



PeeringDB

PeeringDB Workshop

How is PeeringDB organised? // Track 1



arnold@peeringdb.com

Agenda

- Please always use the tutorial DB at <https://tutorial.peeringdb.com>
- What is PeeringDB?
- Organisation
 - History
 - Association
 - Committees

What is PeeringDB?

Mission statement: “PeeringDB, a nonprofit member-based organization, facilitates the exchange of user-maintained interconnection related information, primarily for Peering Coordinators and Internet Exchange, Facility, and Network Operators.”

Why should I have a record in PeeringDB?

- As a network a PeeringDB record makes it easy for other networks to find you, and helps you to establish peering / interconnection
- As a colocation provider a PeeringDB record creates visibility, and helps you to attract additional networks and IXes
- As an IX a PeeringDB record provides information about your participants, and colocations where your service is available
- Provides a user-friendly GUI and a powerful API for automation



Governance and Membership

- PeeringDB is a United States 501(c)(6) volunteer organization that is 100% funded by sponsorships
- Healthy organization, building financial reserves and executing the longterm strategic plan
- Membership rules
 - A corporation, limited liability company, partnership or other legal business entity may be a Member of the Corporation
 - Membership is determined by having both an active PeeringDB.com account and an individual representative or role subscription to the PeeringDB Governance mailing list
 - 364 addresses subscribed to the Governance mailing list (as of Feb 14, 2022)
 - Governance list is at <http://lists.peeringdb.com/cgi-bin/mailman/listinfo/pdb-gov>
 - More information available at <http://gov.peeringdb.com/>

Governance

- The Members
 - Any corporation, limited liability company, partnership or other legal business entity may be a Member
 - One (virtual/online) member meeting per year
 - Next meeting is Tuesday, April 12th, at 1600 UTC
- The Board
 - Sets strategic directions and overlooks financial issues
 - Half of the board is elected every year
- The Committees
 - Responsible for the day-to-day work
 - Admin Committee
 - Operations Committee
 - Outreach Committee
 - Product Committee
- <https://docs.peeringdb.com/gov/>

Board of Directors and Officers



Chris Caputo – Secretary & Treasurer (Non-Board Member)



Patrick Gilmore – Director
(Term Expires 2023)



Aaron Hughes – President
(Term Expires 2022)



Christopher Malayter – Director
(Term Expires 2023)



Bijal Sanghani – Director
(Term Expires 2023)

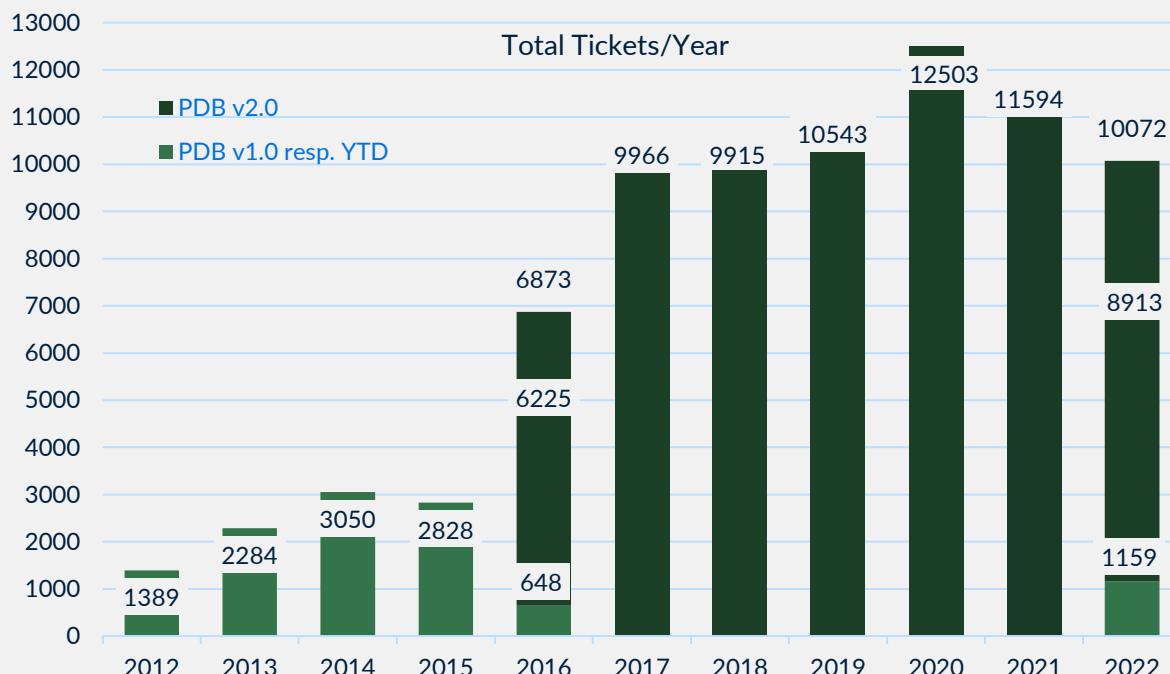


Job Snijders – Vice President
(Term Expires 2022)

Committees

Admin Committee	Operations Committee	Outreach Committee	Product Committee
<ul style="list-style-type: none">Manage administration of user accounts and PeeringDB recordsAnswer support ticketsCleansing and completion of PeeringDB records <p>Leads: Patrick Gilmore (Chair) and Darwin Costa (Vice Chair) Contact: admincom@lists.peerengdb.com</p>	<ul style="list-style-type: none">Manage PeeringDB infrastructure <p>Leads: Job Snijders (Chair) and Aaron Hughes (Vice Chair) Contact: pdb-ops@lists.peerengdb.com</p>	<ul style="list-style-type: none">Manage marketing and social mediaDevelop and maintain presentations, workshops and webinarsCoordinate presentations and attendance at events <p>Leads: Ben Ryall (Chair) and Bijal Sanghani (Vice Chair) Contact: outreachcom@lists.peerengdb.com</p>	<ul style="list-style-type: none">Manage roadmap and development prioritiesAsk for input from the community on desired featuresWrite SoWs to solicit bids to complete requested features <p>Leads: Stephen McManus (Chair) and Matt Griswold (Vice Chair) Product Manager: Leo Vegoda Contact: productcom@lists.peerengdb.com</p>

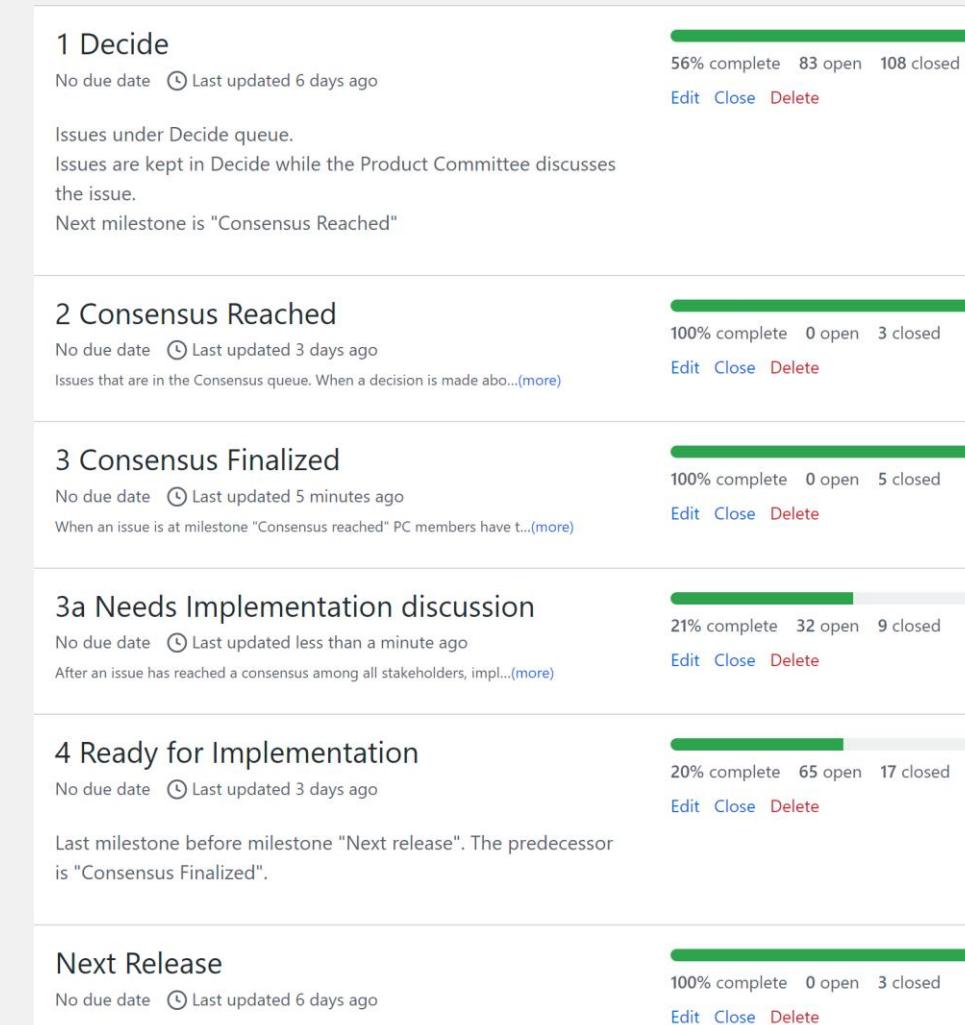
Support Ticket Statistics



- Admin Committee volunteers are based around the world in a variety of time zones with diverse language skills
- Goal is to resolve support tickets within 24 hours

Product Development

- All issues tracked using our [GitHub repository](#)
 - Anyone can open a feature requests or file a bug report
 - Open and transparent process for product development
 - Documented [Decision making and Workflow](#) process
- Product Committee issue process
 - Evaluate and prioritize the requests
 - Request a quote for development costs
 - Request budget from the board
 - Manage implementation and scheduling
- Your input is needed on features!



Become a PeeringDB Sponsor!

- Diamond Sponsorship - \$25,000 / year
 - Limited to 2 sponsors
 - Very large logo on top line of Sponsors page with URL
 - Diamond Sponsor badge display on all records
 - Social media promotion
- Platinum Sponsorship - \$10,000 / year
 - Large logo on second line of Sponsors page with URL
 - Platinum Sponsor badge display on all records
 - Social media promotion
- Gold Sponsorship - \$5,000 / year
 - Medium logo on third line of Sponsors page
 - Gold Sponsor badge display on all records
 - Social media promotion
- Silver Sponsorship - \$2,500 / year
 - Small logo on fourth line of Sponsors page
 - Silver Sponsor badge display on all records
 - Social media promotion



Microsoft Diamond Sponsor

Organization	Microsoft Corporation
Also Known As	8068 8069
Company Website	
Primary ASN	8075

DE-CIX Frankfurt Platinum Sponsor

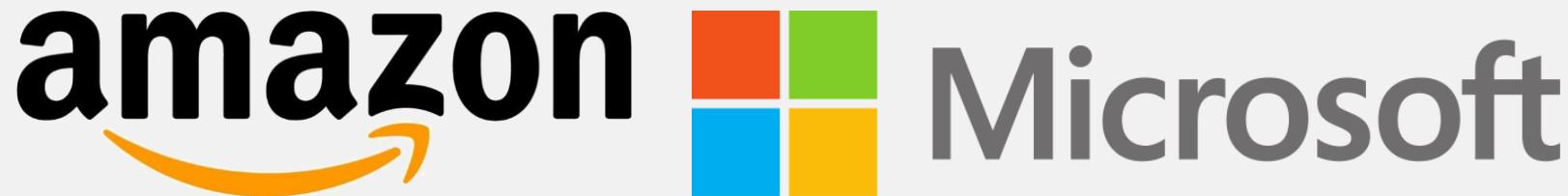
Organization	DE-CIX Management GmbH
Long Name	Deutscher Commercial Internet Exchange
City	Frankfurt
Country	DE
Continental Region	Europe
Media Type	Ethernet



Proud Sponsor of
PeeringDB Gold
Contact sponsorship@peeringdb.com for sponsorship info!

