Noticias del DE-CIX

Contribuyendo a Código y Estándares Abiertos

Marcos Sanz | Global Head of Pizza Delivery

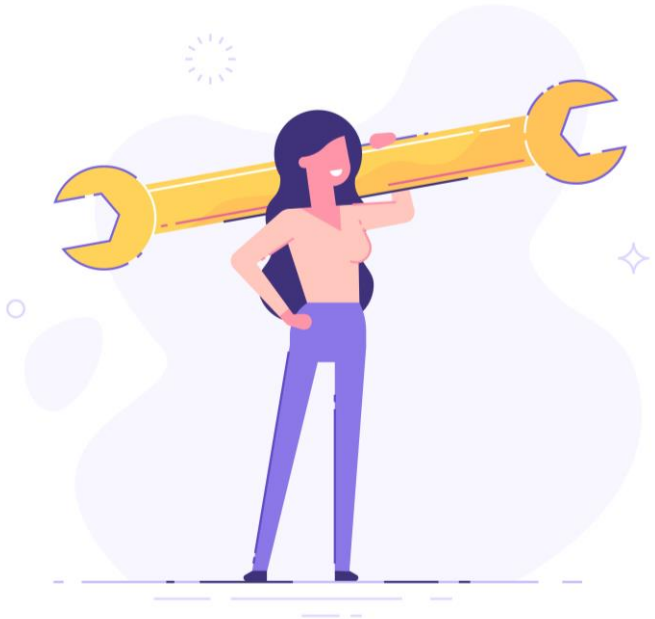
IX API

ROUTE SERVER
SUPPORT FOUNDATION

DE-CIX

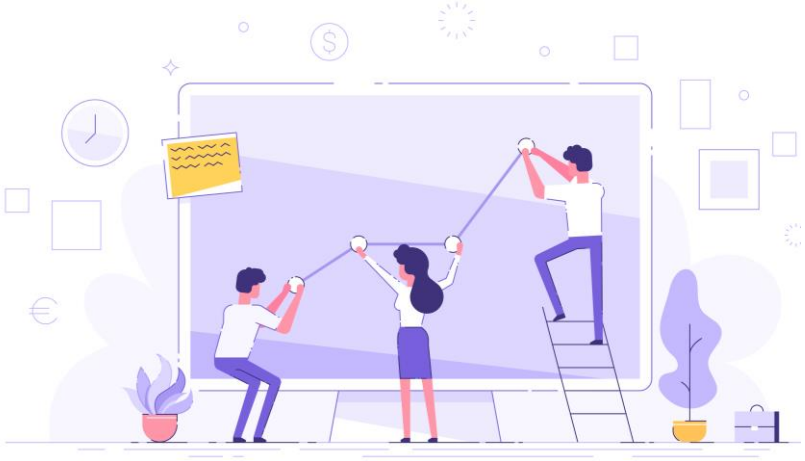
IX-API en pocas palabras

- Esfuerzo conjunto de AMS-IX, DE-CIX y LINX
- Crear un estándar en la industria para provisionar y configurar servicios de interconexión
- IX-API Board & Technical WG
- v1 anunciado en EPF (2019)
- v2 anunciado en vEPF (2020)
- https://ix-api.net



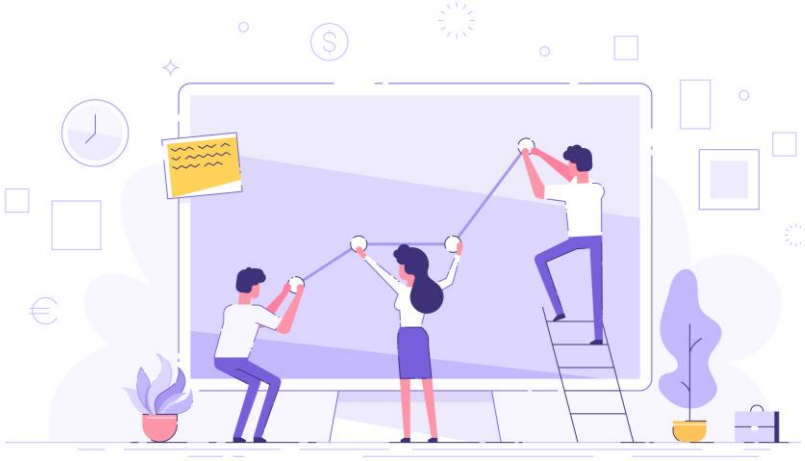
Versión 1

- APIv1 lanzada en EPF14 (Sept 2019):
  - Autenticación
  - Cuentas y Clientes: *reseller & subcustomers*
  - **Servicios peering LAN**



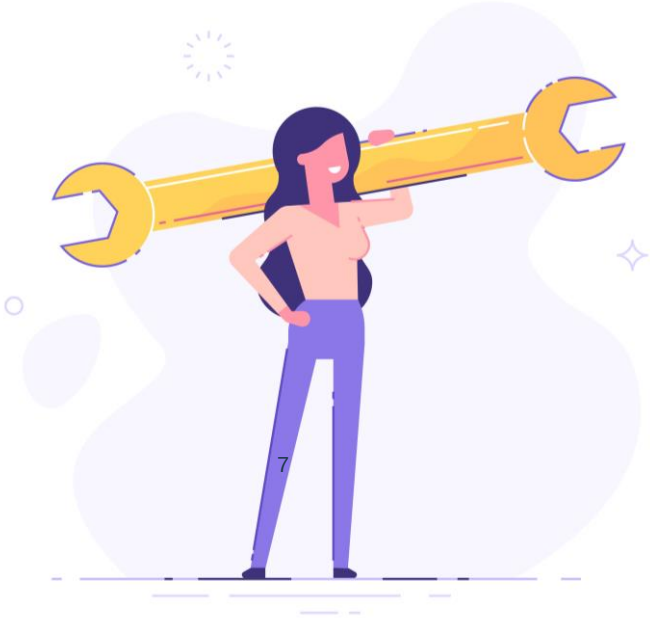
Versión 2

- APIv2 lanzada en EPF15 (Sept 2020):
  - Nuevas abstracciones y flexibilidad para definir nuevos servicios
  - Network service types: `"exchange_lan"` `"p2p_vc"` `"p2mp_vc"` `"mp2mp_vc"` y `"cloud_vc"`
  - servicios de nube completamente independientes del proveedor (GCP, AWS, Azure, IBM…)
  - Precio: compatibilidad con v1 ☹



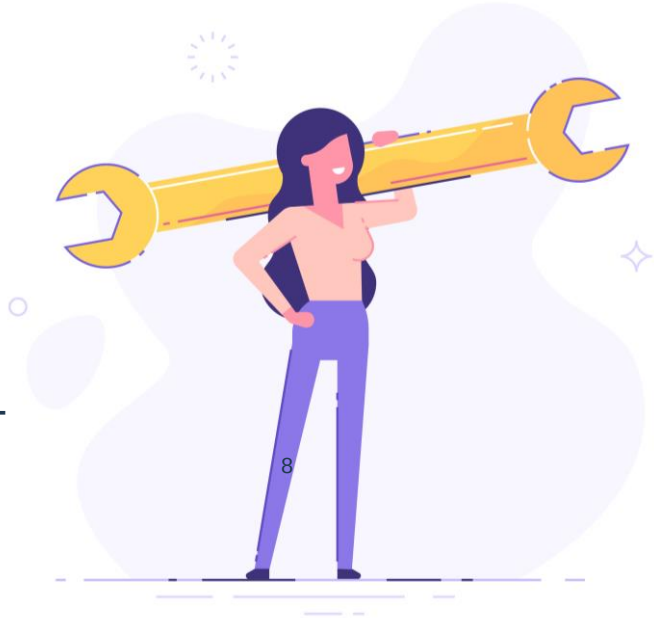
Versión 2.2.0 (12-4-2022)

