351,100 C000:130e3 19F2:80:119A 09:00:80 577 :095:1095 225

RIPE Atlas

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RIPE Atlas:

- So what is an Atlas? = a collection of Maps!
- That's why we called it Atlas, **RIPE Atlas**
- A next generation Internet measurement network
 - To scale to thousands of measurement nodes
 - Potentially "be everywhere" and ready to run different measurements for **YOU**
 - We started in Nov 2010, and we are still building it and continually exploring the possibilities of it



Light Map of Europe (thanks to NASA)





3

So how many probes do we need?

- To gauge the sort of network that we would need!
 - We took a look at all the IP prefixes that RIPE NCC has allocated and then geolocated them
 - We then created a script to randomly plot some dots on a map of those IP prefixes
 - We randomly colored those dots from green to red
 - With an emphasis on highlighting one IP prefix
 - And we got the following results......



Intuition: 1000 Probes





Intuition: 5000 Probes





Intuition: 10k Probes





Intuition: 20k Probes





Intuition: 50k Probes





Intuition: 10k Probes & 1 AS





Instead of building small, separate, individual & private infrastructures, why not build a huge common infrastructure that serves **both** the private goals and the community goals.



Ambitious Community Effort

- Individual Benefits
 - Less expensive than rolling your own
 - More vantage points available
 - More data available
- Community Benefits
 - Unprecedented situational awareness
 - Wealth of data, ...



Why not deploy a SW version?

- Many of the host machines will not run continuously (24/7) over long periods
- The measurements would be *influenced* by sharing systems and network resources with other applications on the host computer
- Software can cause host machines to crash
- SW may be easier to tamper with



Intuition -> Plan

- For accurate maps we need lots of probes
- Deploying very many TTM boxes is too expensive
- Smaller probes
- Easily deployable
- USB powered
- 24 x 365 capable







Probe Deployments









RIPE Atlas - Overall Architecture





RIPE Atlas - Security aspects

- Probes have hardwired trust material (registration server addresses / keys)
- The probes don't have any open ports, they only initiate connections
 - This works fine with NATs too
- Probes don't listen to local traffic, there are no passive measurements running
 - There's no snooping around
- And if in doubt, you can always just pull the plug!



Network extent





Network extent - Global - Feb 2011





Network extent - Europe - Feb 2011





Network extent - Europe - Feb 2012



Network extent - Around India





So what do they currently measure?

• Built in probe measurements to all root servers:

- Shows which root DNS server instance the probe ends up querying
- Shows the response time to all root server instances and one can compare their performance
- RTT to specific targets



Speed of connections to ns.ripe.net





Speed of connections to ns.ripe.net

ireenland Gre € Iceland ∇ P Russia Canada + ∇ Kazakhstan Mongolia North United South Korea Vorth No China Pacific tlantic Atla Afghanistan Ocean Oc cean ran Pakistan Egypt Algeria Libya Saùd México India Arabia Thailand Mauritania Mater Niger Sudan ∇ Chad Nigeria Ethiopia Venezuela Colombia Kkinya DR Congo Indonesia Papua New Tanzania Guinea Brazil Perú Angola Bolivia Namibia Indian Madagasca Botswa Ocean South Australia South Chile Atlantic Pacific South Ocean Ocean Argentina New Zealand Google

Showing results of last measurements. Key (minimum RTT): V<=10ms V<=20ms V<=30ms V<=40ms V<=50ms V<=200ms V<=200ms V<=300ms V<=500ms V<=50



K-root instance query comparison (Berlin, DE)





26

Root server response comparison

Probe ID: 1034

Tajikistan

Tond Marken

Name Server	Response time	Ι
K (IPv4)	10.0ms	2
F (IPv4)	56.0ms	2
I (IPv4)	88.0ms	ć
A (IPv4)	118.0ms	i
M (IPv4)	163.0ms	2
G (IPv4)	195.0ms	2
J (IPv4)	225.0ms	2
B (IPv4)	258.0ms	i
L (IPv4)	263.0ms	2
C (IPv4)	281.0ms	ć
D (IPv4)	320.0ms	2
H (IPv4)	351.0ms	i
E (IPv4)	598.0ms	2