Thank you to our sponsors!

Diamond
Sponsor



Platinum
Sponsors



Gold
Sponsors



Silver
Sponsors



DE-CIX Academy

PeeringDB Workshop

Learning the Ropes // Track 2

arnold@peeringdb.com

PeeringDB

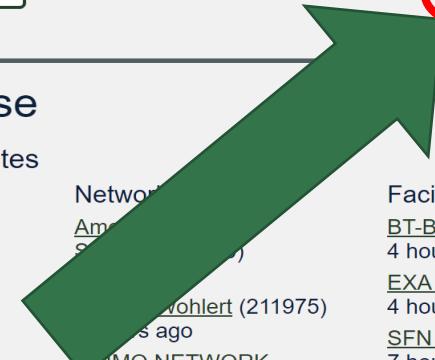


Where

Agenda

- Please always use the tutorial DB at <https://tutorial.peeringdb.com>
- Registering
 - Yourself
 - Your organization
- Adding information
 - About your organization
 - About your network / Autonomous System
 - Adding your peering policy
- Internet Exchanges and Facilities
 - Add where your network is present
 - Managing Suggestions

Registering



 **PeeringDB**

Search here for a network, IX, or facility.

[Advanced Search](#)

[Register or](#) [Login](#)

The Interconnection Database

Join. Search. Grow your network.

PeeringDB is a freely available, user-maintained, database of networks, and the go-to location for interconnection data. The database facilitates the global interconnection of networks at Internet Exchange Points (IXPs), data centers, and other interconnection facilities, and is the first stop in making interconnection decisions.

The database is a non-profit, community-driven initiative run and promoted by volunteers. It is a public tool for the growth and good of the Internet. Join the community and support the continued development of the Internet.

Learn more [about PeeringDB](#) or [register](#).

Most Recent Updates

Exchanges	Networks	Facilities
RapidIX	Amelia Island (211974)	BT-BLUE Datacenter 1
3 days ago	Santos (211975)	4 hours ago
SONIX Stockholm	voahlert (211975)	EXA Edge DC Bordeaux
3 days ago	(209669)	7 hours ago
SONIX Gothenburg	KIMO NETWORK (209669)	SFN IA-Waterloo
3 days ago	2 hours ago	7 hours ago
PKIX Lahore	(209669)	SFN IA-IowaFalls
3 days ago	2 hours ago	7 hours ago
DE-CIX ASEAN	SYSLEVEL (210354)	SFN IA-Emery
4 days ago	2 hours ago	7 hours ago
	Maximus Net (268880)	
	2 hours ago	

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All Rights Reserved. By using this service, you agree to adhere to our [AUP](#).

[2.33.0 - Privacy Policy](#)

About
[Register](#)
[Search](#)
[Sponsors](#)

Resources
[API Documentation](#)
[FAQ](#)
[Governance](#)
[Status](#)

Contact Us
support@peeringdb.com

Global System Statistics

942 Exchanges
24207 Networks
4512 Facilities
43313 Connections to Exchanges
38568 Connections to Facilities
4950 Automated Networks

Registering

Create account

Username

Password

Confirm password

For speedy validation, it is required that you use a work e-mail address. If you plan to register your ASN with PeeringDB, it is recommended that you use an email-address that exists in your ASN's public contact details.

Email

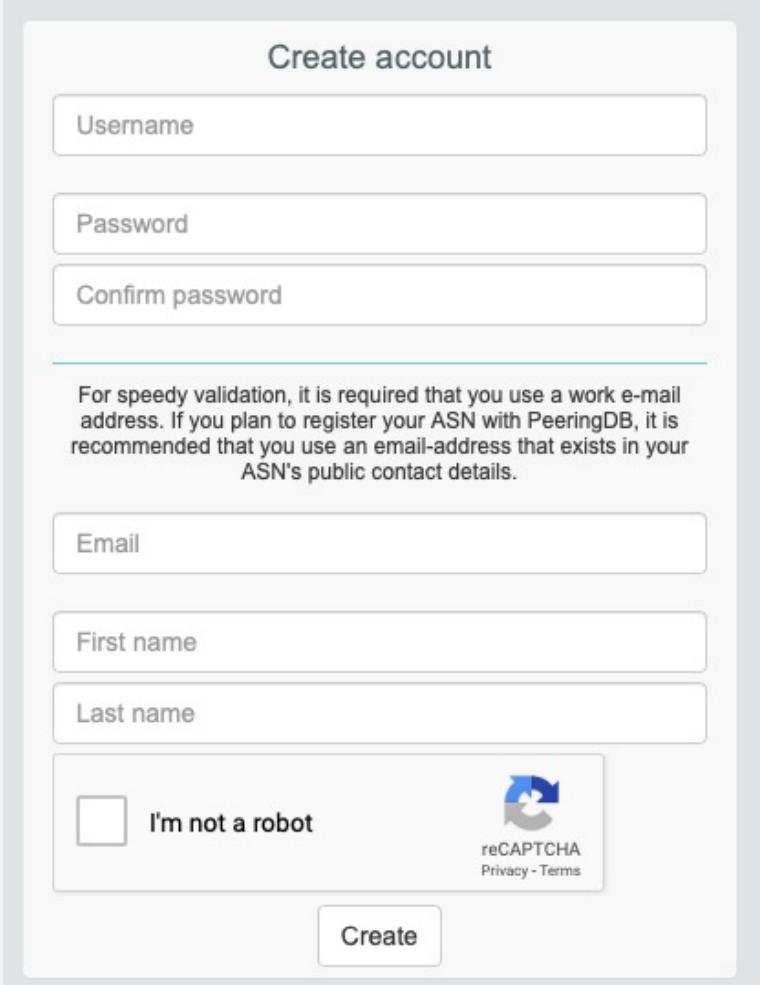
First name

Last name

I'm not a robot

reCAPTCHA
Privacy - Terms

Create



- Choose a username
- Password must be at least 10 characters long
- Use a **real work e-mail address**
 - Ideally the one you registered the ASN with
- And put in your first and last name
- You receive a confirmation email
- Click on the link in the email

Registering

Select language

English

[Set language preference](#)

Email Confirmation

Before getting access to any other features, you need to confirm your email address.

We have sent you a message containing the confirmation link.

[Resend Confirmation Email](#)

Change email address

For speedy validation, it is required that you use a work e-mail address. If you plan to register your ASN with PeeringDB, it is recommended that you use an email-address that exists in the ASN's public contact details.

Email

[Download](#)

- You can choose a language
 - If your language is not available yet and you want to help – let us know!
 - Not all languages are fully translated
- To re-send the confirmation email, click the button
- Further options here:
 - Change email address
 - Change password
- You have to click the link in the email to continue!

Registering

[Set language preference](#)

You have confirmed your email address!

Affiliate with organization

To affiliate with an existing organization, please enter the ASN or organization name below.

To register a new network organization, please enter the ASN and organization name below.

To register a new facility or exchange organization, please enter the organization name below (ASN is optional).

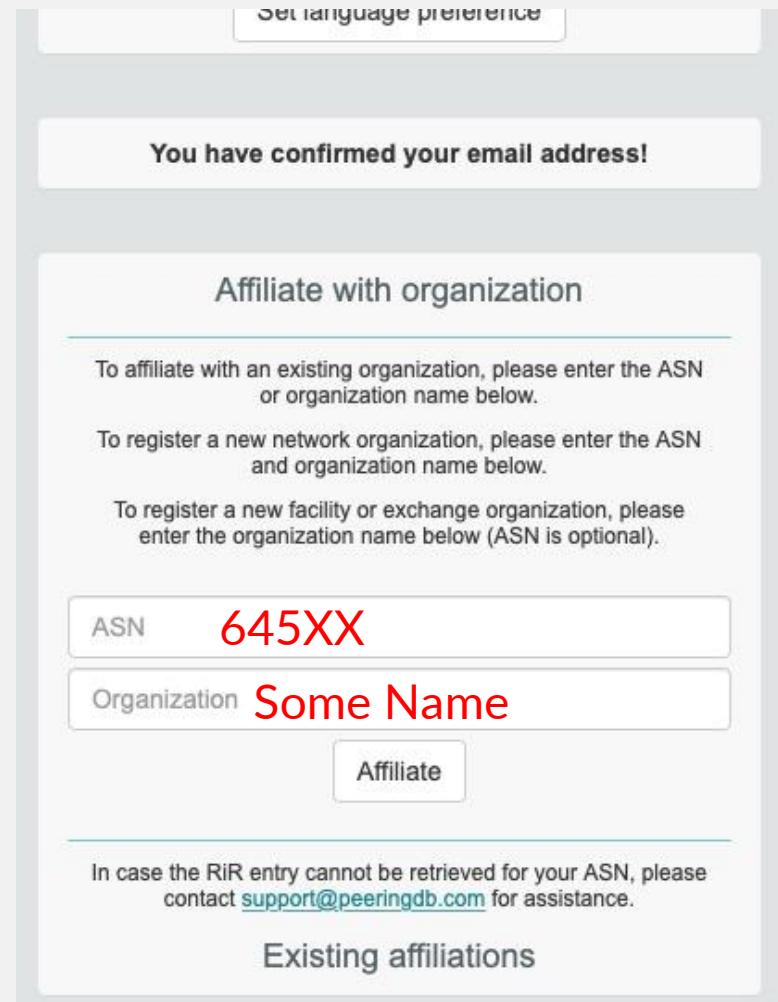
ASN **645XX**

Organization **Some Name**

[Affiliate](#)

In case the RIR entry cannot be retrieved for your ASN, please contact support@peeringdb.com for assistance.

Existing affiliations



- Once your email is confirmed:
- Get affiliated with an organization
 - Your company
 - Which is already in PeeringDB
- Or is new to PeeringDB
 - Can be an ISP – enter your AS number!
 - Or a Datacenter
 - Or an Internet Exchange

Registering

Affiliate with organization

To affiliate with an existing organization, please enter the ASN or organization name below.

To register a new network organization, please enter the ASN and organization name below.

To register a new facility or exchange organization, please enter the organization name below (ASN is optional).

ASN

Organization

Affiliate

In case the RIR entry cannot be retrieved for your ASN, please contact support@peeringdb.com for assistance.

Existing affiliations

Your affiliation with [ACME Alternative Hosting](#) has been approved.



- Once approved, you can edit your organization
- Click on your organization to continue...

