

4 September 2024

# Routing Security Journey at REANNZ

YESHASWINI RAMESH

REANNZ



# Who are REANNZ?

- > 100Gbps backbone
- > Capacity on Hawaiki Subsea cable to Australia and US
- > 44 members - 8 Universities, 7 Crown

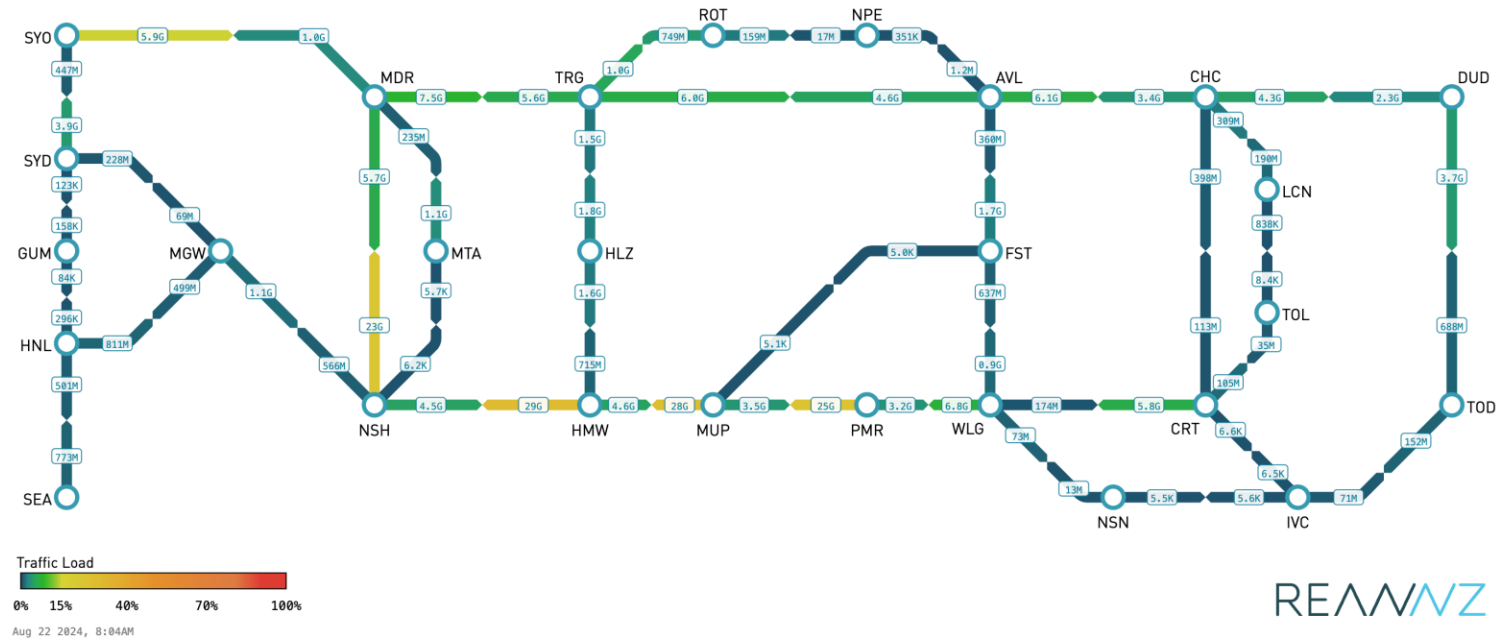
Research Institute, 9 Polytechs and

5 government agencies, and 5 other independent research, innovation or education organisations.



# REANNZ Network Operations

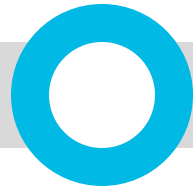
- > Optical infrastructure from One NZ
- > REANNZ Network operations runs all the core routing infrastructure
- > Routing security integral part of operations



# Routing Security Journey

**REANNZ Created**

2006



**Hand-crafted Route Filters  
on Member Edge**

2006



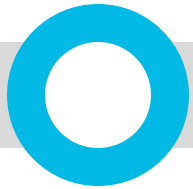
# IP Address Management (IPAM)

Subnet	Description	OrganisationCode	OriginatingASN	NoExport
> 27.96.64.0/22	> Bay of Plenty Polytechnic	BOP	55524	No
📁 49.0.28.0/22	📁 Eastern Institute of Technology	EIT	55702	No
→ 49.0.28.0/24	→ Eastern Institute of Technology	EIT	55702	No
→ 49.0.29.0/24	→ Eastern Institute of Technology	EIT	139272	No
→ 49.0.30.0/24	→ Eastern Institute of Technology	EIT	55702	No
→ 49.0.31.0/24	→ Eastern Institute of Technology	EIT	55702	No
> 103.10.233.0/24	> Victoria University of Wellington	VUW	132003	No
📁 103.119.168.0/23	📁 Ministry of Education	MOE	24318	No

# Routing Security Journey

**Centralise Member  
Routing Information**

2015



**Automation of Route  
Filters on Member Edge**

2015



2015

**Automation of REANNZ +  
Member IRR Entries**

# Introducing MANRS



MANRS

REANNZ

**Desire to improve global Internet routing security**

REANNZ

# REANNZ 1<sup>st</sup> NZ network operator to Join MANRS in 2020

We are still the only network  
operation in NZ ☹️.....



