, Tea11:00 - 11:15Break13:00 - 14:00Lunch15:30 - 15:45Break17:30End

#### Introduction



- Name
- Number on the list
- Experience
  - RIPE Database
  - RIPEstat
  - RIPE Atlas
- Goals

#### **Overview 1 - RIPEstat**



- Introduction to RIPE and the RIPE NCC
- Introduction to RIPEstat
- More about widgets

- Exercise A: Querying for a Resource
- Visualising BGP Routing Information
  - Exercise B : BGPlay
- Reporting Abuse
- Visualising RIPE Database Data
- Personalising RIPEstat
- Comparing Networks
  - Exercise C : Kahoot

#### **Overview 2 - RIPE Atlas**



- Introduction to RIPE Atlas
- Using RIPE Atlas as a Visitor
- Looking up Public Probes
- Finding Results of Public Measurements
- Creating a Measurement
  - Demo and Exercise D
- Network Monitoring
  - Exercise E: Using Streaming API
- Command-line Interface Toolset
  - Exercise F: Using RIPE Atlas CLI
- Use Cases
- More RIPE Atlas Features
- Take Part in the Atlas Community
  - Exercise G : Kahoot

#### **Course Goals**



- RIPEstat Goals:
  - Debug your <u>own</u> networks using RIPE stat
  - Find routing information about <u>other</u> networks to enable decision making and troubleshooting

#### • RIPE Atlas Goals:

- Monitoring and troubleshooting your network using RIPE Atlas
- Create specific tailor-made measurements using API calls or the command line interface



### Introduction to the RIPE NCC

Section 1

#### **RIPE NCC - Who are we?**





- Located in Amsterdam
- Not-for-profit organisation
- One of the five Regional Internet Registries (RIRs)
- 21,225 members (LIRs)

#### **Our service region**





#### What do we do?



- Distribute IPv4, IPv6, ASNs
- Training courses
- RIPE Database
- Support RIPE community
- RIPE Atlas, RIPEStat, Resource Certification

### **RIPE (Réseaux IP Européens)**



- Started in 1989
- Discussion forum open to all parties
- Not a legal entity, no formal membership
- Develops policies
- Work done in Working Groups
- Activities on a voluntary basis
- Decisions by consensus





# Introduction to RIPEstat

Section 2

#### What is RIPEstat?



One interface for Internet data and statistics

"One-stop shop"







# stat.ripe.net

#### What data? What sources?



- RIPE Database
- Other RIR data
- BGP routing data (RIS)
- Active measurements (RIPE Atlas, DNSMON)
- Geolocation (third party)
- Blacklist data (third party)
- More...

### Landing page



#### RIPEstat shows your own IP/ASN



Home | Sitemap | Contact Us | Service Announcements | Privacy Statement | Legal | Cookies | Copyright Statement | Terms of Service

### **Query Types**



- IPv6 address/prefix
- IPv4 address/prefix
- ASN
- Hostname
- Country code

#### **Results page**



#### Why use RIPEstat?



- For your own network:
  - Is someone else announcing my prefix?
  - How visible is my new IPv6 network?
  - Is my BGP routing consistent with the Routing Registry?
  - Are my DNS and reverse DNS consistent?
  - Location of my customers' prefixes
  - Was my prefix visible yesterday in Tokyo?

#### Why use RIPEstat?



- For viewing other networks:
  - How many IPv6 prefixes are announced in my country?
  - IPv6 in my country compared to neighbours
  - Who has more peers, AS1 or AS2?
  - How does the upstream outage look?
  - Is the prefix/ASN that I want already announced?
  - Which ASN announces an IP?
  - Where can I report abuse from an IP?

#### **RIPEstat Interfaces**



• Web interface

https://stat.ripe.net

• RIPEstat widget API

• RIPEstat data API



# **More About Widgets**

Section 3

#### Get the data behind the widget!



#### **Shareable results URL**





- Immutable shareable URL for each result!
- URL includes:
  - widget + queried resource
  - for some widgets: **settings**, **zoom**, **time period**

#### Where's the data from?





source data

embed code permalink info

#### Content Explanation

#### What does this widget show? Allocation History displays information about allocations and direct assignments of prefixes or AS

numbers.

#### How can the visualisation be interpreted?

When the queried resource was a prefix, the graph will show how that prefix and related (more or less specific prefixes) were allocated over time. When the queried resource was an ASN, the graph will show the allocation of that ASN.

The legend will display all resources, including those which are not announced during the time range displayed. It is possible to change the displayed time period with the timeline selector underneath the graph.



The shaded area is displayed in the graph. This area can be adjusted by moving to the left or right end of the shaded area and then dragging it to the desired location. It is possible to change not only the start and end time, but also the length of the period which is shown.



#### What is the data source?

The RIR statistics files summarise the current state of allocations and assignments of Internet number resources. They are intended to provide a snapshot of the status of Internet number resources, without any transactional or historical details. Find details for each RIR here: AFRINIC

- APNIC
- ARIN
- LACNIC RIPE NCC

### Freshness and timescale of the data 😥



- Timestamp and time period
- Different widgets = different update frequency
- Adjustable usually
  - Limits: different maximum granularities

#### **Embed the widget!**





#### **Embedding widgets on your site**



#### ISP embedded widgets on its page







#### Widgets List



#### https://stat.ripe.net/widget/list

#### **RIPEstat Widgets**

This is a complete list of all of the widgets that RIPEstat offers. Each of these widgets can be accessed using the links below.

When you view a widget you can also get code for embedding it in your own pages. The full procedure for embedding and configuring widgets is described in the Widget API Documentation.

Show 25 + entries				Search:		
Title (show slug) 🗘	Example	Prefix 0	IP address	ASN \$	Hostname	Country o
Abuse Contact Finder		~	~	~		
Address Space Hierarchy		~	~			
Address Space Usage		~	~			
Allocation History	1	~	~	~		
Announced Prefixes	ja i			~		
Announced Prefixes (Inrdb)	ijin in			~		
Announced Prefixes (Ursa)	<u>in i</u>			~		
AS Overview				~		
AS Path Length	- <b>1</b>			~		
AS Routing Consistency	<u> 11 - 11</u>			~		
ASN Neighbours	47.54			~		
ASN Neighbours History				~		



# Querying for a Resource

**Exercise** A

#### Tasks



- What network announces 140.78.50.90?
- Is 83.68.16.27 routed?
- In which country is 91.229.42.0/23 used?
- What is its corresponding inetnum object?
- What widget provides real-time routing status?
- By what percent did the number of prefixes announced within Greece increase over the last two years?
- How would you share interesting network events with a colleague?



# Visualising BGP Routing Information

Section 4

### Querying



- IP or ASN queried?
  - You get different widgets!

 ASN often visualised based on the prefixes it announces

#### **RIS - Routing Information Service**

- RIPE NCC collecting BGP information since 1999
  - Raw data: ris.ripe.net
- 22 route collectors
  600+ peers
- RIPEstat visualises
  RIS data





#### **At-a-glance view: Prefix queried**





#### **At-a-glance view: ASN queried**




## **BGPlay**



#### See how your network is routed

- Announcements
- Withdrawals
- Path changes
- Shows routing history
  - Animated graphic
  - Highly interactive

#### https://stat.ripe.net/widget/bgplay



## **BGPlay**





### **Prefixes visible for this ASN**





## Announced Prefixes: useful for ASN

	Announced Prefixes (AS1205)							
Show 10 💠 entri	es	Search:						
Prefix	* First Seen ?		\$					
193.186.176.0/22	2004-01-22 16:00:00 UTC	2014-08-13 08:00:00 UTC						
193.186.172.0/22	2004-01-01 00:00:00 UTC	2014-08-13 08:00:00 UTC						
193.171.8.0/24	2008-12-09 08:00:00 UTC	2008-12-11 16:00:00 UTC						
193.171.32.0/20	2008-12-09 08:00:00 UTC	2008-12-11 16:00:00 UTC						
193.171.200.0/21	2008-12-09 08:00:00 UTC	2008-12-11 16:00:00 UTC						
193.170.32.0/21	2008-12-09 08:00:00 UTC	2008-12-11 16:00:00 UTC						
140.78.0.0/16	2004-01-01 00:00:00 UTC	2014-08-13 08:00:00 UTC						
Showing 1 to 7 of 7 e			00					
	Exclude low visibility	prefixes						
Showing results for AS	1205 from 2004-01-01 00:00:00 UTC to 2014	-08-13 08:00:00 UTC						
Results exclude	e routes with very low visibility (less th	an 3 RIS peers seeing).						
source data		embed code p						

## History of Prefixes Announced by ASN 👧





## **BGPlay**

**Exercise B** 

#### **Tasks**



- Find the up-stream provider for AS1205
- Is 69.36.157.0/24 originated by only one or more ASNs?
- Check the IPv6 connectivity of your own network



## **Reporting Abuse**

Section 5

## What to do if your network is attacked?

- Spam or unauthorised access?
  - Find IP in message headers or logs
- Want to contact their admin?
  - Find the correct email for reporting abuse
- RIPE Database
  - Contact details for every ASN and IP address
  - In Europe, Middle East, Central Asia





#### Take action with the Abuse Contact Finder

#### https://stat.ripe.net/abuse

#### **RIPEstat Abuse Contact Finder**

particular IP address.	e to help you find the email address that should be meral and what you can do to stop it on the RIPE NO		In -depth information about abuse
Tod carries in nore about network abuse in ge	merar and what you can do to stop it on the KPE IN	Les Abuse mormation page.	abuse
	Abuse Contact Finder		
	Enter an IP address	Enter IP address	
source data		embed code permalink info	

For regular RIPEstat users: this widget, of course, can also be found on the regular result page in the "Anti Abuse" tab.