Your Organization

- Enter information about your organization – click on edit

ACME Alternative Hosting

Some of the data on this page is incomplete, please update the fields marked with ⓘ to improve data quality.

Website ⓘ

Address 1 ⓘ

Address 2

Location ⓘ

Country Code ⓘ

Notes

Facilities

Name ▾

Country

City

Nothing matched your filter

You may filter by Name, Country or City

Networks

Name ▾

Filter

[ACME Alternative Hosting](#)

ASN

64501

Exchanges

Name ▾

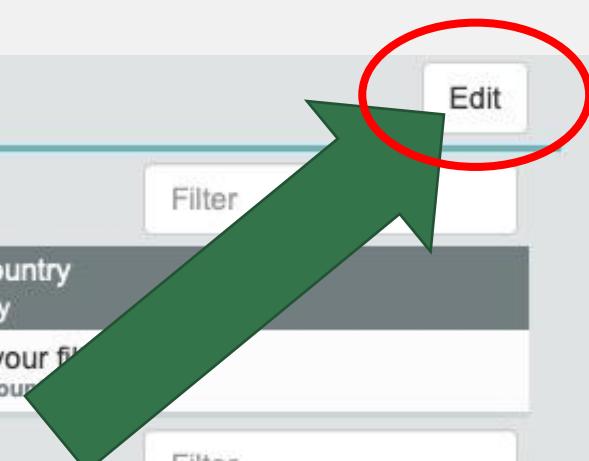
Country

City

Nothing matched your filter

You may filter by Name, Country or City

Edit



Your Organization

ACME Alternative Hosting

Website ⓘ	<input type="text" value="http://www.example.com"/>
Address 1 ⓘ	<input type="text"/>
Address 2	<input type="text"/>
Location ⓘ	<input type="text"/> <input type="text"/> <input type="text"/>
Country Code ⓘ	<input type="text"/>
Notes	Markdown enabled
<input type="text"/>	

- Lets focus on the left side of the screen
- Enter the required information (use either your Sheet or your real company information)
- Use the notes field to promote your company as a peer (if you want to)
 - You can use Markdown (see handout for URL)

Your Organization

The screenshot shows a company profile edit form for "ACME Alternative Hosting Inc." with several fields and their current values:

- Website:** http://www.acme.example
- Address 1:** Vienna
- Address 2:** (empty)
- Location:** Vienna
- State:** (empty)
- Zip Code:** 01000
- Country Code:** Austria
- Notes:** Markdown enabled
ACME Hosting
* Best hosting provider ever
* Open peering policy
* Peer with us!

Large green arrows point from the right side of the slide towards each of the input fields, indicating where user input is needed.

- You can also change your company name
- Enter some information and click “Save”

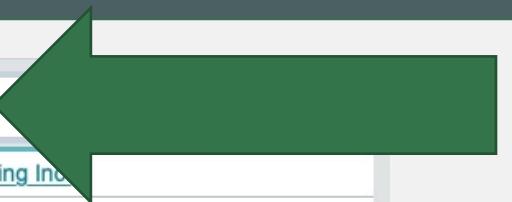
Network Information

- Now it gets interesting
- With your basic company information now in, let's add information about your network
- Click on your network name – beside your AS number on the right side

The screenshot shows the PeeringDB interface. On the left, there is a sidebar with company information for "ACME Alternative Hosting Inc." including fields for Website, Address 1, Address 2, Location, Country Code, and Notes. The Notes section contains a bulleted list: "ACME Hosting", "Best hosting provider ever", "Open peering policy", and "Peer with us!". A large green arrow points from the "Notes" section towards the network search results on the right. On the right, there are two search panels: one for "Facilities" and one for "Networks". The "Facilities" panel has a "Name" dropdown and filters for "Country" and "City", with a message stating "Nothing matched your filter". The "Networks" panel also has a "Name" dropdown and filters for "Country" and "City", with a message stating "Nothing matched your filter". Below these panels, a table lists networks, showing columns for Name, Country, City, ASN, and a "Filter" button. One specific network entry, "ACME Alternative Hosting", is highlighted with a red circle.

Name	Country	City	ASN	Filter
ACME Alternative Hosting	Austria	Vienna	64501	Filter

Network Information

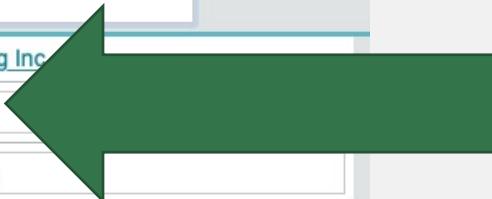


Organization	ACME Alternative Hosting Inc.
Also Known As ⓘ	
Company Website ⓘ	http://www.example.com
Primary ASN	64501
IRR Record ⓘ	
Route Server URL ⓘ	http://www.example.com
Looking Glass URL ⓘ	http://www.example.com
Network Type	Not Disclosed
IPv4 Prefixes ⓘ	0
IPv6 Prefixes ⓘ	0
Traffic Levels	Not Disclosed
Traffic Ratios	Not Disclosed
Geographic Scope	Not Disclosed
Protocols Supported	<input type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input type="checkbox"/> IPv6
Last Updated	2018-12-12T12:48:07Z
Notes	Markdown enabled

- Again, click on „Edit“ (top right)
- Here is a lot of information to enter
- Most is self-explanatory
- But some is not that obvious
 - Title here is your **network name**
 - Does not have to be the same as your company name
 - Some companies run more than one network/ASN
 - Or use a different name for their networking business (dba)

Network Information

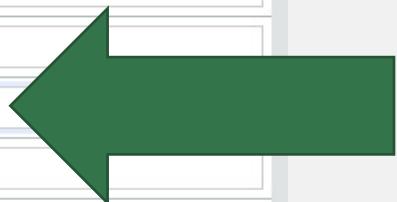
ACME Alternative Hosting	
Organization	ACME Alternative Hosting Inc
Also Known As ⓘ	
Company Website ⓘ	http://www.example.com
Primary ASN	64501
IRR Record ⓘ	
Route Server URL ⓘ	http://www.example.com
Looking Glass URL ⓘ	http://www.example.com
Network Type	Not Disclosed
IPv4 Prefixes ⓘ	0
IPv6 Prefixes ⓘ	0
Traffic Levels	Not Disclosed
Traffic Ratios	Not Disclosed
Geographic Scope	Not Disclosed
Protocols Supported	<input type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input type="checkbox"/> IPv6
Last Updated	2018-12-12T12:48:07Z
Notes	Markdown enabled



- Use this field for an alternative name
- Or an „old“ name if you changed names
- Or leave it empty
- Company website – remember this is PeeringDB
 - Put in the URL your peers should see
- AS number – your main one
 - If you have more, you can add them later

Network Information

ACME Alternative Hosting	
Organization	ACME Alternative Hosting Inc.
Also Known As ⓘ	ACME Hosting
Company Website ⓘ	http://www.acme.example
Primary ASN	64501
IRR Record ⓘ	AS64501:AS-ACME-HOSTING
Route Server URL ⓘ	http://www.example.com
Looking Glass URL ⓘ	http://www.example.com
Network Type	Not Disclosed
IPv4 Prefixes ⓘ	0
IPv6 Prefixes ⓘ	0
Traffic Levels	Not Disclosed
Traffic Ratios	Not Disclosed
Geographic Scope	Not Disclosed
Protocols Supported	<input type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input type="checkbox"/> IPv6
Last Updated	2018-12-12T12:48:07Z
Notes	Markdown enabled



- IRR Record

- Your AS-Macro (also called AS-Set)
- Registered in an [IRR database](#)
- Create an AS-Set if you don't have one

- Route Server URL

- Looking Glass URL

Network Information

ACME Alternative Hosting	
Organization	ACME Alternative Hosting Inc.
Also Known As ⓘ	ACME Hosting
Company Website ⓘ	http://www.acme.example
Primary ASN	64501
IRR Record ⓘ	AS64501:AS-ACME-HOSTING
Route Server URL ⓘ	http://www.example.com
Looking Glass URL ⓘ	http://www.example.com
Network Type	Content
IPv4 Prefixes ⓘ	3
IPv6 Prefixes ⓘ	3
Traffic Levels	100-1000Mbps
Traffic Ratios	Mostly Outbound
Geographic Scope	Regional
Protocols Supported	<input checked="" type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input checked="" type="checkbox"/> IPv6
Last Updated	2018-12-12T12:48:07Z
Notes	Markdown enabled

- Fill in the rest

- Either according to your sheet
- Or choose your real network

- In „Notes“ you can use Markdown

- You can give your peers free text information
- Like details about your peering policy or special services
- More about your peering policy further down below

Peering Information

The screenshot shows the 'PeeringDB Configuration' section. It includes a 'PeeringDB Configuration' heading, a 'Allow IXP Update' checkbox (which is unchecked), and an 'IXP Update Tools' section containing 'Preview' and 'Postmortem' buttons. A green callout bubble points to the 'Allow IXP Update' checkbox with the text 'Allow IXP Update here'. A large green arrow points from the bottom right towards the 'Allow IXP Update' checkbox.

Peering Policy Information	
Peering Policy	
General Policy	Open
Multiple Locations	Not Required
Ratio Requirement	No
Contract Requirement	Not Required

- Now we add information about Peering!
- Important: Allowing IXP Update helps maintaining DB accuracy
- So please allow if you trust your IXPs
 - You trust either all or none

Peering Information

The screenshot shows the 'PeeringDB Configuration' section. It includes a 'Allow IXP Update' dropdown set to 'Open' and a 'IXP Update Tools' section containing two buttons: 'Preview' and 'Postmortem'. A green callout bubble labeled 'Tools for the IXP Update' points to the 'Postmortem' button.

The screenshot shows the 'Peering Policy Information' section. It lists five policy items: 'General Policy' (Open), 'Multiple Locations' (Not Required), 'Ratio Requirement' (No), and 'Contract Requirement' (Not Required).