Probe ID: 423

Name Server	Response time	Last update (UTC)
L (IPv4)	2.0ms	2012-02-24 12:01:58
I (IPv4)	178.0ms	2012-02-24 12:01:47
G (IPv4)	194.0ms	2012-02-24 12:02:35
M (IPv4)	224.0ms	2012-02-24 12:02:01
C (IPv4)	257.0ms	2012-02-24 12:02:15
B (IPv4)	265.0ms	2012-02-24 12:02:09
F (IPv4)	273.0ms	2012-02-24 12:01:53
J (IPv4)	281.0ms	2012-02-24 12:02:47
E (IPv4)	295.0ms	2012-02-24 12:02:28
A (IPv4)	314.0ms	2012-02-24 12:02:11
K (IPv4)	339.0ms	2012-02-24 12:01:36
D (IPv4)	348.0ms	2012-02-24 12:02:24
H (IPv4)	348.0ms	2012-02-24 12:02:35

Afghanistan

ekistan





Qinghai

х

User Defined Measurement (UDM)

- Let's you, the host, take control
- You define your measurements and we role them out for you
- You don't just measure from your probe, but potentially, any of the probes on the infrastructure
- Yes, any of the thousands of probes spread all across the globe - and *we* store all these measurements in our DB!



UDM (beta): Type of Measurement

User Defined Measure	ment				
Type:	Pipe			~	>
Origin Type:	Ping			~	
Area:	ww			~	
Target:	www.apricot.net				
Resolve on probe:					
Start ASAP:					
Start at (UTC):	2012-02-23	•	17:00	~	
End never:					
End at (UTC):	2012-02-28	•	12:00	~	
#Probes	12	÷	5	÷	
Req/Low:					
Low action:	Carry On			~	
Reporting	As soon as you	can			
frequency:					
Measurement					
interval, s :					
Notify me:					
Public:					
Do not					
visualise:					
			Save		Cancel

- Currently:
 - Ping (v4/v6)
 - -Traceroute (v4/v6)
- Upcoming:
 - DNS query



UDM (beta): Choosing the "Origin"

×

Type:	Ping			*	
Origin Type:	Area			~	
Area:	ww			v	
Target:	www.apricot.ne	et			
Resolve on probe:					
Start ASAP:					
Start at (UTC):	2012-02-23		17:00	~	
End never:					
End at (UTC):	2012-02-28	•	12:00	~	
#Probes Req/Low:	12	~	5	~	
Low action:	Carry On			~	
Reporting frequency:	As soon as you	can			
Measurement					
interval, s :	_				
Notify me:					
Public:					
Do not visualise:					

- Currently:
 - -Worldwide
 - Region
 - Country
 - Probe
- Upcoming:

-AS

- Prefix



UDM (beta): and more.....

ype:	Ping		~	
rigin Type:	Area			*
rea:	ww			~
arget:	www.apricot.r	www.apricot.net		
esolve on robe:				
tart ASAP:				
tart at (UTC):	2012-02-23	•	17:00	~
nd never:				
nd at (UTC):	2012-02-28	•	12:00	~
Probes eq/Low:	12	-	5	~
ow action:	Carry On			~
eporting equency:	As soon as yo	u can		
easurement				
terval, s : otify me:	✓			
ublic:				
o not sualise:				
			Save	,

- Target

×

- Start
- End
- # Probes
- more...



UDM (beta): Visualisation





So what do you see?

RTT per probe



Packet loss per probe





Hosting = Credits = Measurements

- We cannot be everywhere without your help Become a probe host!
- Donate a fraction of your bandwidth
- Donate a very small amount of electricity
- You get:
- Recognition
- Access to fixed measurements from your probe
- Credits = Measurements from any probe (Q2/11)



Sponsorship = Credits = Measurements

- 50k probes too expensive for RIPE NCC alone
- Sponsorship Plans:



- Recognition and many more credits
- Access to fixed measurements from probes now
- Credits = Measurements from any probe (Q2/11)



Sponsorship = Credits = Measurements

- 50k probes too expensive for RIPE NCC alone
- Sponsorship Plans:

that is $2048 \in 2K \in$ 8 probes $4K \in$ 16 probes geek compatible pricingSM ... $64K \in$ 256 probes

- Recognition and many more credits
- Access to fixed measurements from probes now
- Credits = Measurements from any probe (Q2/11)



So what's next?

- More features, more measurements, more UDM capabilities and refining the *credit* system
- The *current plan* is to give all our *members* access to the UDMs whether they are hosts or not
- More probes hosts
- More sponsors
- And me getting off the stage!!



Questions?

atlas.ripe.net