## **Reporting Abuse**



Abuse Contact Finder (2001:67c:2e8::/48)		
Email-Contact abuse@ripe.net		Email contact to report abuse
<ul> <li>Resource information</li> <li>Information for resource holders</li> <li>Showing results for 2001:67c:2e8::/48 as of 2017-02-03 13:52:00 UTC</li> </ul>		
Please note that the found contact may be unresponsive.For details please click on 'info' below.		
source data embed code permalink	info	

### **Reporting Abuse**



Abuse Contact Finder (2001:67c:2e8::/48)	Details about the resource and abuse contact:
Email-Contact	Details
abuse@ripe.net	- Results for 2001:67c:2e8::/48 <sup>L3</sup> abuse@ripe.net from abuse-contact role
Resource information	- Special Network Resource Information
Showing results for 2001:67c:2e8::/48 as of 2017-02-03 13:52:00 UTC	This resource has been identified to be related to this information: Designated to RIPE NCC on 01 July 1999 (Status: allocated; Note: n.a.)
Please note that the found contact may be unresponsive.For details please click on 'info' below.	Designated to RIPE NCC on 01 July 1999 (Status: allocated; Note: n.a.) Held by:
	RIPE-NCC-NET <sup>™</sup>
source data embed code permalink info	- RIR Information
	RIR RIR's Whois



## Visualising RIPE Database Data

Section 6

### **Address Space Hierarchy Widget**



- click above or below to refocus query



### **Historical Whois Widget**

- click on another object to refocus query



	Historical Who	is (109.110	.192.0/19) 🖽		
	2016-09-15	16:04:48	compare		
	inetnum () 109.110.192.	0 - 109.11	show more 10.223.255		
	netname:	PL-UPC-	20091113		
	country:	PL			
	status:	ALLOCAT	ED PA		
	created:		23 13:25:57		
	validity:	From 201 16:04:48 To 2018-0	6-09-15 )7-04 14:42:00		
	1		$\downarrow$		
route () 109.110.192.0/19 AS6830	open		role () UPC48-RIPE [ad	min-c]	open
			mntner () MNT-LGI (mnt-b)	v]	open
			mntner () RIPE-NCC-HM-N	/INT [mnt-by]	open
			mntner () UPC-PL-MNT (m	int-lower]	open
			organisation () ORG-UTKS1-RIF	PE [org]	open

### **Historical Whois Widget**



Historical Whois (109.110.192.0/19) EETA

	2018-05-02	08:00:51 🔹	compare		
	mntner () UPC-PL-MN		how more		
	descr:	pl.upc objects maintainer	\$		
	created:	2002-05-31 0	0:05:45		
	validity:	From 2018-05 08:00:51 To 2018-07-04			
	1	1	/		
domain 🕕 121.178.31.in-addr.arpa	open		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	min-c]	open
domain () 151.179.31.in-addr.arpa	open		mer 🕕 C-PL-MNT (m	intner]	open
domain () 13.222.85.in-addr.arpa	open	]			
domain () 172.179.31.in-addr.arpa	open				
•					
Show all objects 1000 x domain, 403 x inetn organisation, 201 x person.					

x role, 25 x aut-num, 4 x inet6num, 2 x asset, 4 x route6, 5 x mntner, 2 x key-cert

#### **Historical Whois Widget**



Historical Whois (AS3333)

Date and time of this update version

of this	✓ 2017-12-04 14:48:54	) compare
sion 🗾	2017-02-21 10:55:57	show more
	2016-06-02 09:49:38	
	2016-04-14 10:01:24	Europeens
	2016-04-12 05:05:25	ordination
	2015-09-04 11:16:41	E NCC)
	2015-09-04 11:05:53	
	2015-05-05 04:26:20	12:58:13
	2014-10-14 22:36:58	12-04
	2014-05-27 11:51:38	04 14:50:00
	2014-01-17 12:56:58	04 14.50.00
	2014-01-17 12:54:34	1.
	2014-01-17 12:49:11	
weeks 0	2013-10-08 01:06:48	
route () 193.0.22.0/23 AS3333	2012-04-17 10:12:15	IPE-NCC-MNT
100.0.22.00 200 00000	2012-04-17 09:55:11	
route ()	2012-03-12 08:40:16	intner 🕕
193.0.10.0/23 AS3333	2011-03-29 14:57:26	IPE-NCC-END
	2011-02-15 10:48:34	
route () 193.0.12.0/23 AS3333	2011-02-15 10:30:34	Brson () RD-RIPE (adm
193.0.12.0/23 A53333	2011-02-02 14:06:10	RD-RIPE (adm
route ()	2009-01-28 17:46:03	le 🕕
193.0.0.0/21 AS3333	2009-01-28 17:27:21	PS4-RIPE [tec
•	2009-01-28 11:14:33	-
:	2009-01-27 15:44:05	rganisation ()
Chaur all abiasts	2008-12-19 18:38:35	RG-RIEN1-RIF
Show all objects 6 x route, 1 x route6	2008-12-19 16:51:45	
·	2008-11-19 16:31:45	
	0007 00 04 15:04:01	

show more	
uropeens rdination NCC)	
2:58:13 2-04	
4 14:50:00	
•	
tner 🕕 E-NCC-MNT [mnt-by]	open
tner () E-NCC-END-MNT (mnt-by)	open
son 🕕 D-RIPE [admin-c]	open
0 34-RIPE [tech-c]	open
anisation () G-RIEN1-RIPE [org]	open

#### **Reverse DNS and DNS**



- For IP prefixes: reverse DNS whois registration
- For hostnames: resolves A and AAAA records
- DNS chain for both
  - hostnames & IP addresses



#### **Reverse DNS Consistency**



Show 10 🛟	entries		Search:		
Prefix 🔺	Reverse DNS 0	In RIPE Registry	≎ <sup>DNS</sup> ≎ Check ≎	Checked \$	
103.3.27.0/24	27.3.103.in- addr.arpa	X No	? MISSING		
193.0.0.0/21	0.0.193.in-addr.arpa	Yes	INFO	2017-03-30 16:36:45	
193.0.0.0/21	1.0.193.in-addr.arpa	Yes	1 INFO	2017-08-28 14:45:40	
193.0.0.0/21	2.0.193.in-addr.arpa	Yes	4 ERROR	2017-03-30 16:36:41	
193.0.0.0/21	3.0.193.in-addr.arpa	Yes	i INFO	2017-03-30 16:36:41	
193.0.0.0/21	4.0.193.in-addr.arpa	Yes	i INFO	2017-03-30 16:37:03	
193.0.0.0/21	5.0.193.in-addr.arpa	Yes	i INFO	2017-03-30 16:37:04	
193.0.0.0/21	6.0.193.in-addr.arpa	Yes	i INFO	2017-03-30 16:37:03	
193.0.0.0/21	7.0.193.in-addr.arpa	<b>√</b> Yes	i INFO	2017-03-30 16:37:07	
193.0.10.0/23	10.0.193.in- addr.arpa	Yes	i	2017-03-30	





#### **Reverse DNS Consistency (2)**



DN	S Check (0.0.193.in-addr.arpa) 🚥		• 20	
Reload	this widget by entering a resource he	er🧼		
Choose a test result				
2017-03-30 16:36:45   INFO			¢	
✔ All tests are okay! For det	ails see below.			
SYSTEM INFO x 3				
BASIC INFO x 31				
ADDRESS INFO x 3				
CONNECTIVITY INFO x 31				
CONSISTENCY INFO x 5				
DNSSEC INFO x 11				
DELEGATION INFO x 9	- 3			
NAMESERVER INFO x 33, NOTICE SYNTAX INFO x 13	× 2			
ZONE INFO x 6, NOTICE x 3				
Request a new test				
Start Test				
source data		embed code permalink	info 🕥	