Peering Policy	
General Policy	Open
Multiple Locations	Not Required
Ratio Requirement	No
Contract Requirement	Not Required

- **Preview** lets you see what will happen with the next import
- **Postmortem** shows what happened at the last import
- Use the dropdowns to indicate your general peering policy
- In case of selective/restrictive you may provide a URL at „Peering Policy“

Contact Information

Contact Information		
Role	Name	Phone E-Mail
Abuse	Abuse Desk	
	Public	abuse@acme.example
Role	NOC	
Name	Network Operations	
Email	noc@acme.example	
Phone	+43 1 2341668	
Visibility	Users	

Add Contact

- To inform peers how to contact you
 - In a number of roles
- You can add as many as you need
 - „Add Contact“ to save a contact
 - Public or for authenticated Users
- You do not have to fill out all fields
- **Keep your contact info up to date**
- **A technical contact is mandatory if you add a connection to an IXP**

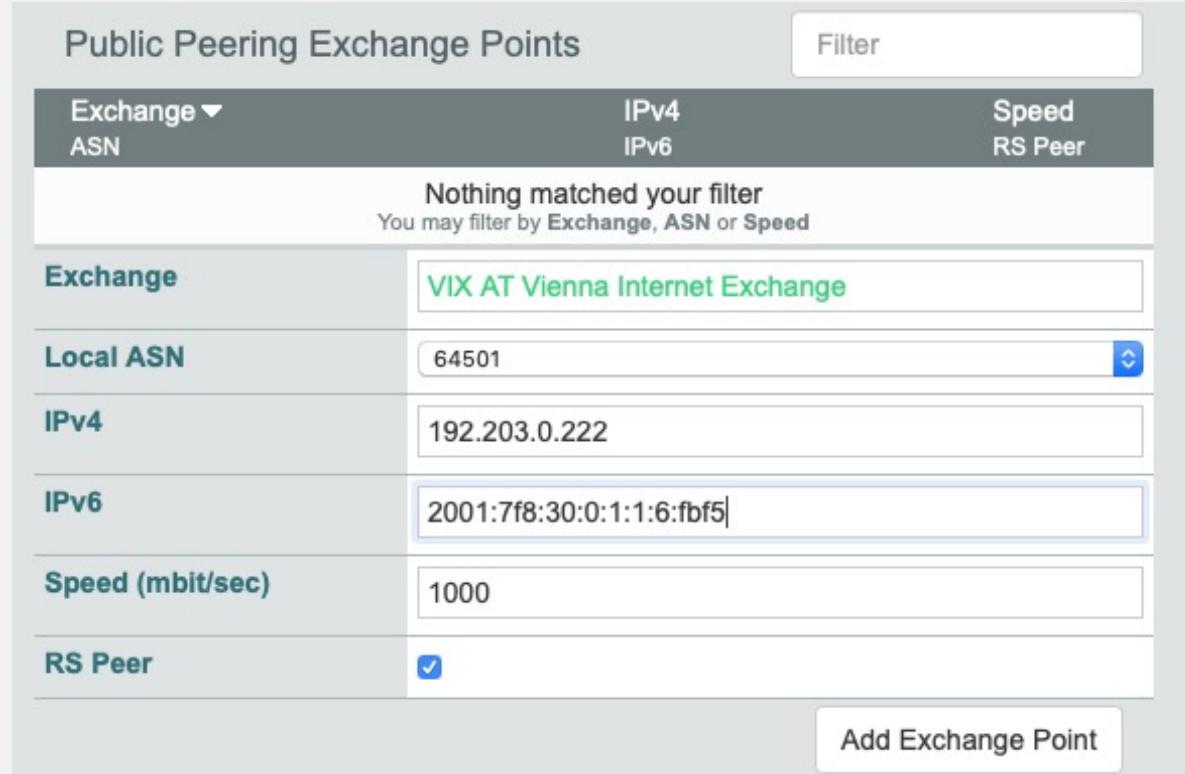
Review what you have entered

- You now have entered:
 - Information about your organization, like:
 - Address
 - Website
 - Free form text
 - Network information
 - Your AS number
 - Number of prefixes you announce
 - Traffic info
 - Peering information, like peering policy
 - Contacts for your peers
- Please check if everything is correct

Add peering at an IXP

Public Peering Exchange Points Filter

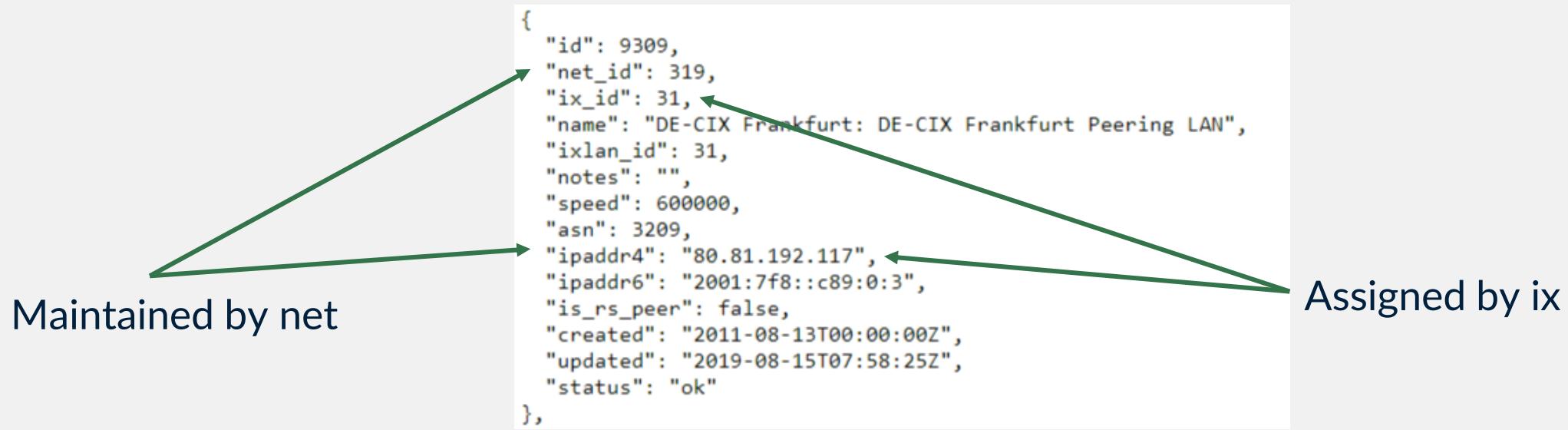
Exchange ▾ ASN	IPv4	Speed RS Peer
Nothing matched your filter You may filter by Exchange, ASN or Speed		
Exchange	VIX AT Vienna Internet Exchange	
Local ASN	64501	<input type="button" value="▼"/>
IPv4	192.203.0.222	
IPv6	2001:7f8:30:0:1:1:6:fbff	
Speed (mbit/sec)	1000	
RS Peer	<input checked="" type="checkbox"/>	



- Click on „Edit“ at the top right again
- Enter an IXP name in Exchange
 - And select the IXP you are connected to from the list
- Enter speed, IPv4 and IPv6
- Select “RS Peer“ if you are peering with the route server
- **Click on „Add Exchange Point“!**
- And then click on „save“.

Data Ownership

- How to resolve conflicts when more than one party is involved?
 - Ex.: netixlan



- A Task Force (so-called DOTF) created a policy document
- Recommendations incorporated in latest releases

Suggested Entries

The screenshot shows a user interface for managing peering entries. At the top right is a green 'Edit' button. Below it, a message box says 'Some exchanges suggest updates to your entries in their peering list.' with a link 'Review suggestions'. At the bottom right are 'Cancel' and 'Save' buttons.

In the main area, another message box says 'Some exchanges suggest updates to your entries in their peering list.' with a link 'Expand each exchange below to review, apply or dismiss those suggestions'.

A specific entry for 'LocIX Netherlands' is shown. It includes a 'Their PeeringDB entry' link. The entry form has fields for 'Add' (IP address: 185.1.138.xx and MAC address: 2a0c:b641:700::xxx:yyy), 'Speed' (1000), and 'Options' (checkboxes for 'Operational' and 'RS Peer'). There are 'Auto-resolve' and 'Auto-add' buttons, and a question mark icon. At the bottom are 'Dismiss' and 'Add' buttons.

- Go to your network page
- Click on „Review suggestions“
- You see a list of IX with suggestions
- Select one
- You have a couple of choices
 - Auto-add: add entry as suggested
 - Auto-resolve: resolve as suggested
 - Dismiss: ignore suggestion

Presence at a datacenter

Facility	Country
ITandTEL TechCenter Linz 64501	AT Linz

Facility

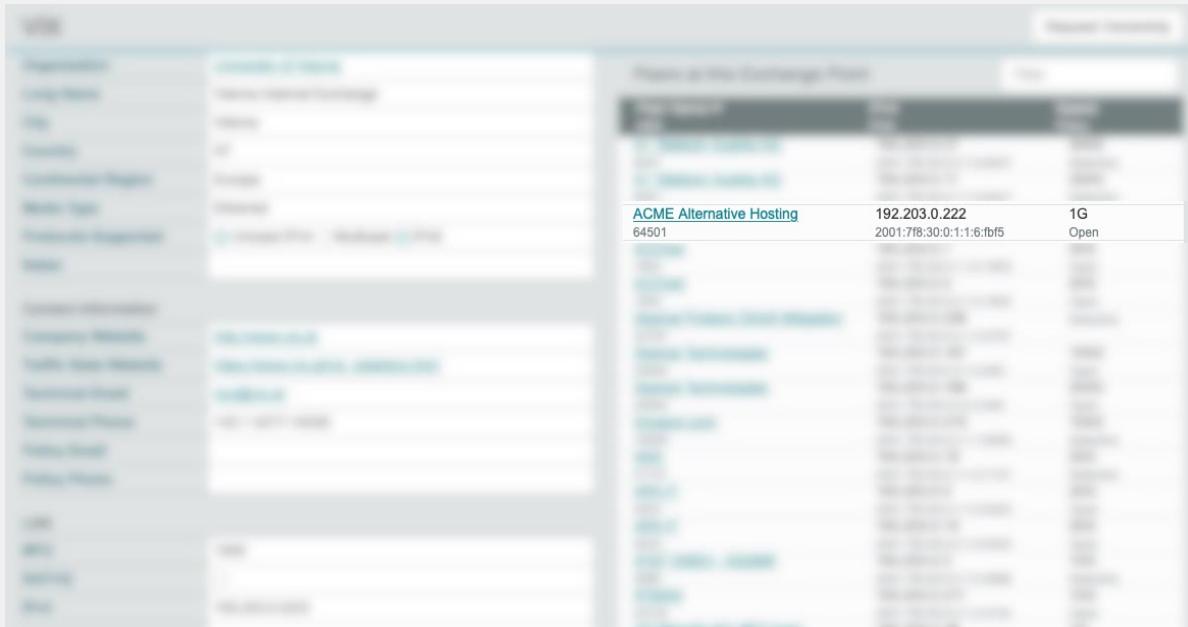
Klagenfurt

Kelag Klagenfurt
Arnulfplatz 2

Klagenfurt Stadtwerke
Gabelsbergerstrasse 50a

- Now again click on „edit“
- Scroll down and enter a city or datacenter name in „Facility“
- Select the facility you are in from the list and....
- ...click on „Add Facility“
- When you have added all facilities click on „Save“

Check what you have entered



- Click on the name of the IXP you entered
- Find your entry in the list
- Do the same for the facilities you are in

Add your own facility

Manage

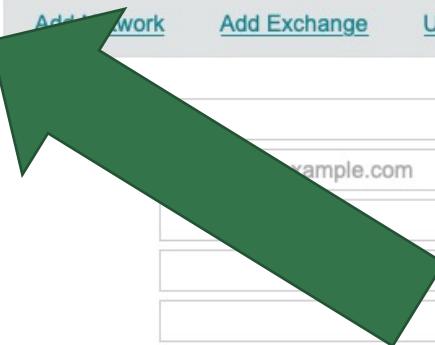
Add Facility Add Network Add Exchange Users Permissions

Name	example.com
Website	example.com
Address 1	
Address 2	
City	
State	
Zip-Code	

Add a new Facility
need to be approved
or the API listings

To be listed as a Facility
data center and/or peering point

Submit Facility



- If you run **your own** datacenter
- Why not add it to PeeringDB?
- Go to your organization page
- Scroll down to „Manage“
- Choose „Add Facility“

Add your own facility

Manage

[Add Facility](#)