- Nuevos schemas
- Incluye soporte para:
  - Port management (reservar/crear/cancelar puertos en accesos físicos)
  - PDFs con LOA (letters of authorization)
  - Políticas de cancelación de servicios
- Preparando transición a OAuth2
- Optimización en OpenAPI para generación automática de código

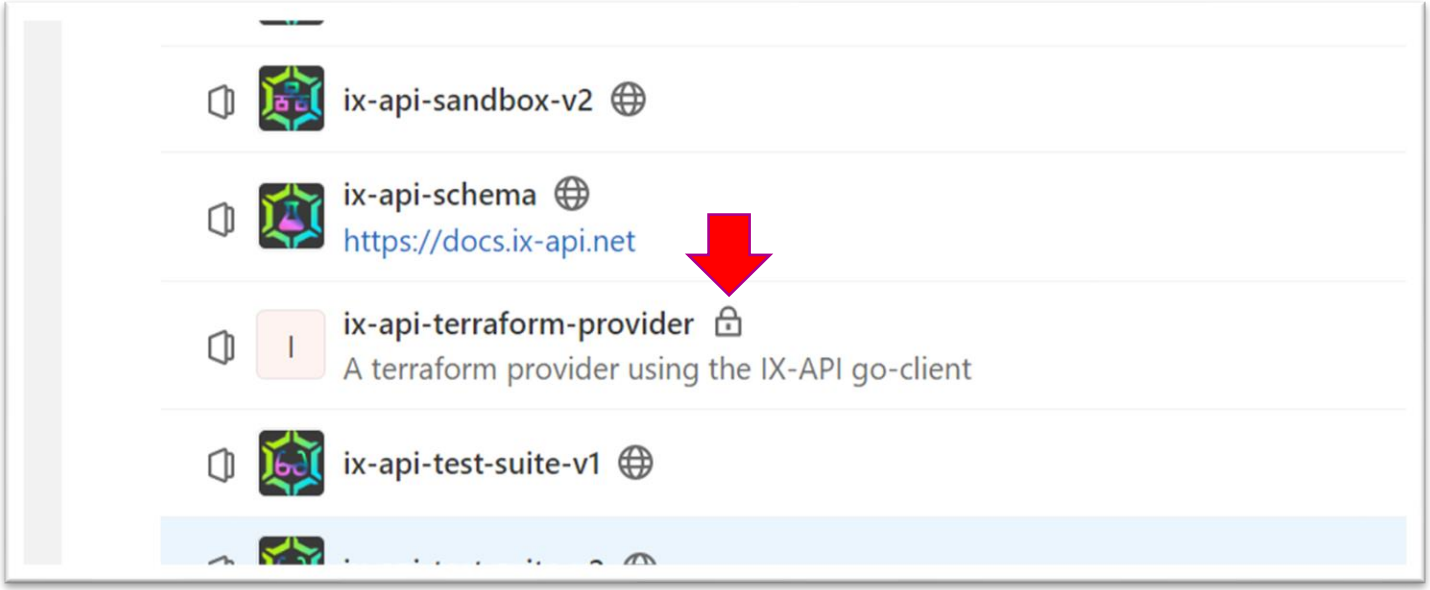


Código Abierto

- https://gitlab.com/ix-api
- 10 Projects, 0 repositorios privados:
  - Open API Schema
  - Suite de Tests
  - Clientes de referencia
  - Sandbox (emulador de IXP)
  - Website/Hosting configuration/Doc…
- Apache 2.0, Go+Python+Django/Django REST
- RESTful, OpenAPI, JSON&YAML

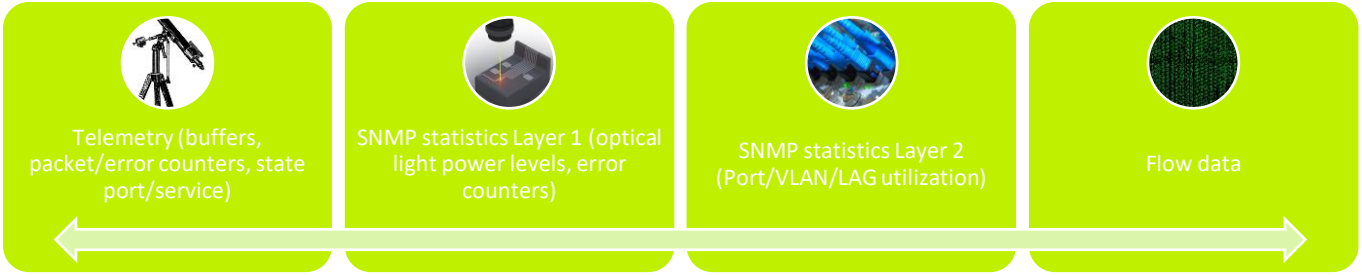


“¿0 repositorios privados?”



Horizonte: v3

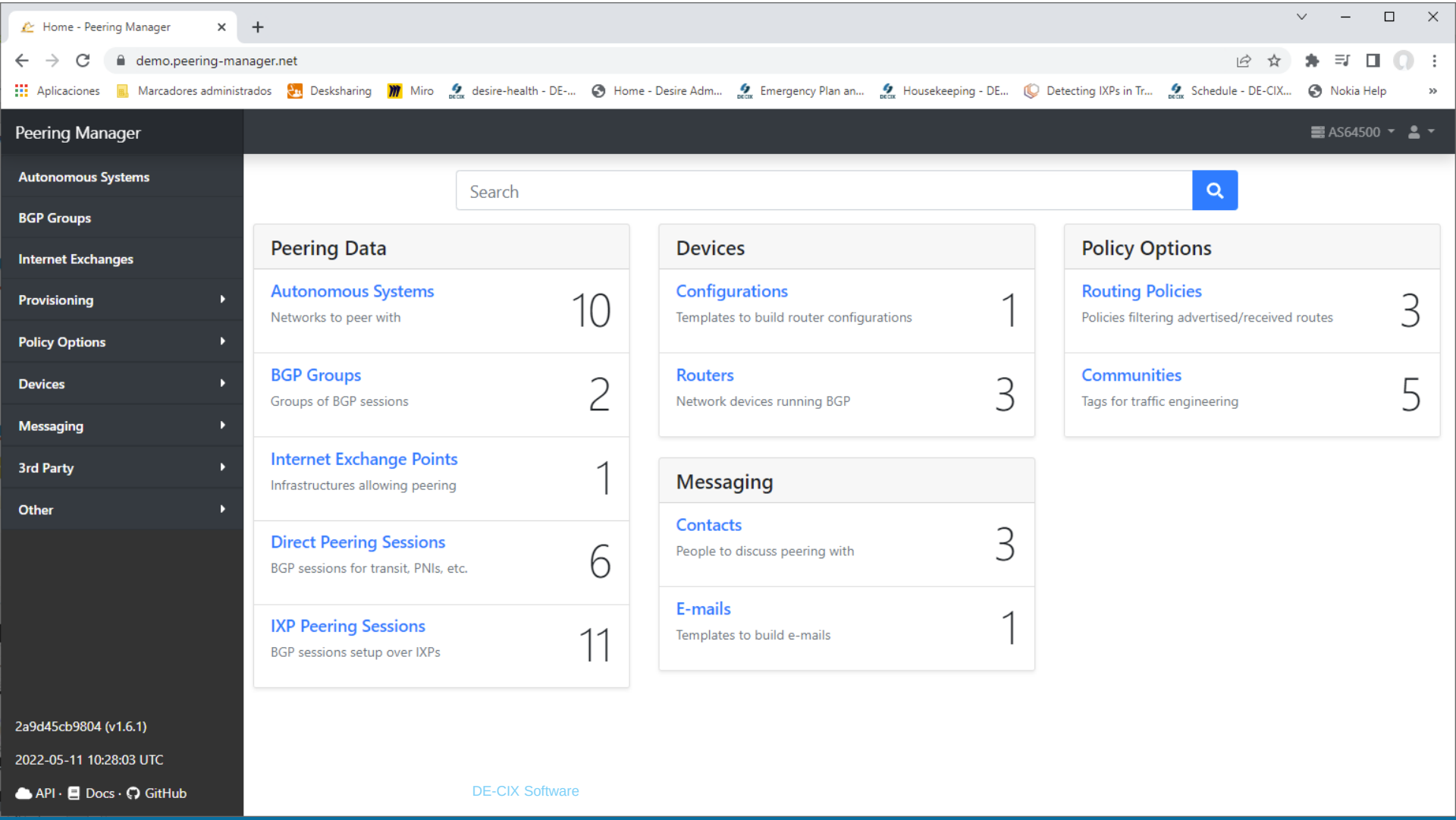
Estadísticas, telemetría, monitorización