MANRS

@RoutingMANRS

.@REANNZ, New Zealand's National Research and Education Network (NREN), is the 1st network operator in NZ 🇳🇿 to join #MANRS.

In this post, Senior Network Engineer Aaron Murrphy outlines the top 7 actions they take to ensure #routingsecurity. Impressive!



manrs.org

Seven actions REANNZ takes to secure routing of New Zeala  
REANNZ, New Zealand's National Research and Education  
Network (NREN), is proud to be the first network operator ...

5:34 pm · 22 Sep 2020



# Who are MANRS

- > Global Initiative
- > Collaborative Community
- > Culture of Collective Responsibility
- > Action-driven Programmes
  - > **Network Operators**
  - > IXPs
  - > CDN and Cloud Providers
  - > Equipment Vendors



MANRS

# What does MANRS want one to do?



ISPs that are MANRS-compliant greatly improve Internet security and reliability by implementing four simple actions.



## Filtering

Filtering incorrect routing announcement ensures the correctness of your own announcement and the announcements from you customers to adjacent networks with prefix and AS-path granularity.



## Anti-Spoofing

Enabling source address validation for at least single-homed stub customer networks, your own end-users, and infrastructure.



## Maintaining Routing Information

Publish your data, so others can validate routing information on a global scale.



## Coordinating

Maintaining globally accessible, up-to-date contact information.

# Why?

- > Reputation
- > Availability
- > Security
- > Lead by Example



MANRS

# REANNZ MANRS Journey

Creation on  
REANNZ ROAs

2019



Ensure RADB, PeeringDB,  
whois contact information  
is up to date

2020



RPKI ROV on  
Member Edge

2022



2019  
RPKI ROV on  
Upstream Edge



2020  
MANRS Application  
Approved



2022–present  
Anti-spoofing ACLs on  
Member Edge  
CAIDA Spoofer  
Automation and more  
Config Audit



# REANNZ Championing MANRS

- > 6+ MANRS and RPKI presentations by REANNZ locally and globally to encourage other network operators
- > Advocating MANRS and RPKI to partner network operators
- > Working with government agencies to encourage MANRS and RPKI adoption
- > Routing Integrity assessment tool with our own members

# Routing Integrity Assessment Tool

- > Developed by Internet2 (the US NREN)
- > Tool goes beyond MANRS action assessment
- > Repurposed by REANNZ for encouraging good routing practices and mainly ROA updates by our members

## University of Otago fully compliant

Family	Assessment
External Facing IP Address Resource Management Capability	100%
Route origins - Protecting against Route Hijacks	100%
Network Routing Configuration - Improving Security and Availability	100%

## Route Origin Authorizations (ROAs) Stats

[ASN report for AS38305 \(OTAGO-UNIVERSITY-AS-NZ-AP The University of Otago\)](#)

Data retrieved: 2024-05-29

### IPv4

Valid	2
Unknown	0
Invalid	0
Total	2

### IPv6



### IPv4 Records

IP	Country	ASN	Name	Status
<a href="#">139.80.0.0/16</a>	NZ	38305	OTAGO-UNIVERSITY-AS-NZ-AP The	Valid
<a href="#">202.27.239.0/24</a>	NZ	38305	OTAGO-UNIVERSITY-AS-NZ-AP The	Valid

### IPv6 Records

No data available

## All Dutch govt networks to use RPKI to prevent BGP hijacking

By **Bill Toulas**

April 9, 2023 11:21 AM 0



The Dutch government will upgrade the security of its internet routing by adopting before the end of 2024 the Resource Public Key Infrastructure (RPKI) standard.

RPKI, or Resource Certification protects against erroneous rerouting of internet traffic, maliciously or not, through cryptographic verification of the routes.

<https://www.bleepingcomputer.com/news/security/all-dutch-govt-networks-to-use-rpki-to-prevent-bgp-hijacking/>

# South Asia leading the way

OBSERVATORY | ROUTING SECURITY

## South Asia, Bangladesh leading Routing Completeness

By Aftab Siddiqui • 9 May 2023

Bangladesh

South Asia

This week, the 39th South Asian Network Operators Group conference, SANOG 39, is happening in Dhaka, Bangladesh.

With around one-quarter of the world's population living in the sub-continent, the network operators who oversee the Internet infrastructure for this growing number of Internet users play a critical role in helping to ensure that the Internet remains open, secure, and accessible to all.

One area where network operators in South Asian countries are excelling is securing their routing infrastructure from mistaken and malicious incidents caused by other network operators that can take whole countries offline. In this post, I will provide insight into how networks in SANOG 39 host country, Bangladesh, are doing in this respect, highlighting their successes and where they can improve to consolidate what they've done so far.