[Add Network](#)

[Add Exchange](#)

[Users](#)

[Permissions](#)

Name

ACME Alternative Datacenter

Website

<http://www.acme.example>

Address 1

Old Road 301

Address 2

Vienna

City

State

Zip-Code

A-1001

Country

Austria

CLLI Code

NPA-NXX

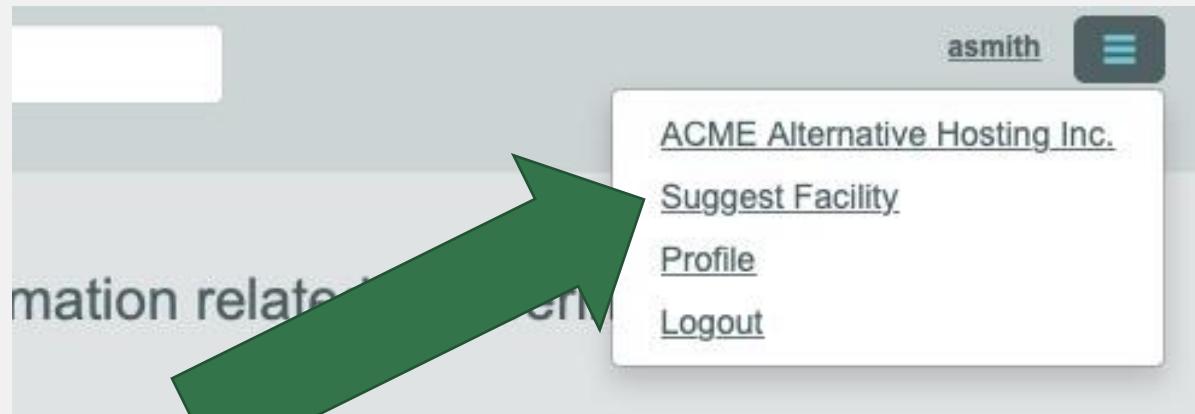
Add a new Facility to your Organization. Note that the newly created Facility will need to be approved by PeeringDB staff before it will appear in the search results or the API listings

To be listed as a Facility in PeeringDB we would expect that you offer colocation, data center and/or meet-me-room services to the public.

[Submit Facility](#)

- Fill in applicable fields
- CLLI and NPA-NXX: deprecated
- Click „Submit Facility“
- Entry will be reviewed
- And added or declined

Suggesting a facility



- For facilities **you don't own**
- **But you are in or know about**
- Choose „Suggest Facility“
- Is reviewed by PeeringDB staff

Suggesting a facility

Name	ACME Alternative Datacenter
Website	http://www.acme.example
Address 1	Old Road 301
Address 2	
City	Vienna
State	
Zip-Code	A-1001
Country	Austria
CLLI Code	
NPA-NXX	

Suggest Facility to be added to the database. Your suggestion will be reviewed by the PeeringDB Administration Committee. It will then either be finalized and entered into the database, or declined. No further action is required on your part.

In order to be approved we would expect that the suggested Facility offers colocation, data center and/or meet-me-room services to the public.

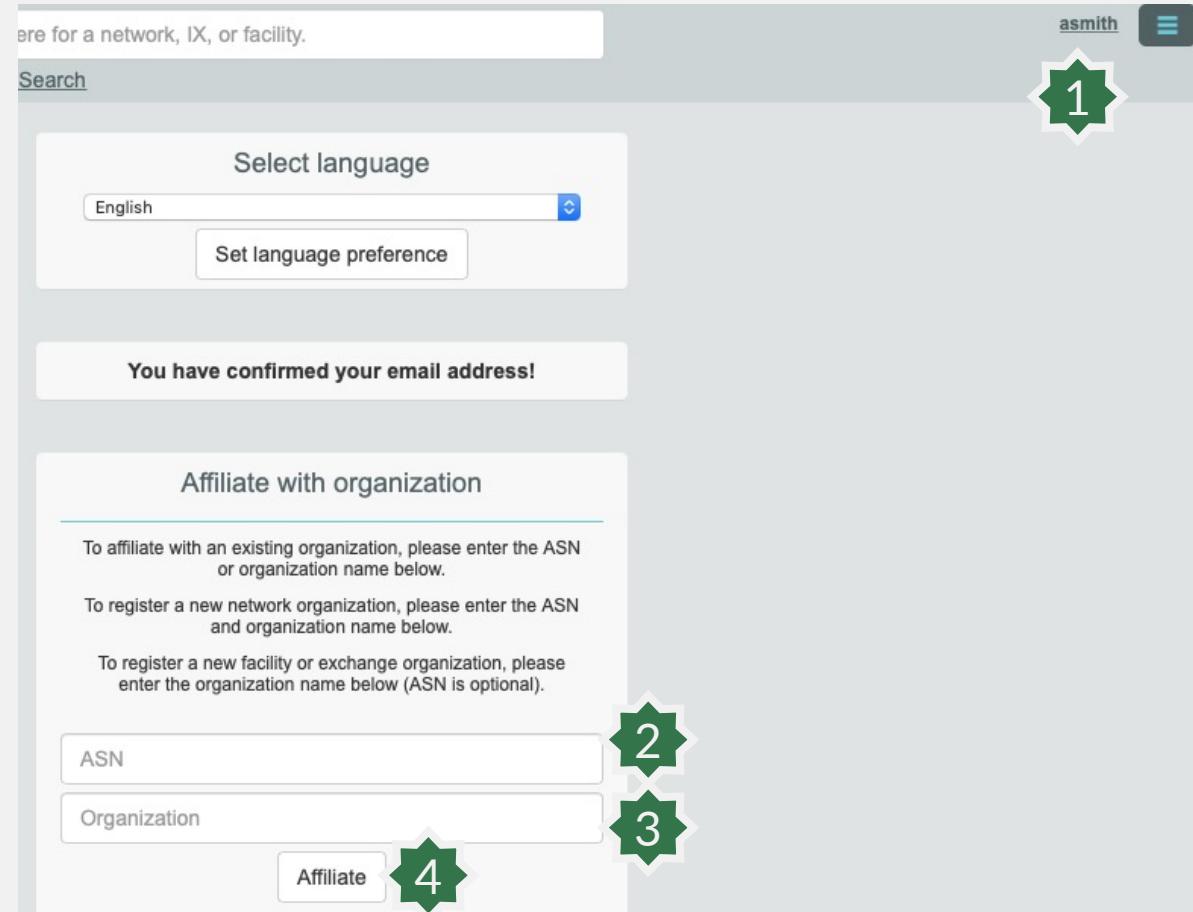
Suggest Facility

- Fill in applicable fields
- CLLI and NPA-NXX: deprecated
- Click „Suggest Facility“
- Entry will be reviewed
- And added or declined

Adding users

- You do not have to be the only person working with PeeringDB
- Other users from your organization may also register!
- Users can be „admin“ or „member“
 - The first user automatically will be an „admin“
- Administrators are allowed to edit all fields (of your organization)
- Members rights can be as restrictive or as open as you need them to be
- Let's try it out
- Request affiliation with the organization you just presented

Affiliate with an organization



- Go to your profile page (1)
- Request affiliation
 - Either use the AS number (2)
 - Or name and select (3)
 - Click on „Affiliate“ (4)
- Admin of organization gets an email if there is one. Otherwise PeeringDB support is informed
 - They check, and either approve or deny
 - Let PeeringDB support know if you do not receive an answer timely

Approve affiliation requests

Manage

Add Facility Add Network Add Exchange Users Permissions

Users requesting affiliation

Name User	Email Confirmed	Date	
Wolfgang Tremmel wtremmel	wolfgang.tremmel@de-cix.net Yes	2018, Dec. 14	<button>Approve</button> <button>Deny</button>

Users in Organization

Name User	Email	Group	
Adam Smith asmith	asmith@garf.de	admin	<button>Remove</button> <button>Save</button>

- Go to your organization page
- Scroll down to the „manage“ section
- Click on the „Users“ tab
- Either approve or deny new users

User administration

Manage

Add Facility Add Network Add Exchange **Users** Permissions

Users requesting affiliation

Name	Email	Date
User	Confirmed	

Currently no users requesting affiliation with ACME Alternative Hosting Inc.

Users in Organization

Name	Email	Group
Adam Smith asmith	asmith@garf.de	admin
Wolfgang Tremmel wtremmel	wolfgang.tremmel@de-cix.net	member

Remove **Save**



- Users can be admins or members
- Use the dropdown to change
- For members – you can add permissions
- Use the permissions tab to grant create, update and/or delete permission to any entity
- Do not forget to „save“ your changes

Manage

Add Facility Add Network Add Exchange **Users** Permissions

Here you can grant permissions to regular members of your organization. Administrative users are not listed here as they have access to everything by default. Additionally, entities that are pending review cannot be permissioned out to users, and will not appear in the entity list.

Wolfgang Tremmel <wolfgang.tremmel@de-cix.net> wtremmel	Create	Update	Delete
<input checked="" type="checkbox"/> Any Exchange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Any Facility			
Any Network			
Facility - ACME Alternative Datacenter			
Network - ACME Alternative Hosting			
Organization and all Entities it owns			

Add **Save**

Removing Users

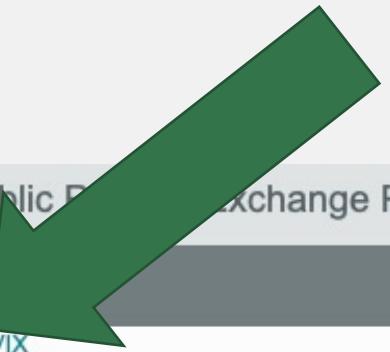
The screenshot shows the 'Manage' section of the PeeringDB website. The 'Users' tab is selected. There are two sections: 'Users requesting affiliation' (empty) and 'Users in Organization'. Under 'Users in Organization', there are two users: 'Adam Smith' (email: asmith@garf.de, group: admin) and 'Wolfgang Tremmel' (email: wolfgang.tremmel@de-cix.net, group: member). For Wolfgang Tremmel, there are 'Remove' and 'Save' buttons.

Name User	Email Confirmed	Date
Currently no users requesting affiliation with ACME Alternative Hosting Inc.		

Name User	Email	Group
Adam Smith asmith	asmith@garf.de	admin
Wolfgang Tremmel wttremmel	wolfgang.tremmel@de-cix.net	member

- Be sure you are logged in as an admin
- Go to your organization page
- Scroll down to the „manage“ section
- Click on the „Users“ tab
- Click on „Remove“ on the right side
- The user is only deleted from your organization
- If you want to remove a user completely, email PeeringDB support

More removing...



Public IP Exchange Points

Exchange Points	IPv4	Speed
VIX 64501	192.203.0.222 2001:7f8:30:0:1:1:6:fbff	RS Peer <input checked="" type="checkbox"/>

Exchange

Local ASN: 64501

IPv4:

IPv6:

Speed (mbit/sec): 0

RS Peer:

Add Exchange Point

- If you leave an internet exchange:
 - please remove your peering IP addresses
- Go to your network page
- Click on „Edit“ (top right)
- Click on the  beside the entry of the exchange
- Confirm and do not forget to „Save“

More removing...