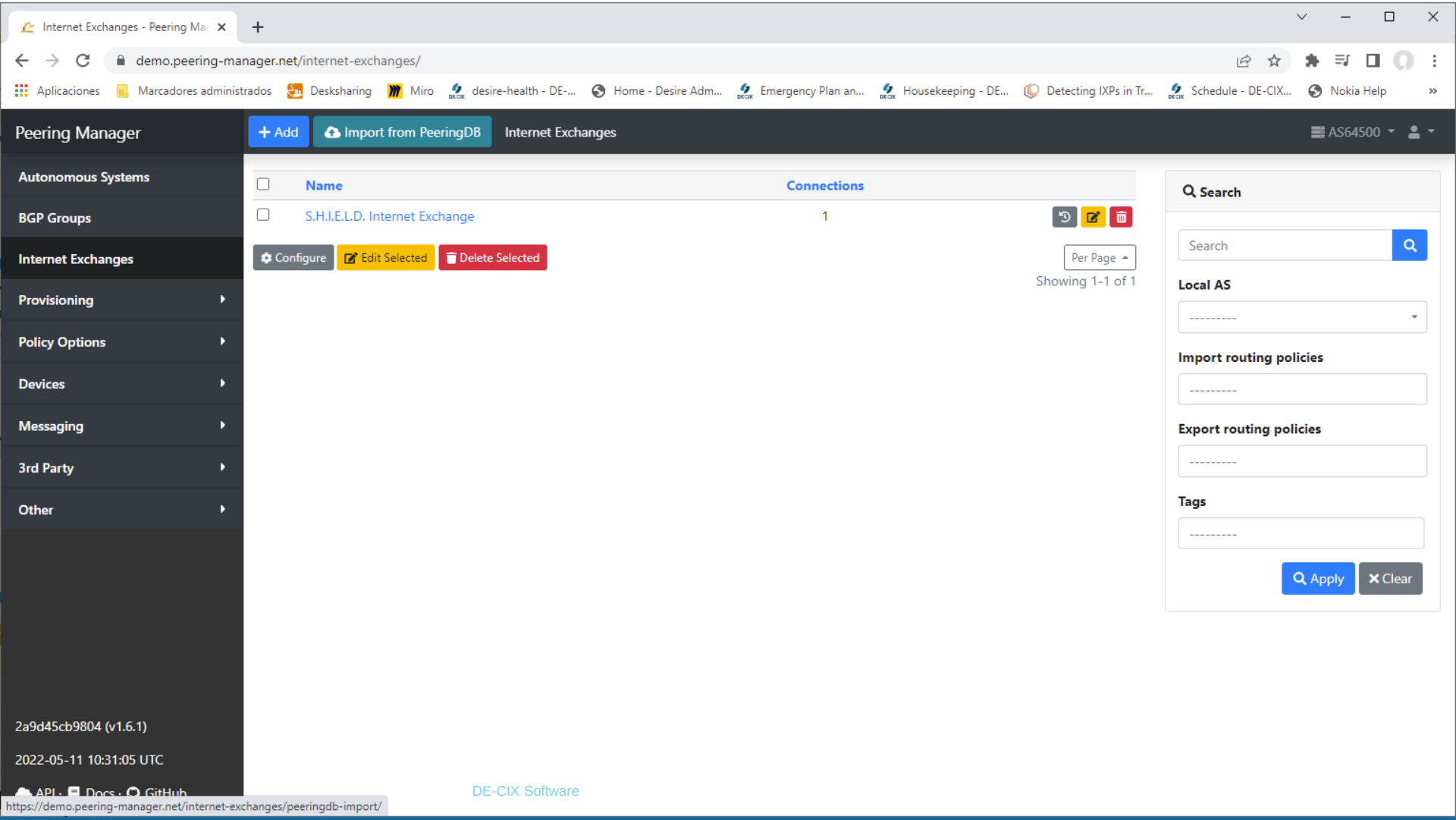


…y más Código Abierto

Peering puede ser aburrido y consumir tiempo…

https://peering-manager.net/


Home - Peering Manager
demo.peering-manager.net
Aplicaciones
Marcadores administrados
Desksharing
Miro
desire-health - DE-...
Home - Desire Adm...
Emergency Plan an...
Housekeeping - DE...
Detecting IXPs in Tr...
Schedule - DE-CIX...
Nokia Help
Peering Manager
AS64500
Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Messaging
3rd Party
Other
Search
Peering Data
Autonomous Systems
Networks to peer with
10
BGP Groups
Groups of BGP sessions
2
Internet Exchange Points
Infrastructures allowing peering
1
Direct Peering Sessions
BGP sessions for transit, PNIs, etc.
6
IXP Peering Sessions
BGP sessions setup over IXPs
11
Devices
Configurations
Templates to build router configurations
1
Routers
Network devices running BGP
3
Messaging
Contacts
People to discuss peering with
3
E-mails
Templates to build e-mails
1
Policy Options
Routing Policies
Policies filtering advertised/received routes
3
Communities
Tags for traffic engineering
5
2a9d45cb9804 (v1.6.1)
2022-05-11 10:28:03 UTC
API · Docs · GitHub
DE-CIX Software


Internet Exchanges - Peering Ma
demo.peering-manager.net/internet-exchanges/
Aplicaciones
Marcadores administrados
Desksharing
Miro
desire-health - DE-...
Home - Desire Adm...
Emergency Plan an...
Housekeeping - DE...
Detecting IXPs in Tr...
Schedule - DE-CIX...
Nokia Help
Peering Manager
+ Add
Import from PeeringDB
Internet Exchanges
AS64500
Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Messaging
3rd Party
Other
Name
Connections
S.H.I.E.L.D. Internet Exchange
1
Configure
Edit Selected
Delete Selected
Per Page
Showing 1-1 of 1
Search
Search
Local AS

Import routing policies

Export routing policies

Tags

Apply
Clear
2a9d45cb9804 (v1.6.1)
2022-05-11 10:31:05 UTC
API · Docs · GitHub
DE-CIX Software
https://demo.peering-manager.net/internet-exchanges/peeringdb-import/

Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Configurations
Routers
Platforms
Messaging
3rd Party
Other

Info Changelog

Details

Name	Core Groups and IXPs
Trim	✔
Lstrip	✔
Last update	2022-03-05 10:07
Utilization	Used by 3 routers

