IP Inventory APIs

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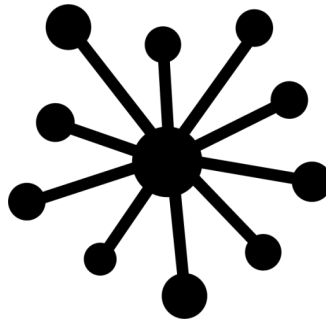
Sr Engineer

TELUS

What I'll be talking about

- Framing the IP Inventory Challenge
- **Audience Survey Part 1**

- IP Inventory APIs
- Differentiating pools of IP Addresses
- Implementation Considerations
- Example Use Cases
- Demonstration
- **Audience Survey Part 2**

- What's Next

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Framing the IP Inventory Challenge

Record accuracy

Centralized inventory

RIR Registration

Automation-ready

Geofeeds
(RFC 8805)

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Audience Survey Part 1

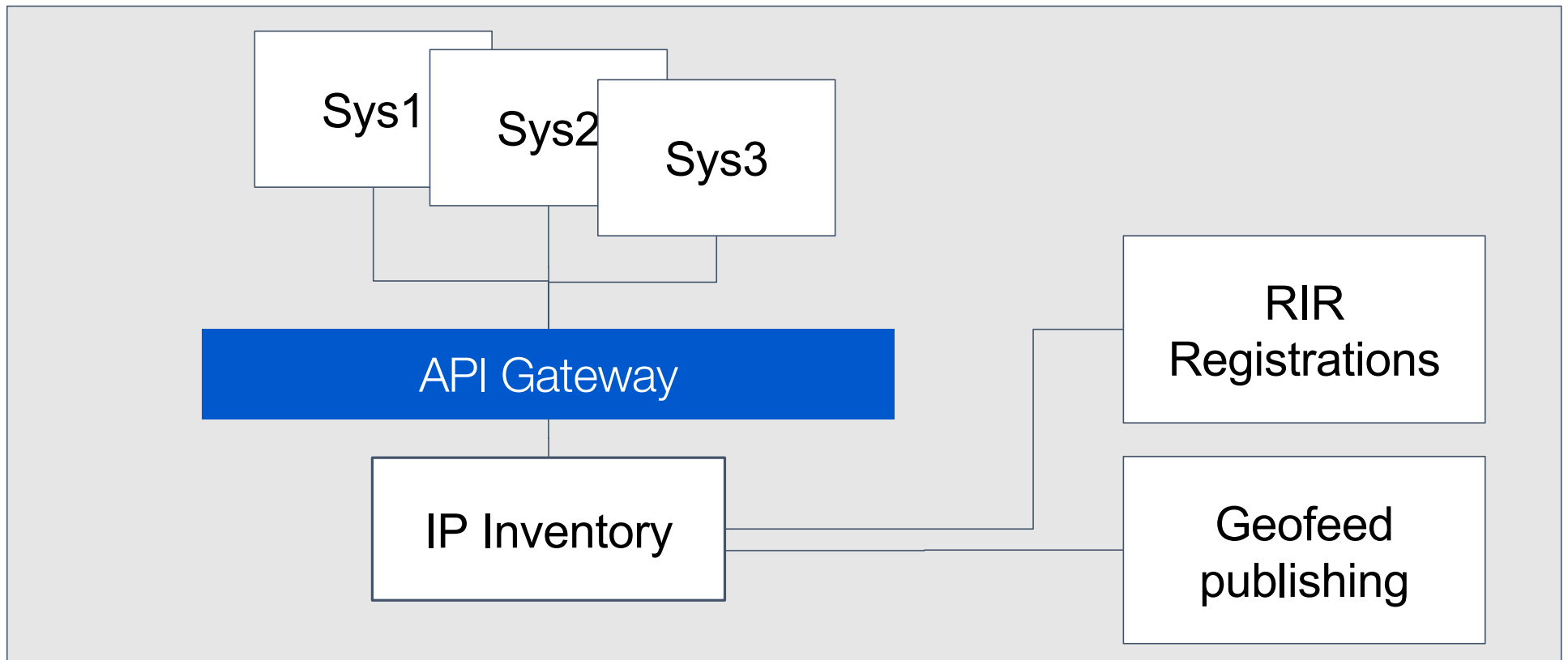- **Question**: Does your organization use mainly one single IP Inventory system, or multiple?