- Facilities, Contacts, all the same
- Click on „Edit“
- Click on the remove symbol at the entry
- Click on “Save“
- Remember that **you must have a technical contact when connected to an IXP**

Private Peering Facilities	
Facility ▾	ASN
<input checked="" type="checkbox"/> ITandTEL TechCenter Linz	
	64501
<input checked="" type="checkbox"/> Klagenfurt Stadtwerke	
	64501
Facility	

Contact Information	
Role ▾	Name Visibility
<input checked="" type="checkbox"/> Abuse	Abuse Desk
	Public
Role	

Removing – more information

- Objects are only *marked deleted, but stay in the DB*
 - Facilities and IXes only can be removed if they don't have participants
- *You cannot simply re-add them*
- Please contact support@peeringdb.com if you need help

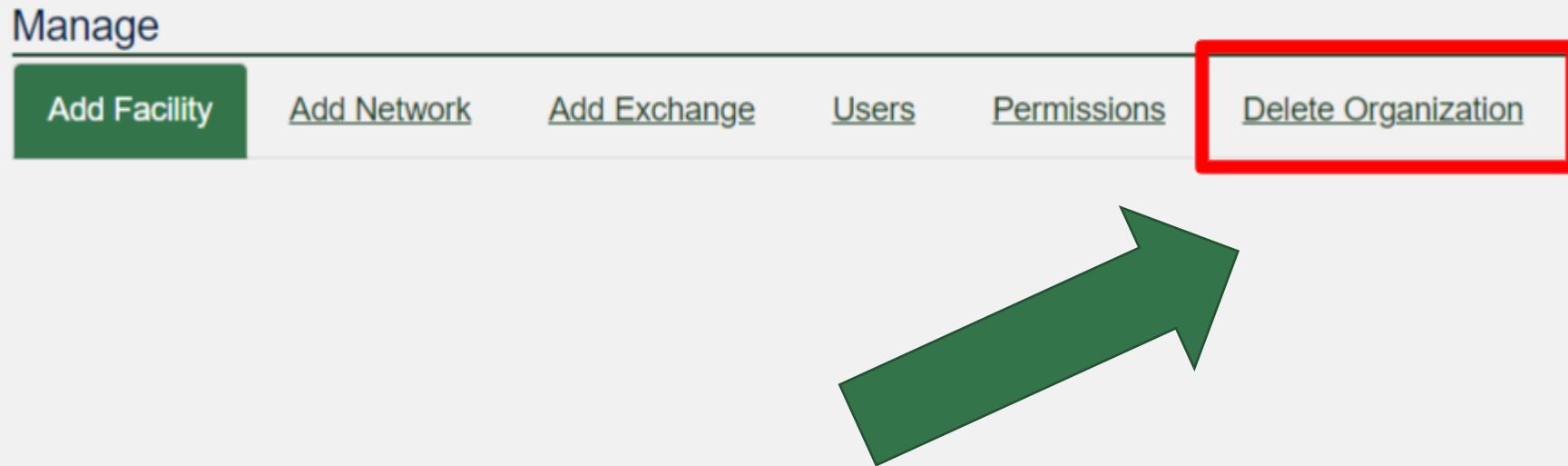
The screenshot shows the PeeringDB web application interface. At the top, there are two sections: 'Facilities' and 'Networks'. Both sections have a 'Name' dropdown menu and a 'Filter' button. In the 'Facilities' section, there is one entry: 'ACME Alternative Datacenter' with 'Country' set to 'Austria' and 'City' set to 'Vienna'. In the 'Networks' section, there is one entry: 'ACME Alternative Hosting' with 'ASN' set to '64501'. A large green arrow points from the bottom left towards the 'ACME Alternative Datacenter' entry in the Facilities list.

Facilities	
Name ▾	Country
<input checked="" type="checkbox"/> ACME Alternative Datacenter	Austria
	Vienna

Networks	
Name ▾	ASN
<input checked="" type="checkbox"/> ACME Alternative Hosting	64501

Removing your organization

- If you dissolve your organization
 - You first have to „empty“ your Ixes, Network and Facilities
- Please contact support@peeringdb.com if you need help





PeeringDB

The PeeringDB API

Workshop // Track 3

arnold@peeringdb.com

Agenda

- Please always use the tutorial DB at <https://tutorial.peeringdb.com>
- Introduction
- jq
- JSON
- HTML Operations
- Record Types
 - Basic Records
 - Derived Records

Introduction

- Why API (Application Programming Interface)?
 - The GUI is nice for human beings
 - Automation needs structured data
- Makes it easy to integrate PeeringDB in your environment

- Light-weight and flexible command-line processor
- awk, sed and grep equivalent to JSON data
- A jq program is a filter
 - Needs an input and produces an output
 - Maybe piped
 - Looks weird sometimes, like „add/length“ produces average of an array
 - Simplest filter is „.“ which is the Identity
 - Can be used to pretty print JSON output
- See <https://stedolan.github.io/jq/manual> for an introduction
- Ex: `curl -sG https://peeringdb.com/api/org --data-urlencode fields=id | jq -c '[.data[] | .id] | length'`

JSON

- Open standard file format
- Short for JavaScript Object Notation
- Filenames use the extension .json
- Language independent data format
- Basic data types
 - Number
 - String
 - Boolean
 - Array
 - Object
 - null

```
{  
  "firstName": "John",  
  "lastName": "Smith",  
  "isAlive": true,  
  "age": 27,  
  "address": {  
    "streetAddress": "21 2nd Street",  
    "city": "New York",  
    "state": "NY",  
    "postalCode": "10021-3100"  
  },  
  "phoneNumbers": [  
    {  
      "type": "home",  
      "number": "212 555-1234"  
    },  
    {  
      "type": "office",  
      "number": "646 555-4567"  
    },  
    {  
      "type": "mobile",  
      "number": "123 456-7890"  
    }  
  "children": [],  
  "spouse": null  
}
```

Basics

- In general <https://peeringdb.com/api/OBJ>
 - OBJ is case insensitive
 - So-called endpoint: /api/OBJ
- Output always fits in one object
 - Meta is optional
 - Data always is an array

```
{  
  meta:  
    {  
      status:  
      message:  
    }  
  data:  
    [  
      {},  
      {}  
    ]  
}
```

Authentication

- Authentication
 - basic HTTP authorization
 - API keys
- Guest access does not need any authentication
- Examples
 - curl -sG <https://username:password@peeringdb.com/api/poc>
 - curl -u username:password <https://peeringdb.com/api/poc>
 - Put credentials in ~/.netrc
 - machine peeringdb.com login *username* password *password*
- Recap: only access to contact information may be restricted
 - Endpoint /api/poc
 - You need to be authenticated to view/retrieve objects with visibility „Users“

Operations

- All HTML operations are supported
 - GET
 - Requests a representation of the specified resource
 - POST
 - Used to submit an entity to the specified resource
 - PUT
 - Replaces all current representations of the target resource with the request payload
 - DELETE
 - Deletes the specified resource

GET

- GET
 - Multiple objects
 - Endpoint /api/OBJ
 - Single object
 - Endpoint /api/OBJ/id

Optional URL parameters for GET

- **limit**
 - Integer value
 - Limits to n rows in the result set
- **skip**
 - Integer value
 - Skips n rows in the result set
- **depth**
 - Integer value
 - Nested sets will be loaded
 - See Nesting slide

Optional URL parameters for GET

- **fields**
 - String value
 - comma separated list of field names
 - only matching fields will be returned in the data
- **since**
 - Integer value
 - Retrieve all objects updated since specified time
 - Unix timestamp in seconds
- **fieldname**
 - Integer or string value
 - Queries for fields with matching value

Nested Data / Depth

- Of type `OBJ_set`
- Example: `net_set` will hold network objects
- Depth (for endpoint `/api/OBJ`)
 - 0: don't expand anything (default)
 - 1: expand all first level sets to ids
 - 2: expand all first level sets to objects
- Depth (for endpoint `/api/OBJ/id`)
 - 0: don't exand anything
 - 1-4: expand all sets and related objects according to level of depth specified
 - 2 is default

Nested Data / Depth

<https://peeringdb.com/net/947?pretty>



<https://peeringdb.com/net/947?pretty&depth=0>

```
{  
  "meta": {},  
  "data": [  
    {  
      "id": 947,  
      "org_id": 1187,  
      "name": "DE-CIX Frankfurt Route Servers",  
      "aka": "DE-CIX",  
      "website": "https://fra.de-cix.net",  
      "asn": 6695,  
      "looking_glass": "https://lg.de-cix.net",  
      "route_server": "https://www.de-cix.net/en/locations/germany/frankfurt/routeserver-gu",  
      "irr_as_set": "AS-DECIX",  
      "info_type": "Route Server",  
      "info_prefixes4": 240000,  
      "info_prefixes6": 50000,  
      "info_traffic": "1 Tbps+",  
      "info_ratio": "Balanced".  
    }]
```

```
{  
  "meta": {},  
  "data": [  
    {  
      "id": 947,  
      "org_id": 1187,  
      "org": {  
        "id": 1187,  
        "name": "DE-CIX Management GmbH",  
        "website": "https://de-cix.net",  
        "notes": ""},  
      "net_set": [  
        947,  
        5547,  
        6978,  
        6979,  
        8383,  
        8703,  
        8919,  
        8920,  
        9840,  
        9841,  
        10018,  
        13190,  
        13251,  
        19331,  
        20739  
      ],  
      "fac_set": [],  
      "ix_set": [  
        31,  
        74,  
        248,  
        804,  
        1131,  
        1149,  
        1150,  
        1214,  
        1249,  
        1277,  
        2531  
      ],  
      "address1": "Lindleystr. 12",  
      "city": "Frankfurt am Main",  
      "state": "Hessen",  
      "country": "Germany",  
      "lat": 49.8917,  
      "lon": 8.5417  
    }]
```

Query modifiers

- numeric fields
 - __lt: less than
 - __lte: less than equal
 - __gt: greater than
 - __gte: greater than equal
 - __in: value inside set of values (comma separated)
- string fields
 - __contains: field value contains this value
 - __startswith: field value starts with this value
 - __in: value inside set of values (comma separated)

POST

- Used to create an object
- Endpoint /api/OBJ
- Required parameters
 - Depending on OBJ
 - For *org* you need the *name*
 - For *fac*, *ix*, *net* you need the *org_id*
 - For *fac* you need the *name*
 - For *ix* you need the *name* and *prefix*
 - For *net* you need the *asn*
- Example
 - curl -sn -X POST -H "Content-Type: application/json" -d @22106.json \ https://tutorial.peeringdb.com/api/org

```
{  
    "name": "Org-22106"  
}
```

File 22106.json

PUT

- Used to edit object
- Endpoint /api/OBJ/id
- Updates data in OBJ/id
- You have to send all the data, not just the change
- Example
 - curl -sn -X PUT -H "Content-Type: application/json" -d @22106.json \ https://tutorial.peeringdb.com/api/org/22114
- Operation of PUT is idempotent

```
{  
    "name": "Org-22106",  
    "address1": "23 Mulholland Drive",  
    "city": "Los Angeles",  
    "country": "US"  
}
```