Comments

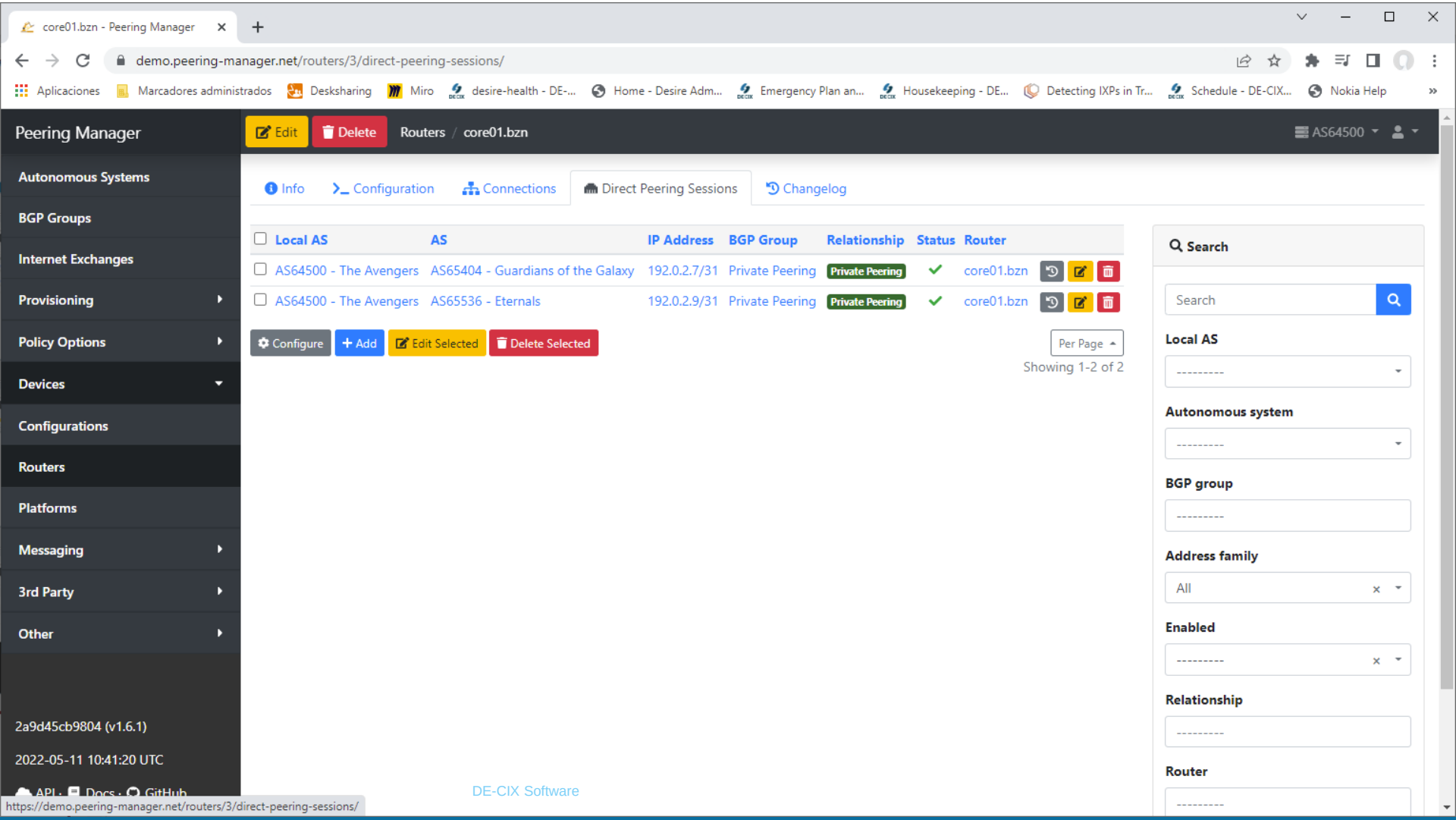
None

Tags

No tags assigned

Template

```
        type external;
        multipath;
        advertise-inactive;
{% if ixp | iter_import_policies %}
        import [ {{ ixp | iter_import_policies('slug') | join(' ') }} ];
{% endif %}
        family inet{% if family == 6 %}6{% endif %} {
            unicast;
        }
{% if ixp | iter_export_policies %}
        export [ {{ ixp | iter_export_policies('slug') | join(' ') }} ];
{% endif %}
{% for session in router | ixp_sessions(family=family, ixp=ixp) %}
        neighbor {{ session | ip }} {
  {% if not session.enabled %}
            shutdown;
```


core01.bzn - Peering Manager
demo.peering-manager.net/routers/3/direct-peering-sessions/
Peering Manager
Edit
Delete
Routers / core01.bzn
AS64500
Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Configurations
Routers
Platforms
Messaging
3rd Party
Other
Info
Configuration
Connections
Direct Peering Sessions
Changelog
Local AS
AS
IP Address
BGP Group
Relationship
Status
Router
AS64500 - The Avengers
AS65404 - Guardians of the Galaxy
192.0.2.7/31
Private Peering
Private Peering
core01.bzn
AS64500 - The Avengers
AS65536 - Eternals
192.0.2.9/31
Private Peering
Private Peering
core01.bzn
Configure
Add
Edit Selected
Delete Selected
Per Page
Showing 1-2 of 2
Search
Search
Local AS
Autonomous system
BGP group
Address family
All
Enabled
Relationship
Router
2a9d45cb9804 (v1.6.1)
2022-05-11 10:41:20 UTC
API · Docs · GitHub
DE-CIX Software

