

ACM IMC '25

Prefix2Org

Mapping BGP Prefixes to Organizations

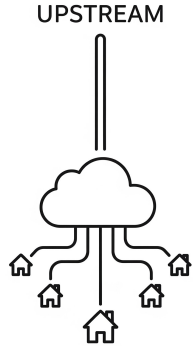
Deepak Gouda, Alberto Dainotti, Cecilia Testart

October 28, 2025

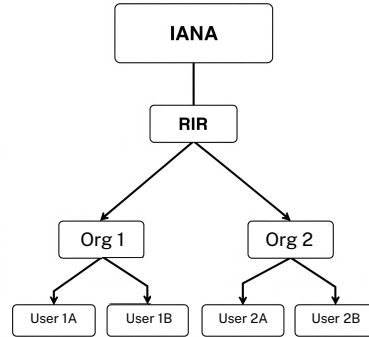


Research Question

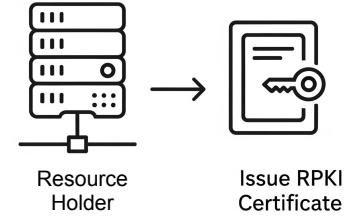
Which organization is in-charge of making critical decisions for the operation of IP prefixes?



Upstream Connectivity



Sub-delegation of
Address Space



Issuing RPKI
Certificates

In this work...

We present a framework to

1. Identify the organizations responsible for the operational decisions of a BGP prefix
2. Consolidate the names used by an organization

Identifying the owner of a BGP prefix

Previous approaches to finding owners

50.7.115.0/24: AS174
162.217.60.0/22: AS174 + AS174: Cogent → 50.7.115.0/24: Cogent
162.217.60.0/22: Cogent

CIDR:	50.7.115.0/24
NetName:	FDCSERVERS-VIENNA
NetHandle:	NET-50-7-115-0-1
Parent:	FDCSERVERS (NET-50-7-0-0-1)
NetType:	Reallocated
OriginAS:	
Organization:	FDCservers.net (FDCSE-5)
RegDate:	2014-11-06
Updated:	2019-05-23

CIDR:	162.217.60.0/22
NetName:	ALLOTELECOM
NetHandle:	NET-162-217-60-0-1
Parent:	NET162 (NET-162-0-0-0-0)
NetType:	Direct Allocation
OriginAS:	
Organization:	Allo telecom (OT-84)
RegDate:	2017-04-14
Updated:	2017-04-14

Not Cogent!

Finding owners using WHOIS records

WHOIS records are challenging to use!

Prefix: 206.238.0.0/16

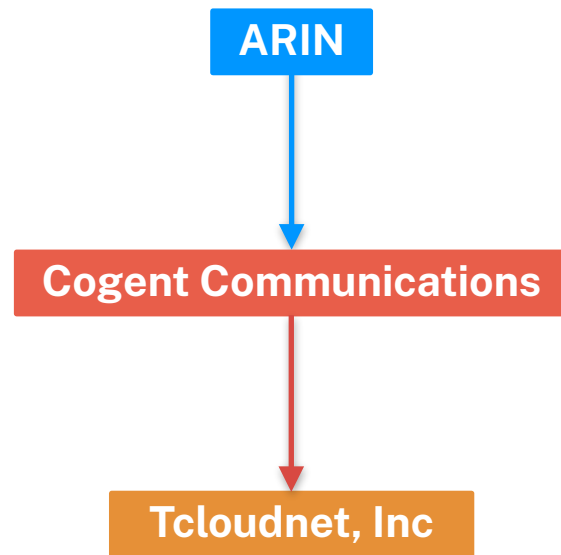
```
NetRange: 206.232.0.0 - 206.238.255.255
CIDR: 206.232.0.0/14, 206.238.0.0/16, 206.236.0.0/15
NetName: COGENT-206-232-233-234-235-236-237-238-16
NetHandle: NET-206-232-0-0-1
Parent: NET206 (NET-206-0-0-0-0)
NetType: Direct Allocation
OriginAS:
Organization: Cogent Communications, LLC (COGC)
RegDate: 1995-11-06
Updated: 2025-09-23
Ref: https://rdap.arin.net/registry/ip/206.232.0.0
```

```
NetRange: 206.238.0.0 - 206.238.255.255
CIDR: 206.238.0.0/16
NetName: TLOUDNET-CGNT-NET-1
NetHandle: NET-206-238-0-0-1
Parent: COGENT-206-232-233-234-235-236-237-238-16 (NET-206-232-0-0-1)
NetType: Reassigned
OriginAS:
Organization: Tcloudnet, Inc (C09815123)
RegDate: 2023-07-14
Updated: 2024-02-09
Ref: https://rdap.arin.net/registry/ip/206.238.0.0
```