Option 1:
Single IP Inventory System

Option 2:
Multiple IP Inventory Systems

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Introducing the APIs

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Integrated IP Inventory & APIs

The IP Inventory APIs

TMF639 - Resource Inventory Management

Intent: query and manipulate inventory

Specific APIs:
- Get Details (of IP resource)
- Modify (IP Address / prefix)

TMF685 - Resource Pool Management

Intent: acquire resources

Specific APIs:
- Assign IP Prefix (from pool)
- Assign IP Address (from pool)
- Assign IP Address (from prefix)

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Assign Subnet / IP Range API

API Call contains

Selection criteria:
- PrefixLength (CIDR)
- IP Pool
- Region
- Address Purpose

Descriptive labels:
- Description
- Additional details

Inventory System responds

If it finds a matching, <u>available</u> resource it is assigned and given the labels, and the API responds with the assigned resource

If no matching available resource is found the response is "No available resource found"

Assign IP Address from IP Range

API Call contains

Selection criteria:
- IP Range

Descriptive labels:
- Description
- Additional details

Inventory System responds

If it finds a matching, <u>available</u> IP Address within the specified IP Range it is assigned and given the labels, and the API responds with the assigned resource

If no matching available resource is found the response is "No available resource found"

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Differentiating pools of IP Addresses

- **Challenge of differentiation:**
  1. IPv4 vs IPv6
  2. Private IP versus Globally Unique IP
  3. Association with one region versus another
  4. Pre-existing configuration

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Implementation Considerations

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IPv6 text representations

Careful with IPv6 Address Formats (RFC 4291)

These are all "legal" representations of the same prefix:

- 12AB:0000:0000:CD30:0000:0000:0000:0000/60
- 12AB::CD30:0:0:0:0/60
- 12AB:0:0:CD30::/60

Consider RFC 5952 (A Recommendation for IPv6 Address Text Representation)

Insert a translation function to interface with your API gateway or IP Inventory system

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Considerations: IPv4 and IPv6

IP Addresses / Ranges

IPv4

IPv6

Globally Unique IPv4 (RIR)

Private

Globally Unique IPv6 (RIR)