IX API

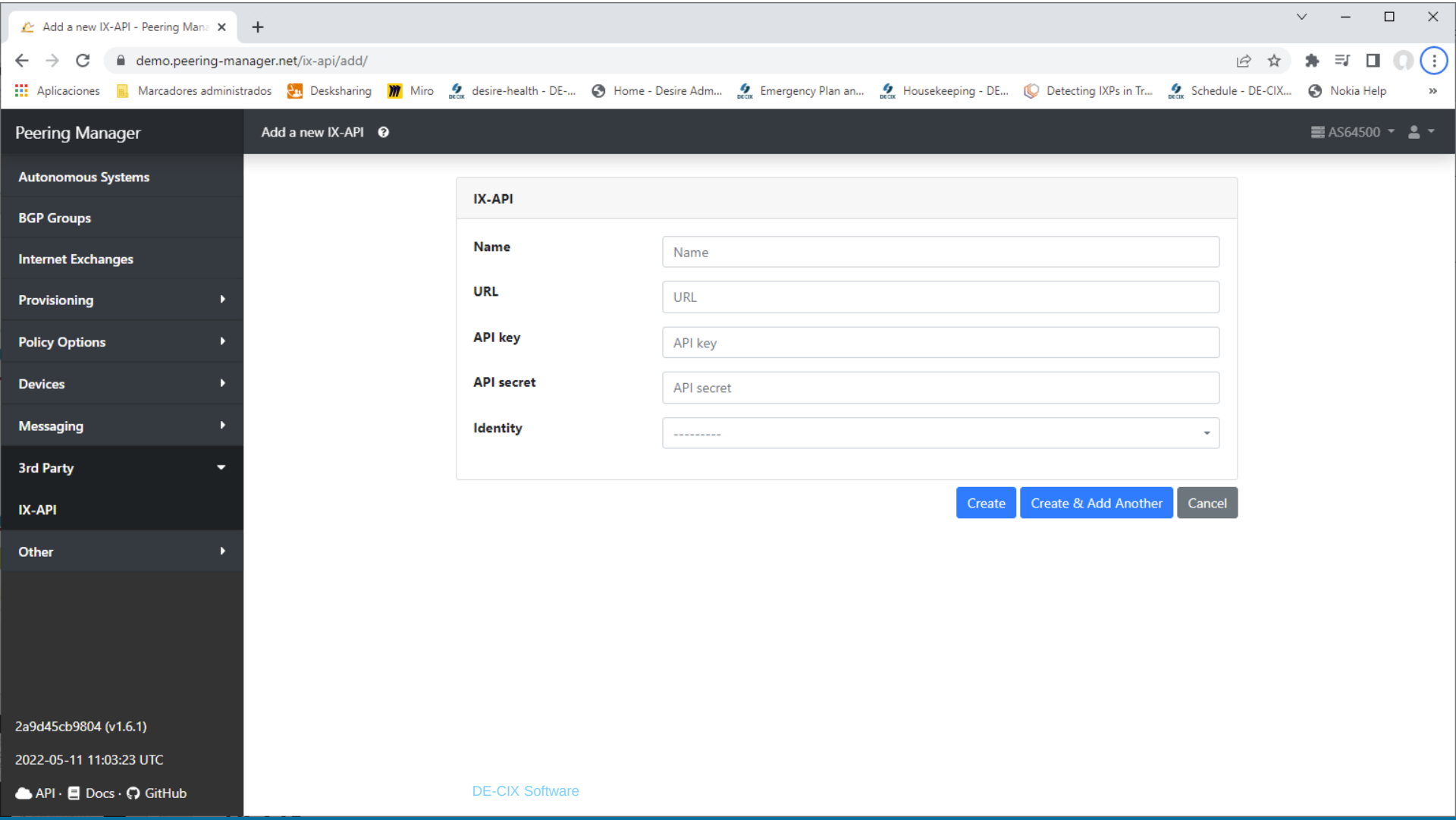
30 Nov 2021

gmazoyer

v1.5.0

0c67069

Compare


Add a new IX-API - Peering Mana
demo.peering-manager.net/ix-api/add/
Aplicaciones
Marcadores administrados
Desksharing
Miro
desire-health - DE-...
Home - Desire Adm...
Emergency Plan an...
Housekeeping - DE...
Detecting IXPs in Tr...
Schedule - DE-CIX...
Nokia Help
Peering Manager
Add a new IX-API
AS64500
Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Messaging
3rd Party
IX-API
Other
2a9d45cb9804 (v1.6.1)
2022-05-11 11:03:23 UTC
API · Docs · GitHub
IX-API
Name
Name
URL
URL
API key
API key
API secret
API secret
Identity

Create
Create & Add Another
Cancel
DE-CIX Software

Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Devices
Messaging
3rd Party
Other

Internet Exchange

Name: S.H.I.E.L.D. Internet Exchange
Full name of the Internet Exchange point

Slug: shield-ixp
Friendly unique shorthand used for URL and config. Warning: may result in change of operational state on a router if being used in the configuration.

Local AS: AS64500 - The Avengers

Routing Policies and Communities

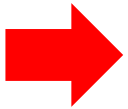
Import routing policies: ---------

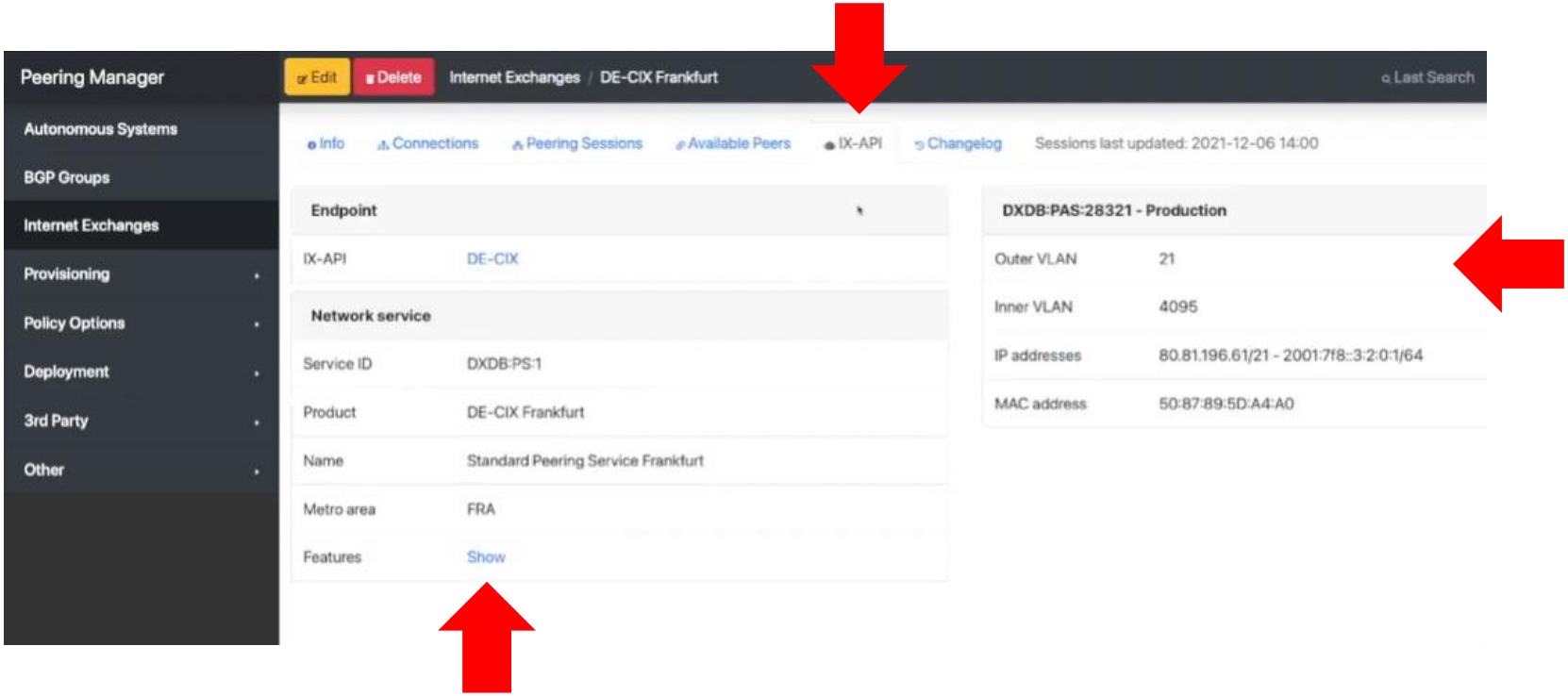
Export routing policies: ---------

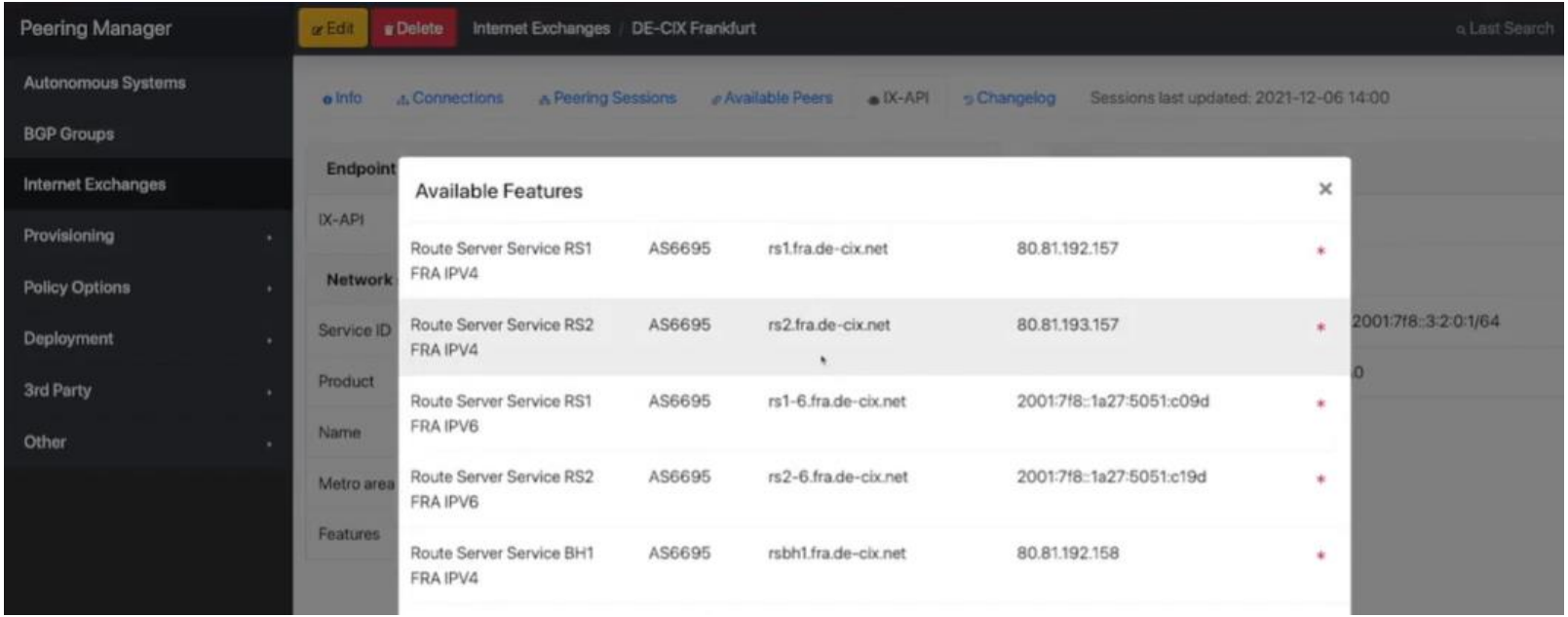
Communities: × Geolocation United States of America × Peer