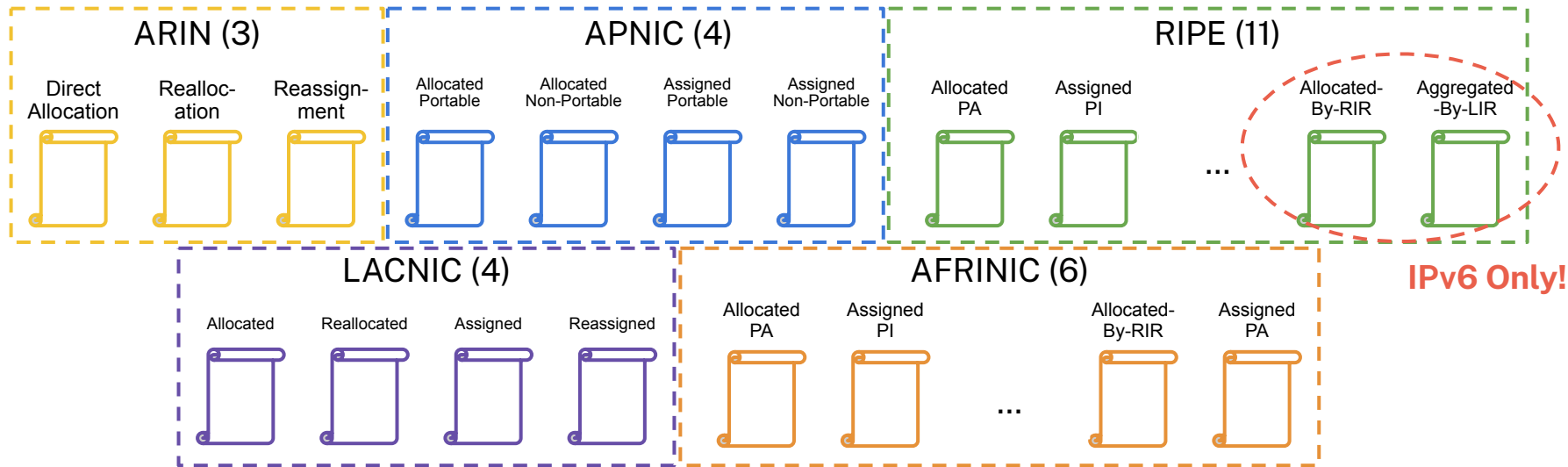
Finding owners using WHOIS records

NetRange: 206.232.0.0 - 206.238.255.255
CIDR: 206.232.0.0/14, 206.238.0.0/16, 206.236.0.0/15
NetName: COGENT-206-232-233-234-235-236-237-238-16
NetHandle: NET-206-232-0-0-1
Parent: NET206 (NET-206-0-0-0-0)
NetType: Direct Allocation
OriginAS:
Organization: Cogent Communications, LLC (COGC)
RegDate: 1995-11-06
Updated: 2025-09-23
Ref: <https://rdap.arin.net/registry/ip/206.232.0.0>

NetRange: 206.238.0.0 - 206.238.255.255
CIDR: 206.238.0.0/16
NetName: TLOUDNET-CGNT-NET-1
NetHandle: NET-206-238-0-0-1
Parent: COGENT-206-232-233-234-235-236-237-238-16 (NET-206-232-0-0-1)
NetType: Reassigned
OriginAS:
Organization: Tcloudnet, Inc (C09815123)
RegDate: 2023-07-14
Updated: 2024-02-09
Ref: <https://rdap.arin.net/registry/ip/206.238.0.0>