Private

RFC 1918
10.0.0.0/8
172.16.0.0/12
192.168.0.0/16

RFC 6598
100.64.0.0/10

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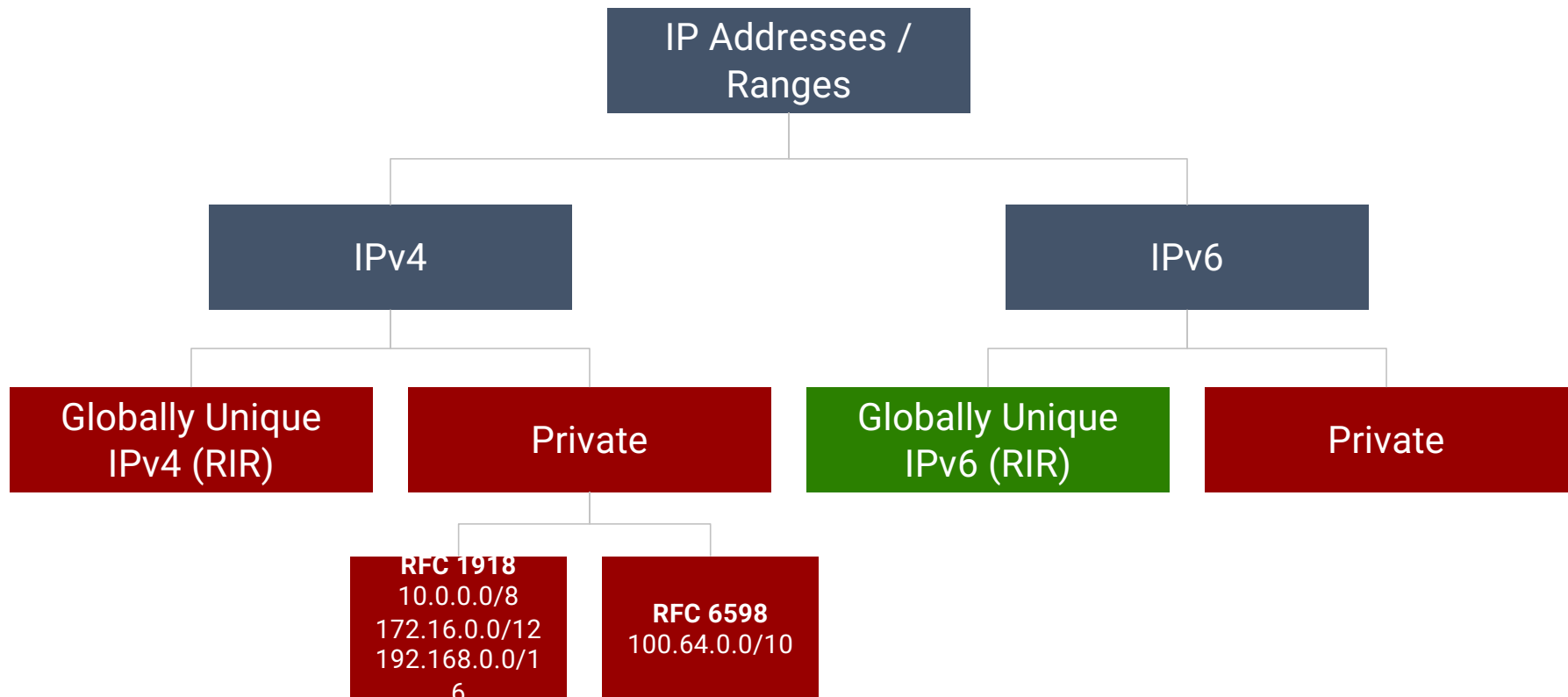
IPv6 Enabled Networks
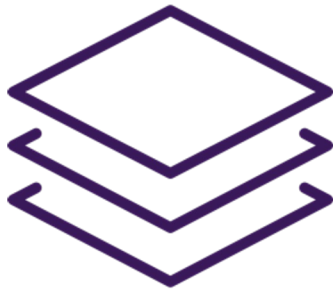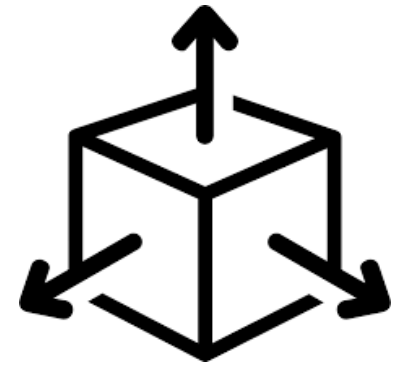
Simple   **Automated**   **Scalable**