File 22106.json

DELETE

- Used to delete objects
- Endpoint /api/OBJ/id
- Example
 - curl -sn -X DELETE -H "Content-Type: application/json" \ https://tutorial.peeringdb.com/api/org/22114

Object Types

- Basic Objects
 - org, fac, ix, net, poc, as_set
- Derived Objects
 - ixfac, ixlan, ixpfx, netixlan, netfac

Basic Objects

- org
 - Root object for fac, ix, net
 - Holds information about organisation
- fac
 - Describes a facility / colocation record
 - More useful information are in derived records ixfac and netfac
- ix
 - Describes an Internet Exchange
 - More useful information are in derived records ixlan, ixpx and netixlan
- net
 - Describes a network / ASN
 - More useful information are in netfac and netixlan
 - Root object for poc
- poc
 - Describes various role accounts (point of contact)
 - Currently only for net objects
- as_set
 - Array of all AS-SETS corresponding to networks/ASNs

Derived Objects

- **ixfac**
 - Describes the availability of an IX in a facility
- **ixlan**
 - Describes the LAN of an IX
 - Will go away with PeeringDB 3.0. Hence, already tightly coupled to ix (i.e. same id)
- **ixpfx**
 - Describes the IP range (IPv4 and IPv6) for an ixlan
 - One ixlan may have multiple ixpfx, both for IPv4 and IPv6
- **netixlan**
 - Describes the presence of a network at an IX
- **netfac**
 - Describes the presence of a network at a facility

GUI to API // org

- <https://peeringdb.com/org/1187>
- Add pretty and depth for human friendly output
- <https://peeringdb.com/api/org/1187>
- https://peeringdb.com/api/fac?org_id=1187
- https://peeringdb.com/api/net?org_id=1187
- https://peeringdb.com/api/ix/org_id=1187

DE-CIX Management GmbH Platinum Sponsor

Website: <https://de-cix.net>

Address 1: Lindleystr. 12

Address 2:

Location: Frankfurt am Main, Hessa, 60314

Country Code: DE

Notes:

org

Facilities

Name ▾ Country City

fac

No filter matches.
You may filter by Name, Country or City.

Networks

Name ▾ ASN

DE-CIX Academy Educational Network 196610

DE-CIX Dallas Route Servers 62499

DE-CIX Dusseldorf Route Servers 56890

DE-CIX Frankfurt Route Servers 6695

DE-CIX Hamburg Route Servers 43252

DE-CIX Istanbul Route Servers 20715

DE-CIX Lisbon Route Servers 43729

DE-CIX Madrid Route Servers 48793

DE-CIX Management GmbH net 51531

DE-CIX Marseille Route Servers 20717

DE-CIX Munich Route Servers 47228

DE-CIX New York Route Servers 63034

DE-CIX Palermo Route Servers 25083

DE-CIX R&D Measurement 205530

DE-CIX VoIP 57769

Exchanges

Name ▾ Country City

DE-CIX Dallas ix United States of America
Dallas

DE-CIX Dusseldorf Germany
Dusseldorf

DE-CIX Frankfurt Germany
Frankfurt

GUI to API // fac

- <https://peeringdb.com/fac/752>
- Add pretty and depth for human friendly output
- <https://peeringdb.com/api/fac/752>
- https://peeringdb.com/api/ixfac?fac_id=752
- https://peeringdb.com/api/netfac?fac_id=752

euNetworks Colocation Hamburg Edit

Organization	euNetworks Group fac
Website	http://www.euNetworks.com
Address 1	Wendenstraße 408
Address 2	
Location	Hamburg, 20537
Country Code	DE
Geocode	Updated geocode data for this entity will be obtained shortly
CLLI Code	
NPA-NXX	
Notes	

Local Exchanges Filter

Exchange ▾	Long Name	Networks
DE-CIX Hamburg	Deutscher Commercial Internet Exchange Hamburg	104
ECIX-HAM	European Commercial Internet Exchange Hamburg	60

Networks Filter

Peer Name ▾	ASN
euNetworks Group	13237
LWLcom GmbH	50629
OMCnet Internet Service GmbH	15388
Vodafone Global Network	1273
Vodafone Kabel Deutschland GmbH	31334

netfac

ixfac

GUI to API // net

- <https://peeringdb.com/net/13251>
- Add pretty and depth for human friendly output
- <https://peeringdb.com/api/net/13251>
- https://peeringdb.com/api/poc?net_id=13251
- https://peeringdb.com/api/netixlan?net_id=31
- OR <https://peeringdb.com/api/netixlan?asn=196610>
- https://peeringdb.com/api/netfac?net_id=13251
- OR
https://peeringdb.com/api/netfac?local_asn=196610

DE-CIX Academy Educational Network Platinum Sponsor
net

Some of the data on this page is incomplete, please update the fields marked with ⓘ to improve data quality.

Organization	DE-CIX Management GmbH	
Also Known As	DE-CIX	
Company Website	http://www.de-cix.net/academy	
Primary ASN	196610	
IRR as-set/route-set	AS196610:AS-DECIX-ACADEMY	
Route Server URL ⓘ		
Looking Glass URL ⓘ		
Network Type	Educational/Research	
IPv4 Prefixes	1	
IPv6 Prefixes	5	
Traffic Levels	0-20 Mbps	
Traffic Ratios	Balanced	
Geographic Scope	Regional	
Protocols Supported	<input checked="" type="radio"/> Unicast IPv4 <input type="radio"/> Multicast <input checked="" type="radio"/> IPv6	
Last Updated	2019-02-15T12:19:05Z	
Notes	<ul style="list-style-type: none">We only peer with the route serversAny peering request you send will be used for educational purposes	
PeeringDB Configuration		
Allow IXP Update	<input checked="" type="checkbox"/>	
Peering Policy Information		
Peering Policy ⓘ		
General Policy	Open	
Multiple Locations	Not Required	
Ratio Requirement	No	
Contract Requirement	Not Required	
Contact Information		
Role ▾	Name	Phone
Abuse	DE-CIX Abuse Department	abuse@de-cix.net
NOC	DE-CIX 24/7 NOC	+49 69 1730 902 11

netixlan

Public Peering Exchange Points Filter

Exchange ▾	IPv4	Speed
ASN	IPv6	RS Peer
DE-CIX Dusseldorf	185.1.58.105	100M
Peering LAN 196610	2001:7f8:9e:0:3:2:0:1	<input checked="" type="radio"/>
DE-CIX Frankfurt	80.81.196.61	1G
Peering LAN 196610	2001:7f8:3:2:0:1	<input checked="" type="radio"/>
DE-CIX Hamburg	80.81.203.11	100M
Peering LAN 196610	2001:7f8:3d:0:3:2:0:1	<input checked="" type="radio"/>
DE-CIX Munich	80.81.202.115	100M
Peering LAN 196610	2001:7f8:44:0:3:2:0:1	<input checked="" type="radio"/>
DE-CIX New York	206.82.104.220	100M
Peering LAN 196610	2001:504:36:0:3:2:0:1	<input checked="" type="radio"/>
MSK-IX Moscow	195.208.210.43	
MSK-IX peering network 196610	2001:7f8:20:101::210:43	<input checked="" type="radio"/>

Private Peering Facilities Filter

Facility ▾	Country	City
ASN		
Interxion Frankfurt (FRA1-12)	Germany	Frankfurt
196610		netfac

poc

GUI to API // ix

- <https://peeringdb.com/ix/31>

- Add pretty and depth for human friendly output
- <https://peeringdb.com/api/ix/31>
- https://peeringdb.com/api/ixlan?ix_id=31
- https://peeringdb.com/api/ixpfx?ixlan_id=31
- https://peeringdb.com/api/ixfac?ix_id=31
- https://peeringdb.com/api/netixlan?ix_id=31

DE-CIX Frankfurt Platinum Sponsor

Organization	DE-CIX Management GmbH
Long Name	Deutscher Commercial Internet Exchange
City	Frankfurt
Country	DE
Continental Region	Europe
Media Type	Ethernet
Protocols Supported	<input checked="" type="checkbox"/> Unicast IPv4 <input type="checkbox"/> Multicast <input checked="" type="checkbox"/> IPv6
Notes	For peering with the DE-CIX Frankfurt route servers, please see: DE-CIX Frankfurt Route Servers

Contact Information

ix

Company Website	https://fra.de-cix.net
Traffic Stats Website	https://www.de-cix.net/en/locations/germany/frankfurt/statistics
Technical Email	support@de-cix.net
Technical Phone	+49 69 1730 902 11
Policy Email	sales@de-cix.net
Policy Phone	+49 69 1730 902 12

LANs

Filter

Name	DOT1Q	MTU
DE-CIX Frankfurt Peering LAN	<input type="radio"/>	1500
<input type="radio"/> Enable IX-F Import		

ixlan

Preview

IPv4 80.81.192.0/21
IPv6 2001:7f8::/64

ixpfx

Local Facilities

Filter

Facility ▾	Country	City
COLT DC Frankfurt	Germany	Frankfurt
Digital Realty FRA (Lyoner Strasse)	Germany	Frankfurt am Main
Digital Realty FRA (Wilhelm-Fay-	Germany	Frankfurt am

ixfac

Basic records in detail // ix and org

```
"data": [
  {
    "id": 31,
    "org_id": 1187,
    "name": "DE-CIX Frankfurt",
    "name_long": "Deutscher Commercial Internet Exchange",
    "city": "Frankfurt",
    "country": "DE",
    "region_continent": "Europe",
    "media": "Ethernet",
    "notes": "For peering with the DE-CIX Frankfurt route servers, please see:\n\n[DE
    "proto_unicast": true,
    "proto_multicast": false,
    "proto_ipv6": true,
    "website": "https://fra.de-cix.net",
    "url_stats": "https://www.de-cix.net/en/locations/germany/frankfurt/statistics",
    "tech_email": "support@de-cix.net",
    "tech_phone": "+49 69 1730 902 11",
    "policy_email": "sales@de-cix.net",
    "policy_phone": "+49 69 1730 902 12",
    "net_count": 805,
    "created": "2010-07-29T00:00:00Z",
    "updated": "2018-06-19T11:53:46Z",
    "status": "ok"
  }
]
```

```
"data": [
  {
    "id": 1187,
    "name": "DE-CIX Management GmbH",
    "website": "https://de-cix.net",
    "notes": "",
    "address1": "Lindleystr. 12",
    "address2": "",
    "city": "Frankfurt am Main",
    "country": "DE",
    "state": "Hessia",
    "zipcode": "60314",
    "created": "2006-11-01T23:37:13Z",
    "updated": "2017-07-02T00:03:27Z",
    "status": "ok"
  }
]
```

Basic records in detail // fac

```
"data": [
  {
    "id": 752,
    "org_id": 8540,
    "org_name": "euNetworks Group",
    "name": "euNetworks Colocation Hamburg",
    "website": "http://www.euNetworks.com",
    "clli": "",
    "rencode": "",
    "npanxx": "",
    "notes": "",
    "net_count": 5,
    "latitude": null,
    "longitude": null,
    "created": "2010-07-29T00:00:00Z",
    "updated": "2019-09-25T22:00:34Z",
    "status": "ok",
    "address1": "Wendenstra\u00dfe 408",
    "address2": "",
    "city": "Hamburg",
    "country": "DE",
    "state": "",
    "zipcode": "20537"
  }
]
```