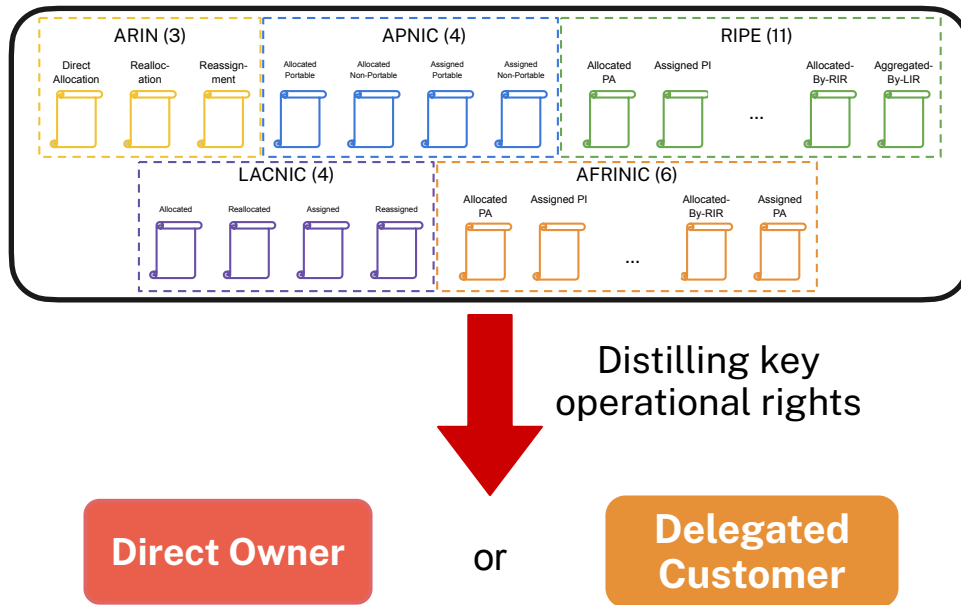


Allocation Types



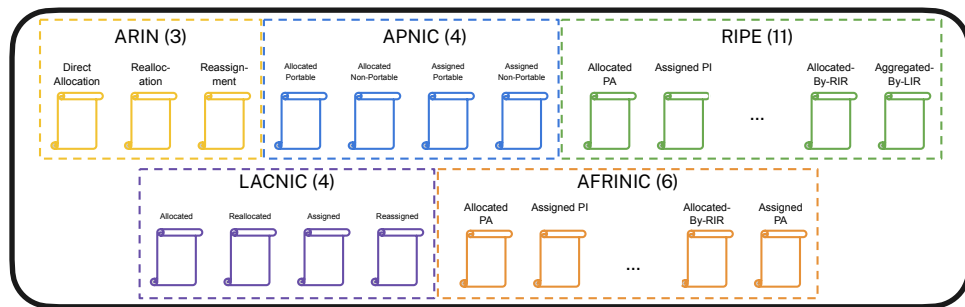
All allocations are not the same
22 unique allocation types across all RIRs!
Each type is associated a different set of **operational rights!**

Allocation Types



- R_1 : Choosing connectivity
- R_2 : Further delegate the address block
- R_3 : Issue RPKI records

Allocation Types



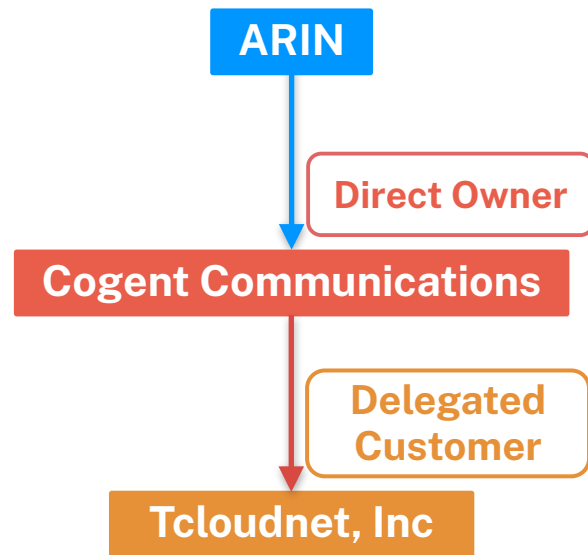
Distilling key operational rights

Direct Owner

or

Delegated Customer

- R_1 : Choosing connectivity
- R_2 : Further delegate the address block
- R_3 : Issue RPKI records



Dataset Snippet

Prefix	Direct Owner	Delegated Customer(s)
210.80.198.0/24	Verizon Japan Ltd	[Neuberger Group LLC]
65.196.14.0/24	Verizon Business	[WS/BCMONE/KKR]
2404:e8:100::/40	Verizon Asia Pte Ltd	[Verizon New Zealand]
172.111.123.0/24	Fastly, Inc.	[]
103.186.154.0/24	Fastly Network Services	[]

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Consolidating organization names

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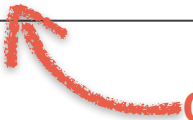
NLP/String Processing?