External Tools

IX-API endpoint: ---------




Peering Manager
Edit
Delete
Internet Exchanges / DE-CIX Frankfurt
Last Search
Autonomous Systems
BGP Groups
Internet Exchanges
Provisioning
Policy Options
Deployment
3rd Party
Other
Info
Connections
Peering Sessions
Available Peers
IX-API
Changelog
Sessions last updated: 2021-12-06 14:00
Endpoint
IX-API
DE-CIX
Network service
Service ID
DXDB:PS:1
Product
DE-CIX Frankfurt
Name
Standard Peering Service Frankfurt
Metro area
FRA
Features
Show
DXDB:PAS:28321 - Production
Outer VLAN
21
Inner VLAN
4095
IP addresses
80.81.196.61/21 - 2001:7f8::3:2:0:1/64
MAC address
50:87:89:5D:A4:A0


Peering Manager
Edit
Delete
Internet Exchanges / DE-CIX Frankfurt
Last Search
Autonomous Systems
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Deployment
3rd Party
Other
Info
Connections
Peering Sessions
Available Peers
IX-API
Changelog
Sessions last updated: 2021-12-06 14:00
Endpoint
IX-API
Network
Service ID
Product
Name
Metro area
Features
Available Features
Route Server Service RS1 FRA IPV4 AS6695 rs1.fra.de-cix.net 80.81.192.157
Route Server Service RS2 FRA IPV4 AS6695 rs2.fra.de-cix.net 80.81.193.157
Route Server Service RS1 FRA IPV6 AS6695 rs1-6.fra.de-cix.net 2001:7f8::1a27:5051:c09d
Route Server Service RS2 FRA IPV6 AS6695 rs2-6.fra.de-cix.net 2001:7f8::1a27:5051:c19d
Route Server Service BH1 FRA IPV4 AS6695 rsbh1.fra.de-cix.net 80.81.192.158
2001:7f8::3:2:0:1/64

Siguientes pasos…

- ➔ Versión 1.6 (Febrero 2022)
  - Soporte para IX-API v2
- ➔ Preparando modo escritura:
  - Cambio de dirección MAC en el servicio de peering

Open Source Working Group

This is a draft agenda: changes are still being made.

Wednesday, 18 May 10:30 - 11:30 (UTC+2)

Chaired By: Marcos Sanz, Martin Winter, Ondrej Filip

A. Administrative Matters

- Finalise agenda
- Approval of minutes from previous WG meeting(s)
- Review of action list

B. Open Sourcing RPKI Core
Bart Bakker, RIPE NCC

C. Five Years of FRRouting
Donatas Abraitis, NetDEF/OpenSourceRouting

D. Peering Manager
Guillaume Mazoyer, PM Lead Developer

ROUTE SERVER
SUPPORT FOUNDATION

https://www.rssf.nl/

La Fundación

- ➔ “*Stichting*” establecida en los Países Bajos
  - sin ánimo de lucro
- ➔ Objetivo: diversidad en las implementaciones de software a la comunidad IX

una alternativa a BIRD

La Fundación

- ➔ "*Stichting*" establecida en los Países Bajos
  - sin ánimo de lucro
- ➔ Objetivo: diversidad en las implementaciones de software a la comunidad IX

una alternativa a BIRD

OpenBGPD

https://www.openbgpd.org/

OpenBGPD

- → Proyecto código abierto ya existente
- → Base madura de software, con muchas funciones
- → Fundamentalmente diferente de BIRD
- → Revivido por *RIPE NCC Community Project Fund*
- → Pero:
  - Escalabilidad
  - Responsividad
  - Portabilidad (OpenBSD)

Novedades en OpenBGPD

- ➔ OpenBGPD 7.3 portable lanzado 3-4-2022
- ➔ Soporte para protocolo RPKI-To-Router (RFC 6810)
- ➔ Soporte para Enhanced Route Refresh (RFC 7313)
- ➔ Descubierto un fenómeno en la FSM de BGP-4
  - https://datatracker.ietf.org/doc/html/draft-spaghetti-idr-bgp-sendholdtimer-04

Recordemos a Alice

Alice

- ➔ Nacida en Madrid, en el Hackathon RIPE 73 (2016)
- ➔ Inicialmente como una API para BIRD (birdwatcher/bird's eye)
- ➔ API primero, código abierto, modular
  - se pueden fácilmente soportar otros BGP Daemon

https://github.com/alice-lg

DE-CIX Looking Glass
lg.de-cix.net

rs1.fra.de-cix.net (IPv4)

ROUTE SERVERS

DE-CIX Frankfurt

- rs1.fra.de-cix.net (IPv4) Bird 1.6.8
- rs1.fra.de-cix.net (IPv6) Bird 1.6.8
- rs2.fra.de-cix.net (IPv4) Bird 1.6.8
- rs2.fra.de-cix.net (IPv6) Bird 1.6.8
- rsbh1.fra.de-cix.net (IPv4) Bird 1.6.8
- rsbh1.fra.de-cix.net (IPv6) Bird 1.6.8

Filter by Neighbor, ASN or Description

Go to: Established Down

BGP SESSIONS ESTABLISHED

Neighbor	ASN	State	Last State Change	Description	Received	Accepted	Filtered	Exported
80.81.194.42	42	up	a month	Packet Clearing House	88	88	0	272420
80.81.195.77	112	up	a month	AS112	2	2	0	272707
80.81.194.106	553	up	a month	BelWue	187	187	0	272314
80.81.192.175	553	up	a month	BelWue	190	190	0	272314
80.81.196.147	559	up	2 days	SWITCH	125	125	0	272535
80.81.193.222	680	up	a month	DFN Deutsches Forschungsnetz e.V.	519	513	6	272840
80.81.192.222	680	up	a month	DFN Deutsches Forschungsnetz e.V.	519	513	6	272841
80.81.192.121	1239	up	6 days	SprintLink Germany GmbH	3395	3155	240	270951
80.81.194.129	1241	up	a month	NOVA TELECOMMUNICATIONS S.M.S.A.	136	136	0	274197
80.81.193.231	1241	up	10 hours	NOVA TELECOMMUNICATIONS S.M.S.A.	137	137	0	273907
80.81.195.130	1241	up	10 hours	NOVA TELECOMMUNICATIONS S.M.S.A.	135	135	0	273907
80.81.192.90	1241	up	a month	NOVA TELECOMMUNICATIONS S.M.S.A.	137	137	0	273905
80.81.194.17	1248	up	a month	HERE Global B.V.	8	8	0	272765

- Last Reboot: **Thursday, October 14, 2021 1:38 AM**
- Last Reconfig: **Thursday, May 12, 2022 6:09 AM**
- **Daemon is up and running**
- Generated **5 minutes ago**. Next refresh **just now**.