#### **Reverse DNS Consistency (3)**



		aload this wide	at by optories	rocourco be					
	ŀ	eload this widg	et by entering a	a resource ner					
Choose a tes	st result								
2017-03-30	16:36:41	error					\$		
Some tes	its show err	ors! Please take	a look at the d	etails below.					
SYSTEM INFO	x3								
BASIC INFO x									
ADDRESS IN	IFO x 1, WAR	NING x 1							
Level 0	Message								
	i Namese	erver rom.singe	.ripe.net has ar 88) without PTF						
INFO	All Nam	eserver addres	ses are in the ro	outable public a	addressing spa	ice.			
Showing 1	to 2 of 2 er	tries				00			
Showing 1	to 2 of 2 er	Itries				00			
		tries 4, WARNING x 3				00			
CONNECTIV	/ITY INFO x 1		NING x 1			00			
CONNECTIV	/ITY INFO x 1 ICY INFO x 6, ICE x 2	4, WARNING x 3	NING x 1			00			
CONNECTIV CONSISTEN	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9	4, WARNING x 3 NOTICE x 1, WAR	NING x 1			00			
CONNECTIV CONSISTEN DNSSEC NOTI DELEGATION	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9	4, WARNING x 3 NOTICE x 1, WAR	NING x 1			00			
CONNECTIV CONSISTEN DNSSEC NOTI DELEGATION NAMESERVEI	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9	4, WARNING x 3 NOTICE x 1, WAR ERROR x 6	NING x 1			00			
CONNECTIV CONSISTEN DISSEC NOTI DELEGATION NAMESERVEI	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9 R INFO x 18, Message	4, WARNING x 3 NOTICE x 1, WAF ERROR x 6	NING x 1 pe.net/193.0.2.	211 is a recurso	or.	00			
CONNECTIV CONSISTEN DNSSEC NOTI DELEGATION NAMESERVEI Level © ERROR ERROR	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9 R INFO x 18, Message Nameserv Nameserv	4, WARNING x 3 NOTICE x 1, WAR ERROR x 6 er pike.singel.ri er pike.singel.ri	pe.net/193.0.2. pe.net/2001:67	c:2e8:7::c100:2	d3 is a recurso				
CONNECTIV CONSISTEN DISSEC NOTI DELEGATION NAMESERVEI Level © ERROR	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9 R INFO x 18, Message Nameserv Nameserv	4, WARNING x 3 NOTICE x 1, WAR ERROR x 6 er pike.singel.ri er pike.singel.ri	pe.net/193.0.2.	c:2e8:7::c100:2	d3 is a recurso				
CONNECTIV CONSISTEN DNSSEC NOTI DELEGATION NAMESERVEI Level © ERROR ERROR	/ITY INFO x 1 ICY INFO x 6, ICE x 2 I INFO x 9 R INFO x 18, Nameserv Nameserv Nameserv	4, WARNING x 3 NOTICE x 1, WAR ERROR x 6 er pike.singel.ri er pike.singel.ri er rom.singel.ri	pe.net/193.0.2. pe.net/2001:67	c:2e8:7::c100:2 136 is a recurse	d3 is a recurso or.	pr.			
CONNECTIV CONSISTEN DNSSEC NOTI DELEGATION NAMESERVEI Level ¢ ERROR ERROR ERROR	VITY INFO x 1 INFO x 6 INFO x 9 INFO x 9 R INFO x 18 Nameserv Nameserv Nameserv Nameserv	4, WARNING x 3 NOTICE x 1, WAP ERROR x 6 er pike.singel.ri er rom.singel.ri er rom.singel.ri	pe.net/193.0.2. pe.net/2001:67 pe.net/193.0.2.	c:2e8:7::c100:2 136 is a recurso c:2e8:7::c100:2	d3 is a recurso or. 88 is a recurso	pr.			
CONNECTIV CONSISTEN DESEC NOT DELEGATION NAMESERVEI Level © ERROR ERROR ERROR ERROR	VITY INFO x 1 INFO x 6 INFO x 9 INFO x 9 R INFO x 18 Nameserv Nameserv Nameserv Nameserv	4, WARNING x 3 NOTICE x 1, WAP ERROR x 6 er pike.singel.ri er rom.singel.ri er rom.singel.ri	pe.net/193.0.2. pe.net/2001:67 pe.net/193.0.2. pe.net/2001:67	c:2e8:7::c100:2 136 is a recurso c:2e8:7::c100:2	d3 is a recurso or. 88 is a recurso	pr.			



## **Personalising RIPEstat**

Section 7

## Create a RIPE NCC Access Account

#### https://access.ripe.net

					RIPE Database (Whois) Search the content of this	Website
Manage IPs and ASNs >	Analyse	>	Participate	>	Get Support	>
You are here: Home > Access						
Sign in using yo NCC Access acc		Email Your ema	il address			
If you don't have a RIPE No account, click here to crea	CC Access	Password 			Forgot your pass	sword?
New: Two-step verificat more	ion. Learn		I			



## Why personalise RIPEstat?



- Recurring lookup tasks with different widgets over multiple tabs
- Building a "history" of your lookups

## Log into RIPE NCC Access Account

Ŭ	6		RIPE Database (Whois) Website		••
			Search the content of this website		
	Ma	anage IPs and ASNs > Analyse > Pa	rticipate > Get Support >		
	Yo	ou are here: Home > Access			
		Sign in using your RIPE       Email         NCC Access account       Your email address         If you don't have a RIPE NCC Access account, click here to create one.       Sign in	Forgot your passwon		
		New: Two-step verification. Learn more			
	~		1-1		Lo
🗛 RIPE N				osite	C
RIPE NETWORK COORDINATI	ON C	🎔 in 🛗 🕅 Ho	Sit	e	
Manage IPs and ASNs >	Anar	iyse > Participate	> Get Support	Publications > A	bout Us
You are here: Home > Analyse > RIPEstat Home	Statistics > RIP	Search RIPEstat			
About RIPEstat	>	Search Rifestat			
Documentation	>	Enter an IP address/prefix, ASN, c	Search		
Use Cases	>	Your network: AS3333, 2001:67c:2e8::/4	e.g.: IPv4 prefix/range.	e.g.: IPv4 prefix/range, IPv6, ASN	
Your IP address is: 2001:67c:2e8:9::c100:14e6			0000		
				Address Types Housely (HEL4 VE-VEE 2018)	
System Statistics			n the	Part 17 Tanya men ang mang ang men ang men ang men ang men ang men ang men ang men men ang men ang men ang men ang men ang men ang men ang men men ang men ang men ang men	
22,297			ess space?	153.0.18.0-153.0.21.255 windows #FEL400 matrix %	
Live requests to RIPEstat (per minute)			our way with the		
Live requests to Rir Estat (per minute)			ess Space Hierarchy	Brown Brites Cont	
1,301,056		widge	et.	Annalysis in 1975 Mill is advect	

and the second s

## **MyView**



- Create custom views
  - Click the "MyView" button
  - Drag and drop the widgets you want on the MyView tab
- Created under "ASN" or "IP"

## **MyView**





## **Customise MyView**



		R	e-order widgets as you like		
	At a Glance Routing DNS Anti Abuse Database Geographic	(4) (11) (1) (5) (2)	Hold JKU-LINZ-AS This ASN is part of 1-65535, the 16-bit ASN Bloo	erview (AS1205)  Announced  Ider of this ASN:  S University Linz,AT  Inck. This block contains all 16-bit ASNs, which are allocated asignments/as-numbers/as-numbers.xml . See RFC 1930	
	Activity	(2)	source data	embed	I code permalink info
		(1) (2) (2) (2)	Routing At 2014-08-14 08:00:00 UTC, AS1205 wa peers.	Status (AS1205) as visible to 100% of 97 IPv4 and 2% of	95 IPv6 RIS full
<ul> <li>Rename</li> <li>Re-order</li> <li>Control v</li> <li>Remove</li> </ul>	isibility		<ul> <li>First ever seen as origin announcing 193.18</li> <li>Originated IPv4 prefixes: 3</li> <li>Originated IPv6 prefixes: 0</li> <li>Observed BGP neighbours: 2</li> <li>Address space announced (IPv4): 67584 IPs</li> <li>Address space announced (IPv6): equiv. to 0 /4</li> <li>Advanced Settings</li> <li>Showing results for AS1205 as of 2014-08-14 08:00:00</li> <li>Results exclude routes with very low visib</li> </ul>	48s D UTC	°C.

## Visibility of MyView



- MyView is only accessible after you have queried an ASN or IP
- A MyView created after an ASN query is only visible for other ASN queries
- A MyView created after IP query is only visible for other IP queries
- This can be changed via settings

## **Controlling Visibility**



## **MyView Summary**



- RIPE NCC Access login required
- Customised selection of widgets
- It's like an extra tab, specifically for your queries
- By default, available for one type of resource (ASN or IP)
- Can't be shared



# **Comparing Networks**

Section 8

## Why compare networks?



- Want to peer with AS-X?
  - Learn by opening multiple widgets about AS-X
- Choosing upstream ?
  - Compare AS-X with AS-Y by opening same widget loaded with two different ASNs
- Internet outage in a country?
  - Open multiple country-related widgets in same view

### How to compare



• Compare results in different widgets



## **Compare results**




### **Compare results**



#### **Compare Results**

Select up to six different widgets from the list to compare at one time. Different resources can be queried for each widget.