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NLP/String Processing?

Careful!



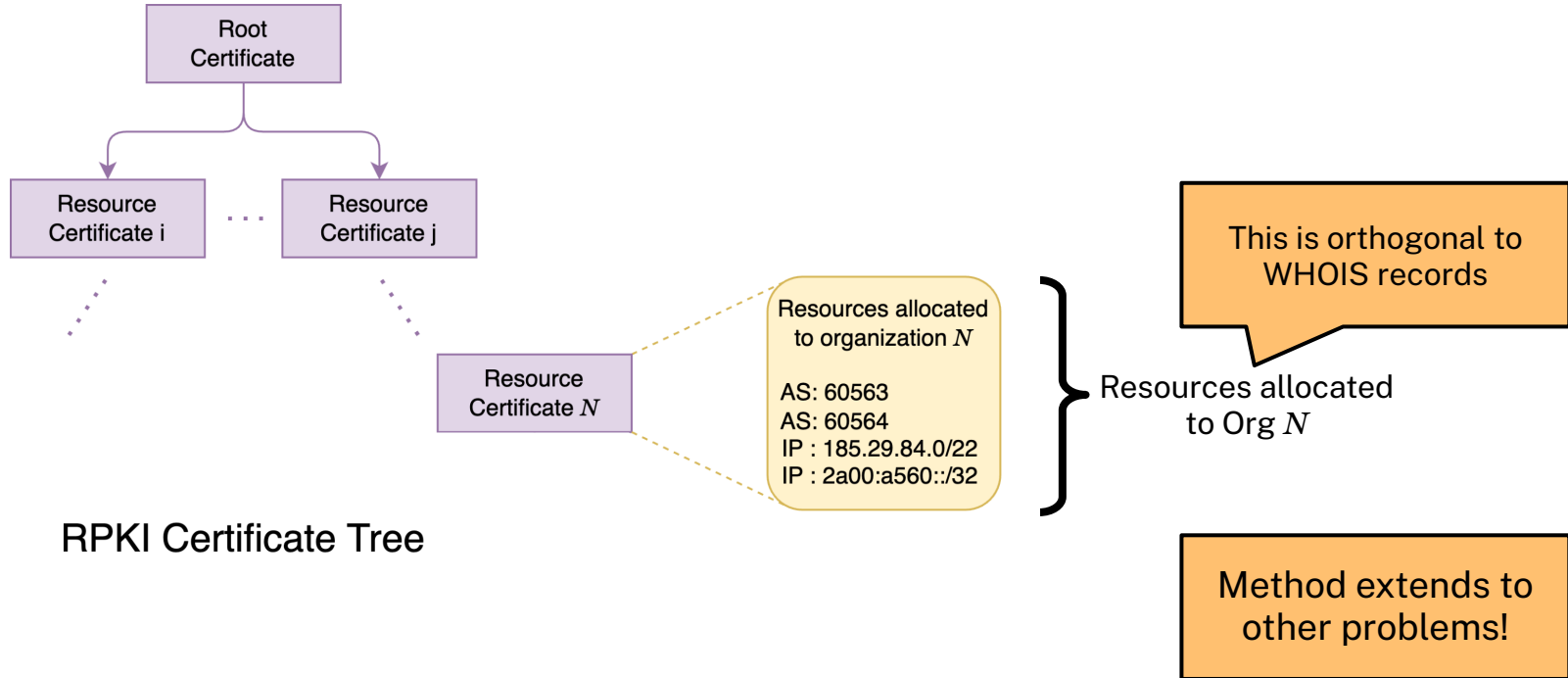
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We leverage properties from:

- **RPKI Certificates**
- **BGP Data**

Leveraging RPKI to Infer Shared Resource Ownership



Prefix2Org Dataset

	Direct Owner	Base Name	RPKI Cert	Origin ASN	Cluster ID
210.80.198.0/24	Verizon Japan Ltd	verizon	0E65A4F...	18692	verizon-1
2404:e8:100::/40	Verizon Asia Pte Ltd	verizon	0E65A4F...	395753	verizon-1
65.196.14.0/24	Verizon Business	verizon	2992C23...	395753	verizon-1
172.111.123.0/24	Fastly, Inc.	fastly	8EADED...	54113	fastly-1
103.186.154.0/24	Fastly Network Services	fastly	167C3B...	63739	fastly-2

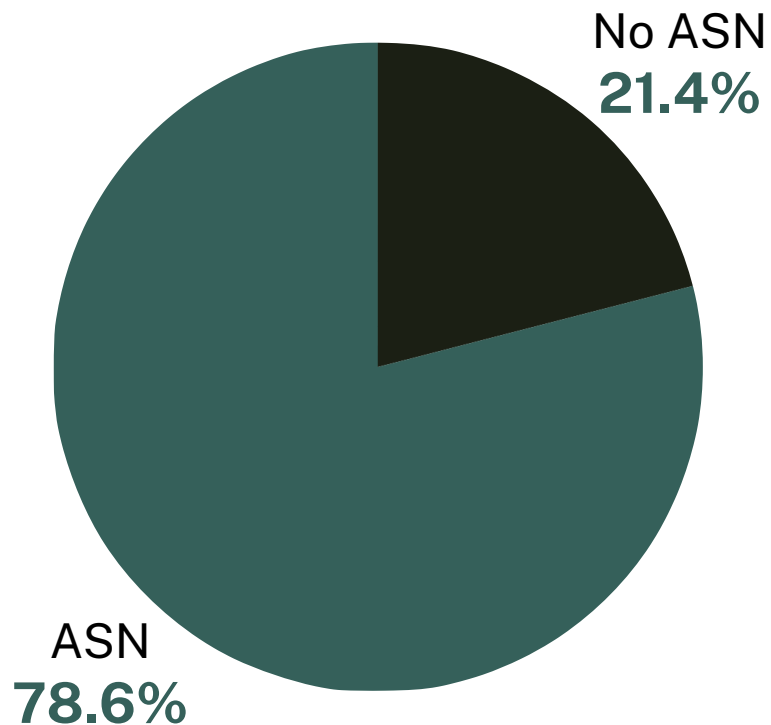
Aggregation Criteria:

Same Base Name & (Same RPKI Certificate | Same BGP Origin)

Validation

- Ground truth data is scarce
- We collected IP range data from
 - 13 large organizations
 - > 800 small organizations (thanks to Internet2!)
- Data covered **9.3% IPv4 address space, 5.5% IPv6 address space**
- Recall: **99% (IPv4), 99.3% (IPv6)**
- Precision: **~40-100%** (100% when we had complete ground truth)

Use Case I: Organizations without ASes



Percentage of Organizations

Orgs without ASN manage:

- **8%** routed IPv4 prefixes
- **6.8%** routed IPv6 prefixes

Notable organizations:

- Wireless Data Service Provider Corp
15.2M IPv4 Addresses
- Cloud Innovation
10M IPv4 Addresses

Use Case II: ROA Coverage of Prefixes by Organizations

Task: Find ROA coverage for the prefixes managed by an organization

Organization	AS2Org	Prefix2Org
Telia Company AB	37.9%	100% ↑
Deutsche Telekom AG	38.1%	100% ↑
Internet Initiative Japan	43.7%	98.5% ↑
IFX Corporation	80.4%	0% ↓
Latitude SH	73.8%	0% ↓

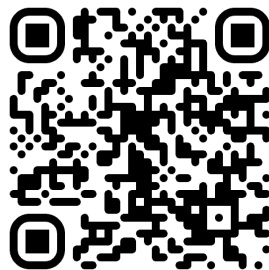

Accurate

Takeaways

- **Ownership** of prefixes is complex and inconsistent.
 - ➔ Prefix2Org standardizes the ownership structure
 - ➔ Prefix2Org consolidates organization names

Availability: Monthly snapshots

Further work: Improvements using mergers and acquisitions data



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