ROUTES ACCEPTED

Showing **1 - 250** of **512** total routes

	Network	Next-Hop	AS Path	Local Pref.	MED	Origin
	128.140.208.0/21	80.81.193.222	680	100	0	Incomplete
	128.176.0.0/16	80.81.193.222	680	100	513	IGP
	128.7.0.0/16	80.81.193.222	680	100	0	Incomplete
	129.13.0.0/16	80.81.193.222	680 34878	100	0	Incomplete
	129.187.0.0/16	80.81.193.222	680 12816	100	845	IGP
	129.206.0.0/16	80.81.193.222	680 553	100	266	IGP
	129.217.0.0/16	80.81.193.222	680	100	266	IGP
	129.233.128.0/18	80.81.193.222	680	100	0	Incomplete
	129.233.193.0/24	80.81.193.222	680 60824 60824 60824	100	266	IGP
	129.233.196.0/24	80.81.193.222	680 60824 60824 60824	100	266	IGP
	129.233.200.0/23	80.81.193.222	680 200943	100	0	Incomplete
	129.233.202.0/24	80.81.193.222	680 200943	100	0	Incomplete
	129.233.208.0/23	80.81.193.222	680 12643 12643 12643 12643	100	266	IGP
	129.233.210.0/24	80.81.193.222	680	100	1093	Incomplete
	129.233.212.0/24	80.81.193.222	680 47610	100	266	IGP
	129.233.213.0/24	80.81.193.222	680 47610	100	266	IGP
	129.233.224.0/20	80.81.193.222	680	100	0	Incomplete
	129.247.0.0/16	80.81.193.222	680	100	0	Incomplete

DE-CIX Looking Glass
lg.de-cix.net

rs1.fra.de-cix.net (IPv4) » DFN Deutsches Forschungsnetz e.V.

ROUTE SERVERS

DE-CIX Frankfurt

- rs1.fra.de-cix.net (IPv4) Bird 1.6.8
- rs1.fra.de-cix.net (IPv6) Bird 1.6.8
- rs2.fra.de-cix.net (IPv4) Bird 1.6.8
- rs2.fra.de-cix.net (IPv6) Bird 1.6.8
- rsbh1.fra.de-cix.net (IPv4) Bird 1.6.8
- rsbh1.fra.de-cix.net (IPv6) Bird 1.6.8

80.81.193.222 | 80.81.192.222

Filter by Network or Next-Hop

Go to: Filtered | Accepted | Not Exported

ROUTES FILTERED

Showing **all** of **6** routes

Network	Next-Hop	AS Path	Local Pref.	MED	Origin
109.68.96.0/21 IRRDB lookup: AS-SET does not include origin AS	80.81.193.222	680 8878	100	0	IGP
141.78.0.0/16 IRRDB lookup: Unable to resolve prefix for origin AS	80.81.193.222	680	100	845	IGP
185.73.20.0/23 RPKI Invalid	80.81.193.222	680 29484	100	266	IGP
185.73.22.0/25 Prefix too specific (> /24)	80.81.193.222	680 29484	100	266	IGP
185.73.23.0/24 RPKI Invalid	80.81.193.222	680 29484	100	266	IGP
192.108.63.0/24 IRRDB lookup: Unable to resolve prefix for origin AS	80.81.193.222	680	100	0	Incomplete

ROUTES ACCEPTED

Showing **1 - 250** of **512** total routes

DE-CIX Software

- Last Reboot: **Thursday, October 14, 2021 1:38 AM**
- Last Reconfig: **Thursday, May 12, 2022 6:09 AM**
- **Daemon is up and running**
- Generated **7 minutes ago**.
  Next refresh **in 8 minutes**.

BGP COMMUNITIES

Select BGP Communities to match...