### **Compare resources summary**



- No login required
- Add widgets AND input query for each widget (ASN, IP, etc.)
- It is a result page with widgets and query results
- Share it via a permalink

## **Comparing countries in one widget**



- Compare growth of ASNs in DE and NL
- See IPv6 adoption rate in four countries at the same time
- Analyse IP hijacking with 'BGP Update Activity Widget'
- Use "multi-resource" button in "Country Routing" widget

### In-widget comparison



### Country Routing Statistics





# kahoot

### Exercise C



# Questions





# **RIPE Atlas**

### **Overview 2 - RIPE Atlas**



- Introduction to RIPE Atlas
- Using RIPE Atlas as a Visitor
- Looking up Public Probes
- Finding Results of Public Measurements
- Creating a Measurement
  - Demo and Exercise D
- Network Monitoring
  - Exercise E: Using Streaming API
- Command-line Interface Toolset
  - Exercise F: Using RIPE Atlas CLI
- Use Cases
- More RIPE Atlas Features
- Take Part in the Atlas Community

### **RIPE Atlas Global Coverage**







# Introduction to RIPE Atlas

Section 9

### Goals



- Monitoring and troubleshooting your network using RIPE Atlas
- Create specific tailor-made measurements using API calls or the command line interface

### **Prerequisites**



- We assume you have already used RIPE Atlas
- Do you have a RIPE NCC Access account?
  - If not quickly create one: access.ripe.net
- Do you have credits to spend?
  - You get a voucher from us

### **An Introduction**



- RIPE Atlas is a global active measurements platform
- Goal: view Internet reachability
- Probes hosted by volunteers
- Data publicly available

# atlas.ripe.net

### **RIPE Atlas measurements**



- Built-in global measurements towards root nameservers
  - Visualised as Internet traffic maps
- Built-in regional measurements towards "anchors"
- Users can run customised measurements
  - ping, traceroute, DNS, SSL/TLS, NTP and HTTP

### **Probes and Anchors**





- 10,300+ probes connected (427 RIPE Atlas Anchors)
- 7,900+ results collected per second
- 21,000+ measurements currently running



### **RIPE Atlas Overview (2)**



### **RIPE Atlas Global Coverage**





### **Most Popular Features**



- Six types of measurements: ping, traceroute, DNS, SSL/TLS, NTP and HTTP (to anchors)
- APIs and CLI tools to start measurements and get results
- Streaming data for real-time results
- New: "<u>Time Travel</u>", <u>LatencyMON</u>, <u>DomainMON</u>, <u>Tracemon</u>
- Status checks (Icinga & Nagios)



## Using RIPE Atlas As a Visitor

Section 10

### **Internet Traffic Maps**



RIPE Atlas	«
About RIPE Atlas	>
Get Involved	>
Probes and Anchors	>
Measurements, Maps and Tools	~
Measurements	
Internet Maps	
Tools	
Resources	>
RIPE NCC Members	
My Atlas	>
Staff Pages	>

#### **Internet Maps**



Shows, for each probe, which root DNS server instance the probe ends up querying, when they ask a particular root server. In other words, it shows the "gravitational radius" for root DNS server instances.

#### **RTT to Fixed Destinations**



Shows the colour coding for the RTT value for the particular destination for each probe. The minimum / average / maximum values are based on standard "ping" measurements.

#### **Comparative DNS Root RTT**



Shows a comparison of response time for DNS SOA queries to all the root DNS servers. For each probe, a marker shows the "best" root server with colour identifying the related minimum response time.

#### Reachability of Fixed Destinations



Shows if the particular fixed destination is reachable or not from each probe. Red markers indicate that the specific destination for these probes are unreachable and green reachable.

#### **Root Server Performance**



This map shows the reply time to the SOA query of a particular root DNS server, over the selected transport protocol (UDP, TCP or comparison of the two) for each probe.

### Where is **B-root**?



We display measurement results from the last hour only.



## **Probes per ASN (in RIPEstat)**





### Where we want to place probes







# **Looking Up Public Probes**

Section 11

### **Searching for probes**



					RIPE Database (Whois) Search IP Address or ASN	Website			er based on
anage IPs	and ASNs >	Ana	alyse	Participate	Get Support	> Pub	lications > A		N, country,
You are	here: Home > A	nalyse > Interne	et Measurements	> RIPE Atlas > Probes					ocation
_ Probe	es								
'his is a list	of all current f	RIPE Atlas prob	bes, including in	formation specific to each prob	e. More probes are contin	ually con	e.		
• See the	ore about prot probes map r your own pro			Filter by id/asn/country/de	scription Any Status	• IPv4/v6	5 • Any Country	• <b>T</b> X	
Public	Login to see	more							
Id	ASN v4	ASN v6	Country	Description			Connection Status	•	
6175	1103	1103		SURFnet bv			4 weeks	<b>•</b>	
6146	60781	60781	=	Leaseweb Network B.V.			4 weeks	-	
6152	28753	28753		Leaseweb Network B.V.			4 weeks	-	
6137	3333	3333	=	nl-ams-as3333-preprod			4 weeks	-	
6147	33280	33280		Afilias			4 weeks	<b>•</b>	
6112	197216	197216		Delta Softmedia Ltd			4 weeks	<b>-</b>	
6161	27843	27843		Optical Technologies			4 weeks	<b>•</b>	
6142	63403	63403		Afilias			🚯 4 weeks	-	
6008	2607	2607	۲	AA sk-bts-as2607			4 weeks	-	
6001	3333	3333	=	AA nl-ams-as3333			4 weeks	-	
			_						

### **Probe page**

» You are here: Home > Analyse > Internet Measurements > RIPE Atlas > Probes > Probe #10010

#### Probe #10010 (Register)



3 days, 9 hours

### **Zoomable Ping Graph**



- Replace multiple RRD graphs: zoom in/out in time, in the same graph
- Easier visualisation of an event's details
- Selection of RTT class (max, min, average)





## Finding Results of Public Measurements

Section 12

## Looking up Measurements Results



### https://atlas.ripe.net/measurements/

Manage IPs	and AS	Ns >	Ar	nalyse	>	Partic	ipate	> (	Get Support	>	Publica	tions	>	About	: Us
You ar			-	ernet Measure	ements >	RIPE Atlas >	Measurem	ents							
		Search	h by target	♦ Search.					Any Status	IPv4/v6	\$ Al	l types	Of all time	\$	T X
Ping	Trac	ceroute	DNS	HTTP	SSL	NTP	WiFi	Built-in	Anchoring						
ID	Туре	Target				Descriptio	n				Probes	Interval	Time (UTC)	•	Status
9278562	Ping	www.rip	e.net			Ping meas	urement t	o www.ripe.ne	et		8	one-off	08-09-2017 1 Never	4:02	0
9278557	Ping	185.15.2	245.163			From scrip	t for laten	cy checks for	Monitoring		35	one-off	08-09-2017 1 Never	3:58	0
9278556	Ping	123.126	.20.54			check unic	om				10	one-off	08-09-2017 1 08-09-2017 1		
9278555	Ping	r1.d1.de	e.recast-it.ne	et		From scrip	t for laten	cy checks for	Monitoring		35	one-off	08-09-2017 1 08-09-2017 1		•
9278554	Ping	r1.a1.nl	.recast-it.ne	t		From scrip	t for laten	cy checks for	Monitoring		35	one-off	08-09-2017 1 08-09-2017 1		
9278553	Ping	2001:6a	8:28c0:2017	7::00:00:FF		Ping 6 BLU	E measure	ement to 2001	:6a8:28c0:2017:	:00:00:FF	956	one-off	08-09-2017 1 08-09-2017 1		
9278550	Ping	2001:6a	8:28c0:2017	7::00:00:FF		Ping6 mea	surement	to 2001:6a8:2	8c0:2017::00:00	:FF	484	one-off	08-09-2017 1 08-09-2017 1		

## **Available visualisations: ping**



 List of probes: sortable by RTT

 Map: colour-coded by RTT

 LatencyMON: compare multiple latency trends





### **Available visualisations: traceroute**

 <u>TraceMON</u>: network topology, latency and nodes information

 <u>IPMap(beta)</u>: hops geolocation on map (prototype)