SHARE

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# ROA status and RPKI adoption increasing

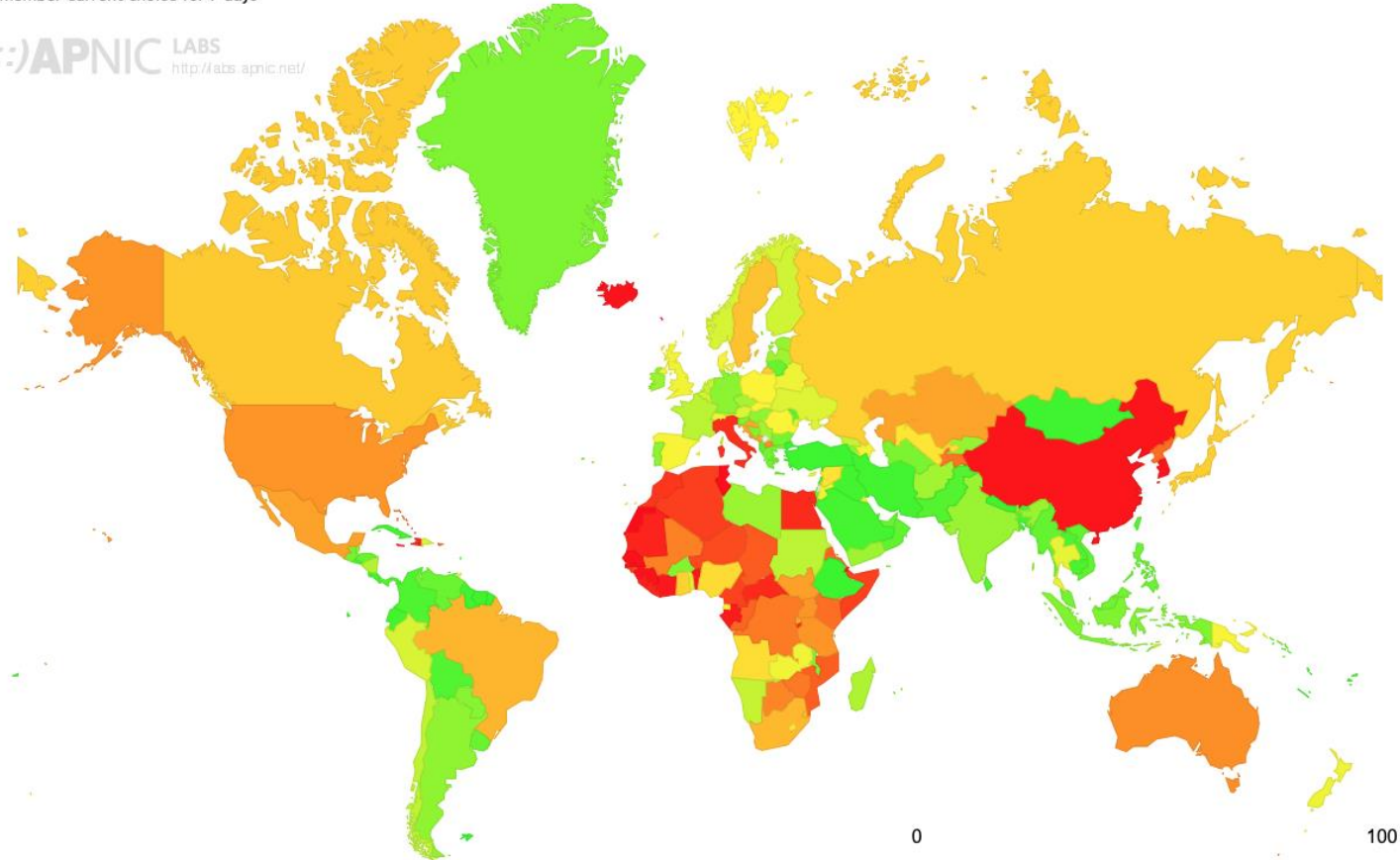
- > ROA updates are increasing
- > RPKI adoptions 50% across the world

## ROA data by Country (%)

[Click here for a zoomable map](#)

Remember current choice for 7 days

 APNIC LABS  
<http://labs.apnic.net/>



# What next for REANNZ?

- > Continue to champion MANRS
- > Continue to improve tooling and operations
- > ASPA - Autonomous System Provider Authorization (ASPA)  
objects are created and distributed the same way as Route Origin Authorizations (ROAs). While ROAs state which ASNs are authorized to announce given prefixes, ASPAs state which ASNs are allowed to propagate their routes.

# Learnings

*Routing security is a journey, not a destination*

Organization Name ▲	Areas Served ◆	ASNs	Action 1 - Filtering ◆	Action 2 - Anti-Spoofing ◆	Action 3 - Coordination ◆	Action 4 - Global Validation ◆
<u>REANNZ</u>	NZ	38022	✓	✓	✓	✓
Organization Name	Areas Served	ASNs	Action 1 - Filtering	Action 2 - Anti-Spoofing	Action 3 - Coordination	Action 4 - Global Validation

<https://www.manrs.org/isps/participants>

4 September 2024

# Thank you

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REANVZ