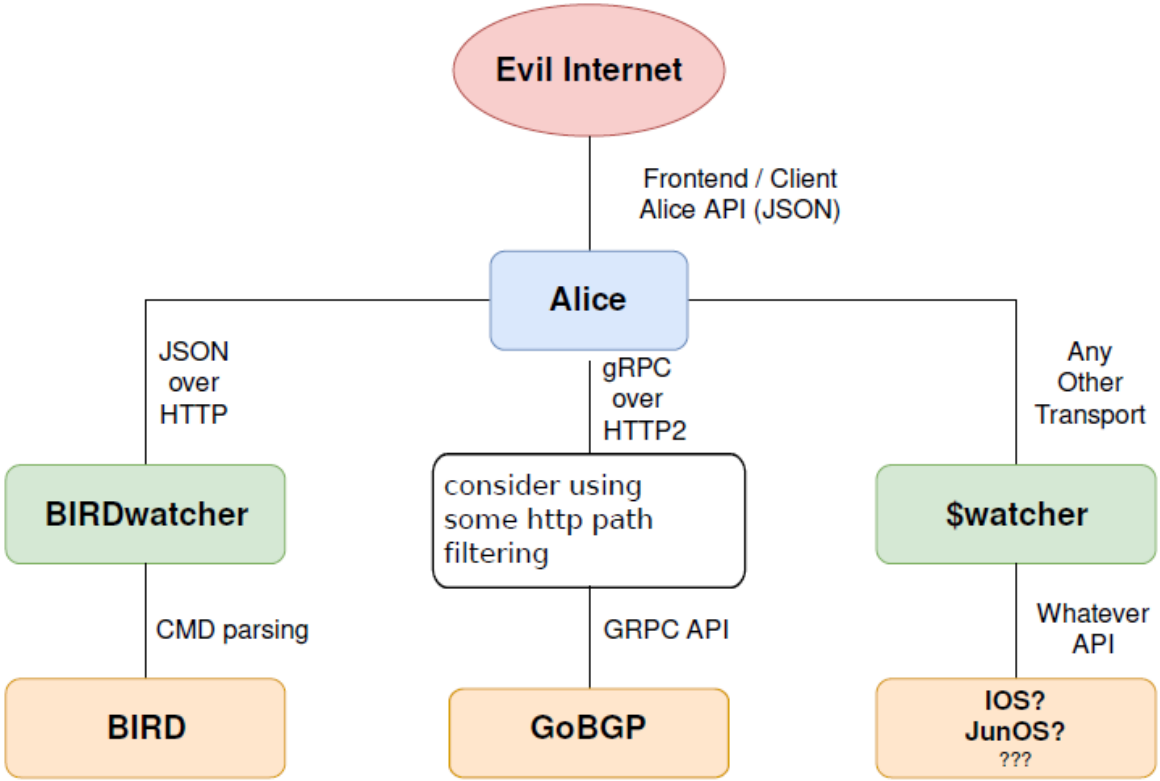


Imagen cortesía de A. Hannig

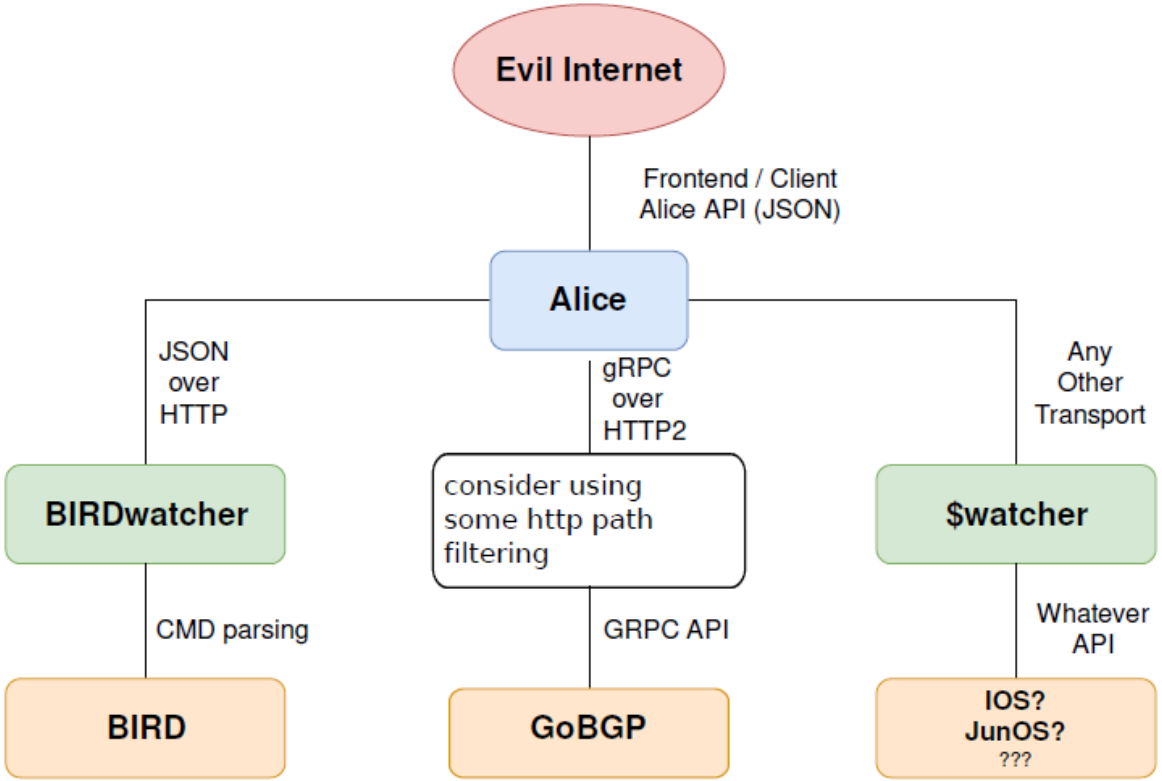


Imagen cortesía de A. Hannig

Novedades alice-lg 2022

- ➔ Soporte para OpenBGPD
- ➔ Refresco en paralelo de los route servers
  - Reducción uso de memoria, streamed parsing
- ➔ Soporte PostgreSQL como backend (opcional)
- ➔ Todo para estar incluido en 5.1.0

Datatracker Groups Documents Meetings Other User Sign in Document search

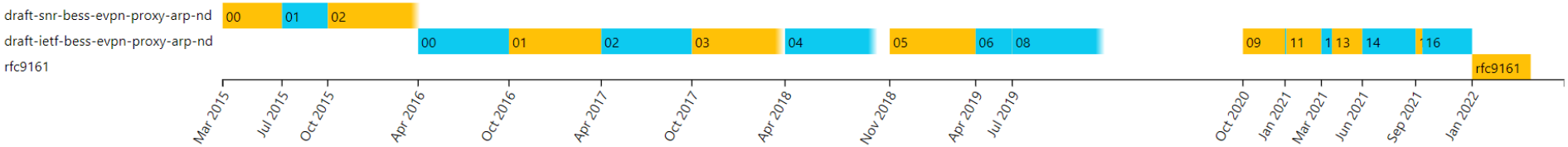
Operational Aspects of Proxy ARP/ND in Ethernet Virtual Private Networks

RFC 9161

Status | IESG evaluation record | IESG writeups | Email expansions | History

Versions:

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16



Document	**Type**	RFC - Proposed Standard (January 2022) Updates RFC 7432 Was draft-ietf-bess-evpn-proxy-arp-nd (bess WG)
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	Last updated	2022-01-13
	Replaces	draft-snr-bess-evpn-proxy-arp-nd
	Stream	Internet Engineering Task Force (IETF)
	Formats	plain text, html, xml, pdf, htmlized, bibtex

A Year in Lockdown: How the Waves of COVID-19 Impact Internet Traffic

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ABSTRACT

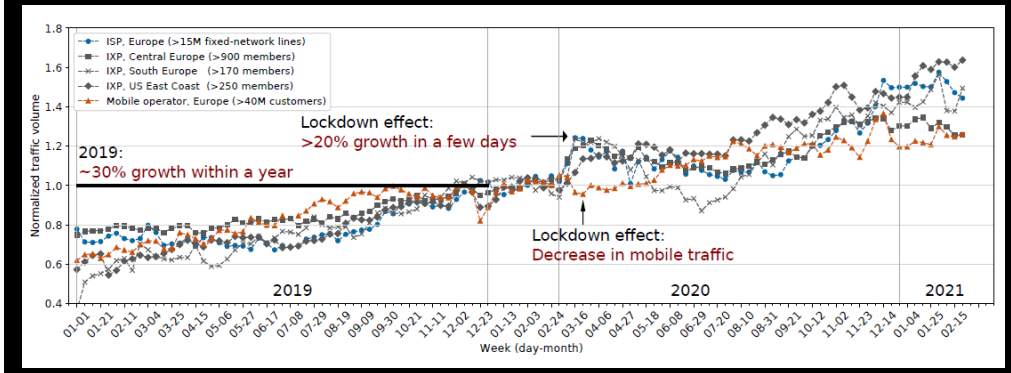
In March 2020, the World Health Organization declared the COVID-19 outbreak a global pandemic. As a result, billions of people were either encouraged or forced by their governments to stay home to reduce the spread of the virus. This caused many to turn to the Internet for work, education, social interaction, and entertainment. With the Internet demand rising at an unprecedented rate, the question of whether the Internet could sustain this additional load emerged. To answer this question, this paper will review the the impact of the first year of the COVID-19 pandemic on Internet traffic in order to analyze its performance. In order to keep our study broad, we collect and analyze Internet traffic data from multiple locations at the core and edge of the Internet. From this, we characterize how traffic and application demands change, to describe the "new normal", and explain how the Internet reacted during these unprecedented times.

1 INTRODUCTION

The worldwide pandemic caused by the Corona Virus 2019 (COVID-19) is a once-in-a-generation global phenomenon that changed the lives of billions of people and destabilized the interconnected world economy. What started as a local health emergency in Asia at the end of 2019, turned into a global event at the beginning of 2020 when the first cases appeared on other continents. By March 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic, causing many governments around the globe to impose strict lockdowns of economic and social activities to reduce the spread of COVID-19. These measures changed the habits of a large fraction of the global population, who now depend on residential Internet connectivity for work, education, social interaction, and entertainment.

Changes in Internet user behavior are common, but they normally occur gradually and over long periods of time. Notable examples of such changes are the increase in demand for peer-to-peer applications that happened in the early 2000s; the increase of traffic served by content delivery networks – including an increase in streaming – that took place in the 2010s; and, more recently, the elevated demand for mobile applications. In all of these cases, the telecommunications industry and network operator community reacted by increasing the investment on network infrastructure. However, the changes in Internet user behavior during the pandemic has been unique because the shifts took place within weeks, leaving hardly any time to react. This raised questions of whether user behavior changes yield to changes in Internet traffic and, more importantly, concerns if the Internet is able to sustain this additional load.

In this paper, we investigate the impact of the COVID-19 pandemic on the Internet traffic by analyzing more than two years of Internet traffic data including the first year of the pandemic. More specifically, we characterize the overall traffic shifts and the changes in demand for particular applications that became very popular in a short amount of time. During the process, we try to understand if there is a "new normal" in Internet traffic and to see how the Internet reacted in these unprecedented times. We summarize our observations for the spring 2020 wave (February 2020 to June



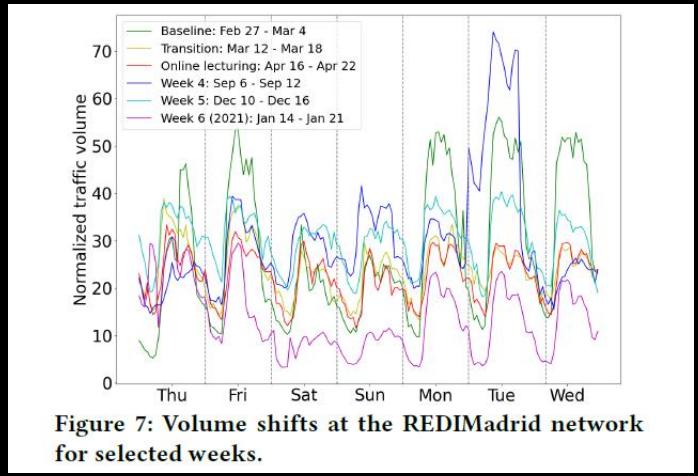


Figure 7: Volume shifts at the REDIMadrid network for selected weeks.

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Moltes gràcies

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