### **Available visualisations: DNS**



### • Map, colour-coded response time or diversity



• List of probes, sortable by response time

General I	nformation	Probes	Мар	Down	load	Results	Modification Log			
Probe	÷ ASN (v4)	¢	ASN (v6)	\$	¢	¢	Time	Name	Response Time	
17840	6327				H	6	2015-05-19 09:38	null		362.009
18035	43030					6	2015-05-19 09:50	null		347.39
18129	327805				$\geq$	6	2015-05-19 09:49	null	207.74	3
15844	32098					6	2015-05-19 09:48	null	184.237	
17857	852				÷	6	2015-05-19 09:37	null	177.694	
19894	6327				÷	6	2015-05-19 09:36	null	168.689	
19204	21513				×	6	2015-05-19 09:50	null	141.199	
15922	30036					6	2015-05-19 09:47	null	133.309	

## **Downloading Measurements Results**

- Click on "Results", then "Download"
- Or URL
- Or API
- Results in JSON
- Libraries for parsing on GitHub

4 <sup>6</sup> Calibra ke-nbo-as3			0			IPv6 Traceroute for							
General Informatio	on Probes	Мар	OpenIPMap Proto	otype	Results								
Download the raw measurement result data here.													
You can use this form to download the data through your browser, or use the preview on the right to help you query the REST API directly.													
Select Your	Select Your Timeframe URL Preview												
Start Date*:	https://atlas.ripe.net/api/v2/measuremer												
Date*: 064/results/?start=1505260800&stop=150534 <i>All dates are start-of-day</i> ormat=json													
Stop Date*:													
	Date*: All dates are end-of-day												
Format:	JSON		\$										
Download													

### Search for Measurements by Target in RIPEstat



### Finding one specific measurement

- If you know the measurement ID:
  - https://atlas.ripe.net/measurements/ID
  - https://atlas.ripe.net/measurements/2340408/
# **Use Existing Measurements**



- Many measurements already running!
- Search for existing public measurements first...
- Only then schedule your own measurement



# **Creating a Measurement**

Section 13

# Benefits of your own measurements

- Customer problem: cannot reach your server
  - Schedule measurements (pings or traceroutes) from up to 1,000 RIPE Atlas probes worldwide to check where the problem is
- Measuring packet loss on suspected "bad" link
- Testing anycast deployment

### **Prerequisites**



- RIPE NCC Access account ?
  - If not, create one: ripe.net/register

- Do you have credits to spend?
  - Redeem voucher
- Redeem LIR credits monthly

# Logging In



- Log in to <u>atlas.ripe.net</u>
  - Use your RIPE NCC Access account
  - Same account for LIR Portal, RIPE Atlas, RIPEstat, RIPE Labs...
  - Create an account if you don't already have one



# **Credits system**



- Measurements cost credits
  - ping = 10 credits, traceroute = 20, etc.
- Why? Fairness and to avoid overload
- Spending limit and max number of measurements

### How can you earn credits?



- Hosting a RIPE Atlas probe
- Being a RIPE NCC member
- Hosting an anchor
- Sponsoring probes
- Being an ambassador
- Redeeming a voucher

### **Credits overview**



You are here: Home > Analyse > Internet Measurements > RIPE Atlas > My Atlas > My Credits         RIPE Atlas <ul> <li>About RIPE Atlas</li> <li>Get Involved</li> <li>Probes and Anchors</li> <li>Probes and Tools</li> <li>Resources</li> <li>RIPE NCC Members</li> </ul> <ul> <li>It all Charts &amp; Archives</li> <li>It all Charts &amp; Archives</li> <li>It all Charts &amp; Archives</li> <li>It and the probe in the prob</li></ul>	out Us
RIPE Atlas   About RIPE Atlas   About RIPE Atlas   About RIPE Atlas   About RIPE Atlas   Get Involved   Probes and Anchors   Measurements, Maps and Tools   Nessures   Nessures   RIPE NCC Members   My Atlas   Credits   Messages   Anchors   Messages   Anchors   Settings <b>Credits Credits C</b>	61
About RIPE Atlas About RIPE Atlas Get Involved Probes and Anchors Measurements, Maps and Tools Resources My Atlas Credits API Keys Messages Anchors Settings My Atlas > Credits Anchors Settings My Atlas > Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Credits Anchors Settings Credits Anchors Settings Credits Anchors Settings Credits Credits Credits Credits Credits Anchors Settings Credits	61
About RIPE Atlas	n
Get Involved >   Get Involved >   Probes and Anchors >   Measurements, Maps and Tools >   Atlas Image: Consumption, transfer credits to someone else, and redeem a voucher for credits if you have one.   Measurements, Maps and Tools >   Atlas Image: Consumption, transfer credits to someone else, and redeem a voucher for credits if you have one.   Measurements, Maps and Tools >   Atlas Image: Consumption, transfer credits to someone else, and redeem a voucher   My Atlas Image: Consumption, transfer credits to someone else, and redeem a voucher   Credits Comm   API Keys Prob   Messages My Atlas > Credits   Anchors Probe ID:6019 Anchor optime 5X extra credit   Settings Comm   Comm Give credits   to someone + 108,000   152,4   Anchors Probe ID:6019 Anchor optime 5X extra credit   Settings Comm	
robes and Anchors     Measurements, Maps and Tools     Messages     My Atlas     Credits   API Keys   Messages   My Atlas > Credits   Probe   Probe   Probe   Definition   Probe   Definition   History     Messages   Anchors   Settings        Probe   Definition                  Value	
Image: Algorithm Image: Algorithm   Algorithm   Apl Keys   Messages   My Atlas     Credits   APl Keys   Messages   My Atlas   Prob   Prob   Prob   Prob   Prob   Prob   Descent and the probe lab   Prob   Prob   Prob   Descent and the probe lab   Prob   Descent and the probe lab   Prob   Descent and the probe lab   Probe lab<	57 1100
IPE NCC Members	
Ky Atlas       Commentation       Give credits       Change       Bala         API Keys       Prob       Prob       Commentation       Find 26       Prob       Find 26       Prob	
Ay Adas       Comm       Give credits       Change       Bala         API Keys       Prob       Prob       for someone       + 108,000       153,0         Messages       My Atlas > Credits       Probe ID:6019 Anchor upcome 5X extra credit       + 108,000       152,0         Anchors       Probe ID:6019 Anchor upcome 5X extra credit       + 108,000       152,0         Settings       CoTC       Probe ID:6019 Anchor host 5x extra credit       + 108,000       152,0	
API Keys     Prob     Give credits to someone     + 108,000     153,0       Messages     My Atlas > Credits     Probe In     + 108,000     152,5       Anchors     Probe ID:6019 Anchor optime 5x extra credit     + 108,000     152,5       Settings     COTC     Probe ID:6019 Anchor host 5x extra credit     + 108,000     152,5	
API Keys         Prob         to someone         + 108,000         153,00           Messages         My Atlas > Credits         Probe ID         Probe ID         + 108,000         152,00           Anchors         Probe ID:6019 Anchor optime 5X extra credit         + 108,000         152,00           Settings         COTC         Probe ID:6019 Anchor host 5x extra credit         + 108,000         152,00	ance
MessagesMy Atlas > CreditsProbe ID+ 108,000152,9AnchorsProbe ID:6019 Anchor optime 5X extra credit+ 108,000152,9SettingsCOTCProbe ID:6019 Anchor host 5X extra credit+ 108,000152,9	,033,561
Settings     Probe ID:6019 Anchor host 5x extra credit     + 108,000     152,3	,925,561
	,817,561
taff Pages         >         2016-02-02 01:02 UTC         Probe ID:6019 Anchor uptime 5x extra credit         + 108,000         152,000	,017,501
	,709,561
2016-02-02 01:02 UTC         Probe ID:6019 Anchor host 5x extra credit         + 108,000         152,4	
2016-02-01 01:02 UTC         Probe ID:6019 Anchor uptime 5x extra credit         + 108,000         152,33	,709,561

# Scheduling a measurement



- Log in to atlas.ripe.net
- Four methods:
  - 1.Quick and easy
  - 2. Advanced GUI usage
  - 3. API (curl and JSON code)
  - 4. CLI

# 1. Quick and easy



<ul> <li>Ping measurement to bbc.co.uk</li> </ul>	×	Daily cost: 10
Target:	Description:	You will run o
bbc.co.uk An IP address or hostname	Ping measurement to bbc.co.uk	in about 1
	Interval:	
Address Family*:	240	
IPv4 \$	How often this should be done (seconds between samples). Note that this value is	- 910/2017 29110/2016
Packets:	Ignored for one-off measurements.	Balan
3		Total Exp
Size:	Resolve on Probe:	
48		Users who w
	9	credits for t
> Advanced Options		ferenc@ripe.r
Worldwide     10     ×       + New Set - wizard     +New Set - manual       Step 3     Timing	+ IDs List + Reuse a set from a measurement	
This is a One-off:		1
Start time (UTC):	Stop time (UTC):	
As soon as possible		
	Never 🗰	