IPv6-centric networks achieve Simplicity, Automation & Scalability

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Example Use Cases

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Use Case 1: Service IPs

Intention: Assign IPv6 Range

PrefixLength: 48
IP Pool: Service X
Region: AB-Calgary
Purpose: Static
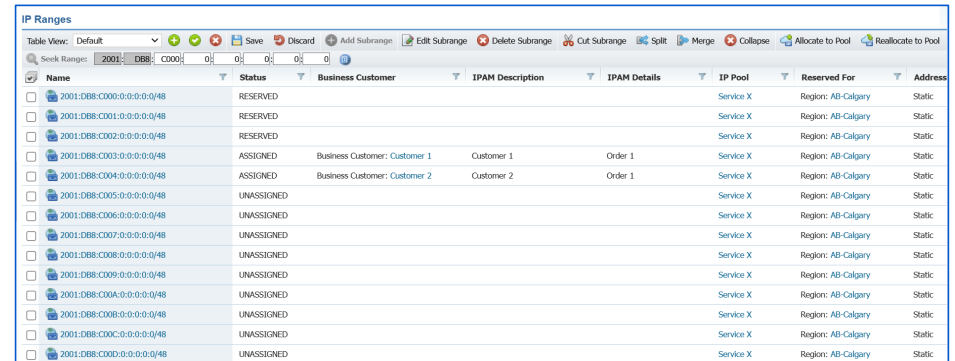
Customer: Customer N
Description: NANOG Demo 1
Details: Order N
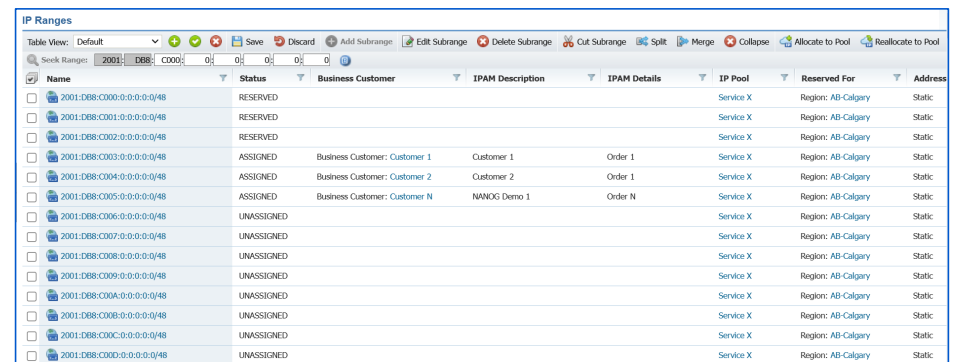
Result: **2001:DB8:C005::/48**

Use Case 2: Infrastructure IPs

Intention: Assign IPv4 Address

Parent Range: 198.51.100.0/24

Description: RouterX
Details: InterfaceY

Result: 198.51.100.2/32

Use Case 3: Network Troubleshooting

Intention: Discover usage of
IP Address 192.168.255.2

Description: RouterX
Details: InterfaceY

IP Pool: Infrastructure
Region: QC-Montreal
Purpose: Loopback

IP Addresses

Table View: Default   Save   Discard

Seek Address: 198. 51. 100. 0

Name	Status	IPAM Description	IPAM Details	IP Pool	Reserved For	Address Purpose
198.51.100.0/32	RESERVED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.1/32	RESERVED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.2/32	ASSIGNED	RouterX	InterfaceY	Infrastructure	Region: QC-Montreal	Loopback
198.51.100.3/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.4/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.5/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.6/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.7/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.8/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.9/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback
198.51.100.10/32	UNASSIGNED	Montreal Loopback IPs		Infrastructure	Region: QC-Montreal	Loopback

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Demo

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Demo Part 1 – Inventory Setup

Demo Part 2 – IP Range API call

```
 9        "@type": "IPRangeReservation",
10        "reservationItem": [{
11            "quantity": "1",
12            "@type": "IP Range",
13            "resourceCapacity": {
14                "@type": "IP Range",
15                "capacityDemandAmount": "1",
16                "resourcePool": {
17                    "@type": "IP Pool",
18                    "id": "ORAN",
19                    "resourceCollection": [{
20                        "@type": "IP Pool",
21                        "name": "ORAN",
22                        "resource": [{
23                            "preferredSubnet": "",
24                            "place": [{
25                                "type": "Region",
26                                "name": "ON"
27                            }
28                            ],
29                            "characteristic": [{
30                                "ipRangeCIDR": "48",
31                                "addressPurpose": "Infrastructure",
32                                "IPAMDescription": "ORAN-Site 1",
33                                "IPAMDetail": "ON-SITEXYZ",
34                                "Customer": {
35                                    "name": "ORAN-Infra-1",
36                                    "cpid": "77000001",
37                                    "streetAddress": "151 Front St",
38                                    "province": "ON",
39                                    "postalCode": "M5J 2N1",
40                                    "country": "Canada",
41                                    "city": "Toronto",
42                                    "lpdsid": ""
43                                }
```

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Demo Part 3 – Inventory result

Audience Survey Part 2

- **Question**: Does your organization make use of APIs for IP Inventory Management?

Option 1:
Yes!

Option 2:
No (at least not yet)

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What's Next

Future additional APIs are planned to set up IP Inventory including:

- **Allocation** *of IP Resources to IP Pools*
- **Splitting** *addition of subranges*
- **Capacity / Availability Reporting** *balance of available matching resources*

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Questions & Comments

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Thank you

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