# 2. Use GUI to schedule a measurement 😥

- Mostly used for a periodic, long-term measurement
  - Or "One-off"
- Choose type, target, frequency, start/end time, # of probes, region...
- Each measurement will have **unique ID**
- "API Compatible Specification" is generated too

### 2. Advanced GUI



	Create a New Measu	rement	
$\square$	Step 1 Definitions		Costs summary
S	<ul> <li>Ping measurement to bbc.co.uk</li> </ul>	×	Daily cost: 10800 credits
	Target:	Description:	You will run out of credits
	bbc.co.uk	Ping measurement to bbc.co.uk	in about 124 days
$(\mathbf{B})$	An P address or hostn	Interval:	
	Address Family*:	240	
	IPv4	+ How often this should be done (seconds	23/2017 - 191/2017 - 9/0/2017
	Packets:	between samples). Note that this value is ignored for one-off measurements.	
	3	ignored for one-on measurements.	Dalaride
		Resolve on Probe:	Total Expenses
	Size:	Force the probe to do DNS resolution	
	48		Users who will supply credits for this
			measurement:
	> Advanced Options		ferenc@ripe.net \$
E	Step 2     Probe Selection       Worldwide     10		
	+ New Set - wizard +New Set - manu Step 3 Timing	al + IDs List + Reuse a set from a measurement	
(F)	This is a One-off: 🗌		
Ŀ	Start time (UTC):	Stop time (UTC):	
-	As soon as possible	Never	
	> Measurement API Compat	tible Specification	
		My Measurement(s)	

# 3: Use API to schedule a measurement 😥

- Using command-line and scripting: Application Programming Interface (API)
  - https://atlas.ripe.net/docs/api/v2/manual/measurements/ types/
  - https://atlas.ripe.net/keys/

- You will need API keys
  - To create measurements without logging in
  - To securely share your measurement data

# 3. API Compatible



#### Create a New Measurement

<ul> <li>Ping measurement to bb Target:</li> </ul>	a.co.un	Description:	×	Daily cost: 10
		· · · · · · · · · · · · · · · · · · ·		You will run o
An IP address	or bostnama	Ping measurement to bbc.co.uk		in about '
All IF address (	or nostname	Interval:		
Address Family*:		240	٢	
IPv4	\$	How often this should be done (s		0.6
P. J. J.		between samples). Note that this	value is	-90/2017
Packets:		Ignored for one-off measure	ements.	6 Balar
3	٢	Resolve on Probe:		Total Exp
Size:		Force the probe to do DNS re	_	
48			U	Jsers who v
	۲		c	redits for t
> Advanced Options			n	neasureme
+ Ping + Tracer Step 2 Probe Selection	oute + DN	NS +SSL +HTTP +NTP		ferenc@ripe.
+ Ping + Tracer	oute + DN	NS + SSL + HTTP + NTP		ferenc@ripe.
+ Ping + Tracen Step 2 Probe Selection Worldwide 10		+ IDs List + Reuse a set from a meas		ferenc@ripe.
+ Ping + Tracen Step 2 Probe Selection Worldwide 10	×			ferenc@ripe.
+ Ping + Tracen Step 2 Probe Selection Worldwide 10 + New Set - wizard + New Set Step 3 Timing	×			ferenc@ripe.
+ Ping + Tracer Step 2 Probe Selection Worldwide 10 + New Set - wizard + New Se Step 3 Timing This is a One-off:	×	+ IDs List + Reuse a set from a meas		ferenc@ripe.
+ Ping + Tracer Step 2 Probe Selection Worldwide 10 + New Set - wizard + New Set Step 3 Timing This is a One-off: Start time (UTC):	X t - manual	+ IDs List + Reuse a set from a meas Stop time (UTC):	urement	ferenc@ripe.
+ Ping + Tracer Step 2 Probe Selection Worldwide 10 + New Set - wizard + New Se Step 3 Timing This is a One-off:	×	+ IDs List + Reuse a set from a meas		ferenc@ripe
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+ Ping + Tracer Step 2 Probe Selection Worldwide 10 + New Set - wizard + New Set Step 3 Timing This is a One-off: Start time (UTC): As soon as possible	X t - manual	+ IDs List + Reuse a set from a meas Stop time (UTC): Never	urement	ferenc@ripe

# [cont...] 3. API Compatible



	ent API Compat			
	lerH "Content-Type	e: application/j	son" -H "Accept:	
application/json"	-X POST -d '{			
"definitions": [				
{				
"target": "nrc.nl	" '			
"af": 4,				
"packets": 3,				
"size": 48,				
"description": "F	Ping measurement to	o nrc.nl",		
"interval": 240,				
"resolve_on_pro	be": false,			
"skip_dns_checl				
"type": "pipg"				

# **Create API Key**



- Go to MyAtlas
- Click on "Create an API Key"
- Choose "permission": "schedule new measurement"
- Careful! Time is UTC!
- Give it a label



# DEMO

Create a Measurement (GUI) Explore advanced parameters



# **Create a Measurement**

**Exercise D** 

#### **Exercise**



- Create a ping measurement:
  - Involving ten probes
  - To a target of your choice
  - Source is your country
  - Duration of two days

#### Tasks



- 1. Warm-up: Create a measurement using the GUI
- 2. Create API Key
- 3. Schedule a measurement using the API

#### Task 1: Use web interface



- Useful hint: once you generate a measurement, copy "API Compatible Specification" to text file
- Take note of the measurement ID!

	C		RI	PE Database (Wh	iois)	Website				
			Sea	arch IP Address o	or ASN					Q
Manage IPs and ASNs >	Analyse	> Participate	>	Get Suppor	rt :	> Pu	blications	>	About Us	
RIPE Atlas	» Measurer	ments > RIPE Atlas > Measurements								
About RIPE Atlas	>									
Get Involved	>									
Probes and Anchors	>							+ Crea	ate a Measuren	nent
Measurements, Maps and Tools	~									
Measurements		Filter by target and/or description		An	y Status	\$ IPv4/v6	\$ All types	\$ Of all t	ime 💠 🕇	×
Internet Maps										
Tools	Public	Built-ins								
Resources	> Descr	iption				Probes	Sta	itus		
RIPE NCC Members	Ping n	neasurement to nu.nl				100				• *
My Atlas		fic Probes » nu.nl hths ago - 2 months ago								
<b>⊯</b> <sup>4</sup> 3057002	Ping n Specif	neasurement to nu.nl fic Probes » nu.nl nths ago - 2 months ago				100		•		•

reate a New Measurement							
Step 1 Definitions	S						
Please select the type of measurement you want to create							
+ Ping + Traceroute + DNS + SSL + NTP							
Step 2 Probe Sel	ection						
Worldwide	50 ×						
+ New Set - wizard +New Set - manual + IDs List + Reuse a set from a measurement							
Step 3 Timing							
This is a One-off:  Start time: As soon as possible		Stop time	:				
> Measurement API Compatible Specification							
Create My Measurement(s)							

### Task 2: Create API key



1. Click on "Create an API Key"

- 2. Permission: "schedule a new measurement"
- 3. "Target" is not applicable (N/A) for this type

You are here: Home > Analyse > Inte	ernet Meas	surements > RIPE Atlas							
RIPE Atlas	«								
About RIPE Atlas	>		APLKova				+0	reate ar	n API key
Get Involved	>	AFIREys	API Keys						
Probes and Anchors	>								
Measurements, Maps and Tools	>	C Key	Created	- Permission	Object	Label	Valid	Valid	Enabled
Resources	>						From	То	
RIPE NCC Members		<ul> <li>1967424c-0947-48ab-a990- b35b42b3e921</li> </ul>	2016-02-04 15:56 UTC	Create a new user defined measurement	(N/A)	ciao			~
My Atlas	~	D 1b2fd786-4059-4505-876d-	2015-08-27	Create a new user defined	(N/A)	Michy			~
Credits		c11880106cc7	11:53 UTC	measurement		Test			
API Keys									
Messages				Showing 2 keys					

# [cont...] Task 2: Create API key



1. Give it a label

- 2. Give it a duration of validity (leave empty for defaults)
- 3. "Key" value to be passed on to the API call (next step)

### Task 3: Use API



Schedule a measurement using API

- Use the "key" you just generated
- Hint: copy and past API call syntax from the measurement generated by the GUI

#### • Example:

curl -H "Content-Type: application/json" -H "Accept: application/json" -X
POST -d '{ "definitions": [ { "target": "ping.xs4all.nl", "description":
 "My First API Measurement", "type": "ping", "af": 4 } ], "probes":
 [ { "requested": 10, "type": "country", "value": "RS" } ] }' <u>https://
 atlas.ripe.net/api/v1/measurement/?key=YOUR\_API\_KEY</u>

# Сору

#### Measurement API Compatible Specification

curl --dump-header - -H "Content-Type: application/json" -H "Accept: application/json" -X POST -d '{ "definitions": [ { "target": "nrc.nl", "af": 4,

"packets": 3,

"size": 48,

"description": "Ping measurement to nrc.nl",

"interval": 240,

"resolve\_on\_probe": false,

"skip\_dns\_check": false,

"type": "ning"

Copy to clipboard

"type": "area", "value": "WW", "requested": 10 } , 'is_oneoff": false, 'bill_to": "ferenc@ripe.net" ' https://atlas.ripe.net/api/v2/measurements//?key=YOUR_KEY_HERE	(ype , ping }  ,  probes": [ {			
'bill_to": "ferenc@ripe.net"	"requested": 10 } l,			
	'bill_to": "ferenc@ripe.net	nts//?key=YOU	R_KEY_HERE	

Terminal Shell Edit View Window Help	° b/s 🕞 🕑 🔷 奈 🕙 🕴 🖬 100% 🖅 wo 12:
⊖ ⊖ ⊙ 🏠 becha —	bash — 72×24 ⊮ <sup>™</sup>
	-Type: application/json" -H "Accept:
<pre>application/json" -X POST -d '{ "de</pre>	finitions": [ { "target": "ping.xs4al
l.nl", "description": "My First Mea	surement", "type": "ping", "af": 4 }
], "probes": [ { "requested": 10, "	type": "country", "value": "RS" } ] }
<pre>https://atlas.ripe.net/api/v1/mea</pre>	surement/?key=7b4c3441-4504-4d83-9ed7
-fbf1a007d060	HOTCHE CHARGE CONTRACTOR AND
{"measurements":[2421551]}air-becha	:~ becha\$
AgaPegJubg3DAnsMBQsFoSqAAAoJEJs2XL2/g9MIksIQAMIS//Busar@Is	Deal Control C
ewA9vOxsYvgrQNv1p6H/HKsuMbs716LaKb5304MUZgVKnCrxHZw+B52NB0	TheFary Profession Constrained Annual Constrained



# **Network Monitoring**

Section 14

# **Network Monitoring**



- Integrate "status checks" with existing monitoring tools (Icinga, Nagios)
- Using real-time data streaming
  - Server monitoring
  - Detecting and visualising outages

# **Steps for integration**



- 1. Create a RIPE Atlas ping measurement
- 2. Go to "status checks" URL (RESTful API call)
  - https://atlas.ripe.net/api/v2/measurements/2340408/ status-check?max\_packet\_loss=20
- 3. Documentation:
  - https://atlas.ripe.net/docs/api/v2/manual/measurements/ status-checks.html
- 4. Add your alerts in Nagios or Icinga



# **RIPE Atlas streaming**



- Allows users to receive the measurement results as soon as they are sent by the probes in real time
  - Publish/subscribe through web sockets
- There are three types of data:
  - Measurement results
  - Probe connection status events
  - Measurements metadata

# **RIPE Atlas streaming**



- Visualising network outages
  - http://sg-pub.ripe.net/demo-area/atlas-stream/conn/
- Real-time server and performance monitoring
- Filtering and reusing measurement results
- Documentation:
  - https://atlas.ripe.net/docs/result-streaming/



# **Using streaming API**

Exercise E

### **Preparation for the exercise**



- Preconfigure web browser
- In Safari
  - Preferences > Advanced>Show Develop menu
- Chrome or Firefox needs no reconfiguration

# **EX1: Monitoring server reachability**



- Scenario: customers complain it takes a long time to reach your server
- Action: ping your server from 50 probes
  - Choose acceptable latency threshold
  - Notice and react when you start receiving samples
- Task: Use the ping measurement ID 19230504
  - Choose which threshold (e.g. greater than 30ms)
  - Impose threshold on "min" (the minimum result of the three ping attempts)

### **Steps**



- 1. http://atlas.ripe.net/webinar/streaming01.html
- 2. Open the development console
- 3. Wait for results to arrive
- 4. Save the HTML file locally and edit the code
- 5.Open the edited html file in a browser and view results

#### **Page Source**




## Streaming results before editing



品 Elements	I Network	J Timelines	Debugger	Storage	Canvas
			Q.	-	< > Preserve Log
E ▶ I received - {af	: 4, prb_id: 19767	, result: [{rtt:	89.11834}, {rtt: 8	6.919135}, {rtt:	85.250185}],}
E ▶ I received - {af	: 4, prb_id: 50080	, result: [{rtt:	171.035625}, {rtt:	170.931583}, {rt	t: 170.712583}],}
E ► I received - {af	: 4, prb_id: 11270	, result: [{rtt:	56.730195}, {rtt:	56.99866}, {rtt:	57.10254}],}
E ► I received - {af	: 4, prb_id: 11819	, result: [{rt:	27.58189}, {rtt: 2	6.48163}, {rtt: 2	6 <b>.</b> 31239}],}
E ► I received - {af	: 4, prb_id: 11254	, result: [{rtt:	25.91282}, {rtt: 2	5.951535}, {rtt:	25.85539}],}
E ▶ I received - {af	: 4, prb_id: 11254	, result: [{rtt:	25.87804 <mark>5</mark> }, {rtt: 1	25.884435}, {rtt:	25.899845}],}
E ► I received - {af	: 4, prb_id: 11254	, result: [{rit:	26.17654}, {rtt: 2	5.92677}, {rtt: 2	5.80457}],}
E ► I received - {af	: 4, prb_id: 34379	, result: [{rtt:	46.6846}, {rtt: 46	.188255}, {rtt: 4	6.266295}],}
E ► I received - {af	: 4, prb_id: 34379	, result: [{rtt:	46.639365}, {rtt:	46.337135}, {rtt:	<b>46.329865</b> }],}
E ▶ I received - {af	: 4, prb_id: 32537	, result: [{rtt:	31.569225}, {rtt:	31.04494}, {rtt:	31.345645}],}
E ► I received - {af	: 4, prb_id: 32537	, result: [{rtt:	31.36033}, {rtt: 3	1.311695}, {rtt:	31 <b>.08219</b> }],}
E ► I received - {af	: 4, prb_id: 50139	, result: [{rtt:	174.899542}, {rtt:	175.433042}, {rt	t: 176.889375}],}
E ► I received - {af	: 4, prb_id: 50139	, result: [{rtt:	175.135042}, {rtt:	179.360667}, {rt	t: 174.592625}],}
E ► I received - {af	: 4, prb id: 50049	, result: [{rtt:	19.526792}, {rtt:	18.990375}, {rtt:	18.938875}],}

## From the doc



Common parame			
Name	Description		
prb	A specific probe ID. If you don't set this parameter, you will receive results from all the probes		
acceptedFields	A list of accepted fields name, the messages will be pruned server side. If you don't set this parameter you will receive all the fields		
enrichProbes	If you want to enrich the information received with the "probestatus" stream about the probes (e.g. lat, long), set this option to true		
equalsTo	Allows to filter by values. E.g. with {status: "connected", asn: "3333 4444"} you will receive all the messages with a connected status and ASn equals to 3333 or 4444		
lessThan	Allows to filter by values. E.g. with {valueX: 15} you will receive all the messages with a valueX less than 15		
greaterThan Allows to filter by values. E.g. with {valueX: 15} you will receive all the messages with a valueX greater than 15			
Parameters for "r Name	esult" stream_type		
	Description A specific measurement ID		
Name	Description		
Name	Description A specific measurement ID		
Name msm type	Description A specific measurement ID Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl		
Name msm type sourceAddress	Description         A specific measurement ID         Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl         Streams all the results coming from a probe having the specified address		
Name msm type sourceAddress sourcePrefix	Description         A specific measurement ID         Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl         Streams all the results coming from a probe having the specified address         Streams all the results coming from a probe having an address in the specified prefix		
Name msm type sourceAddress sourcePrefix destinationAddress	Description         A specific measurement ID         Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl         Streams all the results coming from a probe having the specified address         Streams all the results coming from a probe having an address in the specified prefix         Streams all the results measuring the specified address		
Name msm type sourceAddress sourcePrefix destinationAddress destinationPrefix	Description         A specific measurement ID         Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl         Streams all the results coming from a probe having the specified address         Streams all the results coming from a probe having an address in the specified prefix         Streams all the results measuring the specified address         Streams all the results measuring an address in the specified prefix		
Name msm type sourceAddress sourcePrefix destinationPrefix passThroughHost	Description         A specific measurement ID         Streams all the results of the specified type, i.g. ping, traceroute, ntp, http, dns, ssl         Streams all the results coming from a probe having the specified address         Streams all the results coming from a probe having an address in the specified prefix         Streams all the results measuring the specified address         Streams all the results measuring an address in the specified prefix         Streams all the results measuring an address in the specified prefix         Streams all the traceroutes passing through the specified host. Only for traceroute measurements         Streams all the traceroutes passing through a host in the specified prefix. Only for traceroute		

## **EX2: Monitoring server reachability**



- Same situation as in the exercise before, but you didn't schedule a measurement in advance
  - You don't have a measurement ID
- You want to get all the measurements reaching 216.58.212.227
- Now restrict the results to just include ping measurements



## Command-line Interface (CLI) Toolset

Section 15

## **RIPE Atlas CLI**



- Familiar output (ping, dig, traceroute)
- Linux/OSX
  - http://ripe-atlas-tools.readthedocs.org/en/latest/ installation.html#requirements-and-installation
- Windows [experimental]
  - https://github.com/chrisamin/ripe-atlas-tools-win32

## **RIPE Atlas CLI**

## Open source

- RIPE NCC led community contribution
- Documentation
  - https://ripe-atlas-tools.readthedocs.org/
- Source:
  - https://github.com/RIPE-NCC/ripe-atlas-tools/

## Install RIPE Atlas tools

## • OSX:

- sudo easy\_install pip
- sudo pip install ripe-atlas-tools
- Linux:
  - Available from many package repositories
  - ... or same as in OSX

## **Configure RIPE Atlas CLI**



- Reuse the API key of the first exercise
  - Or create a new one at https://atlas.ripe.net/keys/
- Configure your CLI
  - ripe-atlas configure --set authorisation.create=MY\_API\_KEY

## Fetch an existing measurement



- Fetch the ping measurement 2340408
  - ripe-atlas report 2340408

## **Search probes**



- Search all probes in AS 3333
  - ripe-atlas probe-search --asn 3333
- Show specific fields
  - ripe-atlas probe-search --asn 3333 --field asn\_v6 -field country --field description --field status

## **Create a measurement**



- Create a ping measurement to wikipedia.org
  - One-off, default parameters
  - ripe-atlas measure ping --target wikipedia.org

Looking good! Your measurement was created and details about it can be found here:

```
https://atlas.ripe.net/measurements/3499718/
```

Connecting to stream...

48	bytes	from	probe	#18433	94.112.176.45	to	91.198.174.192	(91.198.174.192):	ttl=50	times:41.979,	41.492,	40.769,
48	bytes	from	probe	#20111	37.151.230.180	to	91.198.174.192	(91.198.174.192):	ttl=57	times:100.511,	100.136,	100.325,
48	bytes	from	probe	#25003	176.193.48.211	to	91.198.174.192	(91.198.174.192):	ttl=59	times:47.967,	47.476,	47.403,
48	bytes	from	probe	#20313	5.199.160.9	to	91.198.174.192	(91.198.174.192):	ttl=58	times:36.501,	36.245,	36.285,
48	bytes	from	probe	#22573	89.176.43.44	to	91.198.174.192	(91.198.174.192):	ttl=52	times:28.747,	27.712,	28.446,
48	bytes	from	probe	#19413	89.71.47.56	to	91.198.174.192	(91.198.174.192):	ttl=51	times:49.89,	49.779,	50.277,
	-				78.52.132.137			(91.198.174.192):			38.095,	37.73,
	-				62.65.126.46			(91.198.174.192):		-	23.412,	33.067,
					87.81.148.2			(91.198.174.192):			12.885,	13.039,
48	bytes	from	probe	#12584	46.175.22.202	to	91.198.174.192	(91.198.174.192):	ttl=59	times:36.073,	35.788,	35.883,

## **Other examples of ping**



- Geo-specific from 20 probes from Canada:
  - ripe-atlas measure ping --target example.com --probes 20
     --from-country ca
- 20 Canadian probes that definitely support IPv6:
  - ripe-atlas measure ping --target example.com --probes 20
     --from-country ca --include-tag system-ipv6-works
- Create a recurring measurement:
  - ripe-atlas measure ping --target example.com --interval 3600



## **Using RIPE Atlas CLI**

**Exercise F** 

## **Preparation for the exercise**



- UNIX/LINUX/OSX:
- Terminal:
  - sudo easy\_install pip
  - sudo pip install ripe-atlas-tools
  - choose "Install" in pop-up
  - ripe-atlas configure --set authorisation.create=MY\_API\_KEY

## Create measurement to test reachability

- Use the traceroute command to test the reachability of:
  - wikipedia.org
  - on TCP port 443
  - from 20 probes
  - in France



## **Use Cases**

Section 16





#### Using RIPE Atlas to Validate International Routing Detours

Anant Shah — 30 Jan 2017

#### A Quick Look at the Attack on Dyn

Massimo Candela 🌢 — 24 Oct 2016

Contributors: Emile Aben

#### Using RIPE Atlas to Monitor Game Service Connectivity

Annika Wickert — 14 Sep 2016

#### **Using RIPE Atlas to Measure Cloud Connectivity**

Jason Read — 06 Sep 2016

#### Using RIPE Atlas to Debug Network Connectivity Problems

Stéphane Bortzmeyer — 10 May 2016

## **RIPE Atlas IXP Country Jedi (1)**

- Do paths between ASes stay in country?
- Any difference between IPv4 and IPv6?
- How many paths go via local IXP?
- Could adding peers improve reachability?

#### https://www.ripe.net/ixp-country-jedi

- Experimental tool
  - Feature requests welcome!
  - Depends on probe distribution in country

## **RIPE Atlas IXP Country Jedi (2)**

### Methodology

- Trace route mesh between RIPE Atlas probes
- Identifying ASNs in country using RIPEstat
- Identifying IXP and IXP LANs in PeeringDB



Figure 1: Visual representation of IPv4 paths (left) and IPv6 paths (right) between selected RIPE Atlas probes in Sweden

IXP IPs: YES, out-of-country IPs: NO IXP IPs: NO, out-of-country IPs: NO IXP IPs: YES, out-of-country IPs: YES IXP IPs: NO, out-of-country IPs: YES

## Use Cases (2)



- DDoS Attack on Dyn DNS Servers (Oct. 2016)
  - 10s millions devices Mirai botnet
  - Legitimate requests



## Use Cases (3)



- Monitor Game Service Connectivity (Sept. 2016)
- Requirements:
  - Check General Reachability, Latency, Historical data
  - Supported by an active and helpful community
  - Integrate with their existing logging system
- Track down an outage in one upstream
- Became sponsors



## Use Cases (4)



- Amsterdam Power Outage (March 2015)
- When and where the outage was happening





## **More RIPE Atlas Features**

Section 17

### Secure Measurement creation and sharing

- Use API keys to:
  - Create measurements without logging in
  - Securely share your measurement data with others
- To create, manage and delete API keys:
  - https://atlas.ripe.net/keys/
  - <u>https://atlas.ripe.net/docs/keys2/</u>
- Examples:
  - https://atlas.ripe.net/docs/rest/

## **Security Aspects**



#### • Probes:

- Hardware trust material (regular server address, keys)
- No open ports; initiate connection; NAT is okay
- Don't listen to local traffic
- No passive measurements
- Measurements triggered by "command servers"
  - SSH connections from probe to server
  - initiated by probe
- Measurement code published

## **Additional Membership Benefits**



- RIPE Atlas:
  - Guaranteed to host a probe
  - Do NOT have to host probe to perform customised measurements
  - 1,000,000 extra credits monthly via LIR Portal
  - "Quick Look" measurements via LIR Portal
  - IPv6 reachability testing (free)
  - Share probe management with LIR colleagues
- RIPEstat:
  - Historical view of RIPE Database objects



# Take Part in the RIPE Atlas Community

Section 18

## **RIPE Atlas community (part 1)**



- Volunteers host probes in homes or offices
- Organisations host RIPE Atlas anchors
- Sponsor organisations give financial support or host multiple probes in their own networks

## **RIPE Atlas community (part 2)**



- Ambassadors help distribute probes at conferences, give presentations, etc.
- Developers contribute free and open software
- Network operators create measurements to monitor and troubleshoot
- Researchers and students write papers

## Hosting a probe



- Create a RIPE NCC Access account
- Go to https://atlas.ripe.net/apply
- You will receive a probe by post
- Register your probe
- Plug in your probe
- If you receive a probe from an ambassador (trainer, sponsor, someone at a conference), just register it and plug it in!

## **Road map**



- What we are planning to do:
- To involve the community
- To gather feedback

https://atlas.ripe.net/docs/roadmap/





- https://atlas.ripe.net
- <u>http://roadmap.ripe.net/ripe-atlas/</u>

- Users' mailing list: <u>ripe-atlas@ripe.net</u>
- Articles and updates: <u>https://labs.ripe.net/atlas</u>
- Questions and bugs: <u>atlas@ripe.net</u>
- Twitter: @RIPE\_Atlas and #RIPEAtlas



## Questions





## kahoot





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## tuitter

## @TrainingRIPENCC



#### https://www.ripe.net/training/mat/survey

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