Basic records in detail // net and poc

```
    "data": [
      {
        "id": 13251,
        "org_id": 1187,
        "name": "DE-CIX Academy Educational Network",
        "aka": "DE-CIX",
        "website": "http://www.de-cix.net/academy",
        "asn": 196610,
        "looking_glass": "",
        "route_server": "",
        "irr_as_set": "AS196610:AS-DECIX-ACADEMY",
        "info_type": "Educational/Research",
        "info_prefixes4": 1,
        "info_prefixes6": 5,
        "info_traffic": "0-20 Mbps",
        "info_ratio": "Balanced",
        "info_scope": "Regional",
        "info_unicast": true,
        "info_multicast": false,
        "info_ipv6": true,
        "notes": "* We only peer with the route servers\n* Any peering request you send will be used for educational purposes",
        "policy_url": "",
        "policy_general": "Open",
        "policy_locations": "Not Required",
        "policy_ratio": false,
        "policy_contracts": "Not Required",
        "created": "2017-04-20T19:44:59Z",
        "updated": "2019-02-15T12:19:05Z",
        "status": "ok"
      }
    ],
    {
      "id": 25826,
      "net_id": 13251,
      "role": "Policy",
      "visible": "Users",
      "name": "Wolfgang Tremmel",
      "phone": "",
      "email": "academy@de-cix.net",
      "url": "",
      "created": "2018-07-24T09:26:21Z",
      "updated": "2018-07-24T09:26:21Z",
      "status": "ok"
    },
    ...
  ]
```

Basic records in detail // as_set

```
{  
  "meta": {},  
  "data": [  
    {  
      "196610": "AS196610:AS-DECIX-ACADEMY",  
      "262150": "AR-EPEC2-LACNIC",  
      "393223": "AS-CWICA",  
      "32780": "AS-HSI",  
      "196621": "AS196621:AS-CUSTOMERS",  
      "327698": "AS-327698",  
      "32787": "AS-PROLE",  
      "327700": "AFRINIC",  
      "32798": "RS-USCS-ALL",  
      "5467": "AS-MIPT",  
      "32806": "AS27822",  
      "32808": "AS-UTBB",  
      "42": "AS-PCH",  
      "262189": "LACNIC",  
      "46": "AS-RUTGERS",  
      "262195": "AS-ITXAR1",  
      "393269": "AS-DAILYMOTIONUS",  
      "57": "AS-NLG-PARTICIPANTS",  
      "327740": "ORG-TA38-AFRINIC",  
      "62": "AS-C1",  
      "393280": "AS393280 in Level3",  
      "72": "AS-SLB",  
      "327754": "AS-RMS-Powertronics",  
      "327693": "AfriNIC::AS-ECHOSP/RS-ECHOSP",  
      "01": "AS-MCRENQAPTM"  
    }  
  ]  
}
```

```
{  
  "meta": {},  
  "data": [  
    {  
      "42": "AS-PCH"  
    }  
  ]  
}
```

<https://peeringdb.com/api/as-set/42>

<https://peeringdb.com/api/as-set>

Derived records in detail // ixfac, ixlan and ixpfx

```
"data": [
  {
    "id": 41,
    "ix_id": 26,
    "fac_id": 63,
    "created": "2010-07-29T00:00:00Z",
    "updated": "2016-03-14T20:33:57Z",
    "status": "ok"
  }
]
```

```
{
  "id": 31,
  "ix_id": 31,
  "name": "DE-CIX Frankfurt Peering LAN",
  "descr": "",
  "mtu": 1500,
  "dot1q_support": false,
  "rs_asn": 0,
  "arp_sponge": null,
  "created": "2010-07-29T00:00:00Z",
  "updated": "2018-07-08T10:22:35Z",
  "status": "ok"
}
```

```
{
  "id": 312,
  "ixlan_id": 31,
  "protocol": "IPv6",
  "prefix": "2001:7f8::/64",
  "created": "2011-06-22T00:00:00Z",
  "updated": "2016-03-14T21:57:28Z",
  "status": "ok"
}
```

Derived records // netfac and netixlan

```
{  
  "id": 30451,  
  "name": "Interxion Frankfurt (FRA1-13)",  
  "city": "Frankfurt",  
  "country": "DE",  
  "net_id": 13251,  
  "fac_id": 58,  
  "local_asn": 196610,  
  "created": "2018-07-24T09:25:24Z",  
  "updated": "2018-07-24T09:25:24Z",  
  "status": "ok"  
}
```

```
{  
  "id": 163,  
  "net_id": 5  
  "ix_id": 31  
  "name": "DE-CIX Frankfurt: DE-CIX Frankfurt Peering LAN",  
  "ixlan_id": 31,  
  "notes": "",  
  "speed": 20000,  
  "asn": 3303,  
  "ipaddr4": "80.81.193.183",  
  "ipaddr6": "2001:7f8::ce7:0:2",  
  "is_rs_peer": true,  
  "created": "2010-07-29T00:00:00Z",  
  "updated": "2019-01-18T11:19:59Z",  
  "status": "ok"  
},
```

Example: peer information at an IXP

Q. Δ $x+y = ab+bc$ $c(x,y) \left\{ \begin{array}{l} cx - cy = ab^2 \\ 2\pi = c \end{array} \right.$ Δ

$\boxed{A=B}$ $A_2 T B_3$ $24 \frac{x}{y} + \frac{a^2 + b^2}{c} + \vec{x} \cdot \vec{y}$

$c = 9ab + 1$

men = $584 + n^{av}$ $(x^2 + 35x + c^2)$

$x = 9.20$ $\sum_{x=2}^{u=14} N_{30} \cdot x - \frac{1}{2} [964 + x^2 + p \cdot b]$

$x \leq 949$

Example: peer information at an IXP

```
(server0:global 5032 )curl -sG https://www.peeringdb.com/api/netixlan \
? --data-urlencode ix_id=31 | jq -r '.data[] | .asn, .ipaddr4, .ipaddr6' | \
? paste - - - | sort -n
42      80.81.194.42    2001:7f8::2a:0:1
112     80.81.195.77    2001:7f8::70:0:1
553     80.81.192.175   2001:7f8::229:0:1
553     80.81.194.106   2001:7f8::229:0:2
559     80.81.196.147   2001:7f8::22f:0:1
680     80.81.192.222   2001:7f8::2a8:0:1
680     80.81.193.222   2001:7f8::2a8:0:2
702     80.81.193.1     2001:7f8::2be:0:2
714     80.81.193.202   2001:7f8::2ca:0:1
714     80.81.193.223   2001:7f8::2ca:0:2
714     80.81.194.161   2001:7f8::2ca:0:3
714     80.81.194.171   2001:7f8::2ca:0:4
1239    80.81.192.121   2001:7f8::4d7:0:1
1241    80.81.192.90    2001:7f8::4d9:0:4
1241    80.81.193.231   2001:7f8::4d9:0:2
1241    80.81.194.129   2001:7f8::4d9:0:1
1241    80.81.195.130   2001:7f8::4d9:0:3
1248    80.81.194.17    2001:7f8::4e0:0:1
1257    80.81.196.81    2001:7f8::4e9:0:1
1267    80.81.192.215   2001:7f8::4f3:0:1
1267    80.81.193.215   2001:7f8::4f3:0:2
1273    80.81.192.33    2001:7f8::4f9:0:1
```

Example: peer information at an IXP

```
nipper@server0:~$ NETIDS=$(curl -sG https://www.peeringdb.com/api/netixlan \  
--data-urlencode ix_id=31 --data-urlencode fields=net_id | jq -r '[.data[] | .net_id] | unique | @csv')  
nipper@server0:~$  
nipper@server0:~$ curl -sG https://www.peeringdb.com/api/net --data-urlencode id_in=$NETIDS --data-urlen  
code fields=asn,irr_as_set | jq -r '.data[] | .asn, .irr_as_set' | paste - - | sort -n  
42      RADB::AS-PCH  
112     AS112  
553     AS-BELWUE  
559     RIPE::AS-SWITCH  
680     AS-DFNTOWINISP  
702  
714     AS-APPLE  
1239    AS1239:AS-CUSTOMERS  
1241    AS-FORTHNET AS-FORTHNET-V6  
1248    AS-HERE  
1257    AS-TELE2  
1267    AS-WINDTRE  
1273    RIPE::AS1273:AS-CWW RIPE::AS1273:AS-CWW-V6
```

Example: peer information at an IXP

```
nipper@server0:~$ NETIDS=$(curl -sG https://www.peeringdb.com/api/netixlan \
--data-urlencode ix_id=31 --data-urlencode fields=net_id | jq -r '[.data[] | .net_id] | unique | @csv')
nipper@server0:~$ 
nipper@server0:~$ curl -snG https://www.peeringdb.com/api/poc --data-urlencode net_id_in=$NETIDS --data-
urlencode role="Policy" --data-urlencode fields=email,net_id --data-urlencode visible="Public" | jq -r '.
data[] | .net_id, .email' | paste - - | sort -n
14      peering@gtt.net
115     peering.de@telefonica.com
118     robert.wurzer@bt.com
179     peering@is.co.za
186     engineering@quickline.net
217     peering@bsonetwork.com
236     peeringTM@tm.com.my
341     peering@verizon.com
475     ip@oteglobe.gr
620     esther.fernandez@telxius.com
620     noelia.silva@telxius.com
678     peering@network.leaseweb.com
694     peering@microsoft.com
700     peering@globalconnect.net
```

64501

A

Peering DB Training Sheet

Your AS number: 64501

Your company name: ACME Alternative Hosting

ACME Alternative Hosting is an Austrian hosting provider with a presence in Vienna, Linz and Klagenfurt. Your traffic profile is mainly outgoing, usually about 200Mbps. You announce via BGP in IPv4 one /24, one /22 and one /18. On IPv6 you announce a /32 and two /48s. As a hosting provider, you have an open peering policy; you are very eager to handle your traffic via peering instead of your three upstream providers.

You take abuse handling seriously; your abuse department is reachable 24/7 at abuse@acme.example for everybody. Your NOC is only reachable for peers and customers at noc@acme.example and via phone at +43 1 2341668

You are connected with 1G to the Vienna Internet Exchange at Interxion Vienna with IPv4 192.203.0.222 and IPv6 2001:7f8:30:0:1:1:6:fbf5. You are at the only data centre in Linz; in Klagenfurt, you are at Stadtwerke.

Please put the above Information into PeeringDB.

64502

B

Peering DB Training Sheet

Your AS number: 64502

Your company name: Belgian Box

Belgian Box is a Belgian DSL provider with a presence in Brussels. Your traffic profile is mainly incoming, usually about 500Mbps. You announce via BGP in IPv4 one /19 and one /21. On IPv6, you announce a /32.

You have an open peering policy; you are very eager to handle your traffic via peering instead of your two upstream providers.

You have a contact for abuse at abuse@box.example for everybody. Your NOC is only reachable for peers and customers at noc@box.example (you do not have a phone contact for your NOC), and you also have an address for press enquiries at publicrelations@box.example.

You are connected with 2G to BNIX at Interxion Brussels with IPv4 194.53.172.254 and IPv6 2001:7f8:26::a500:fbf6:1.

Please put the above Information into PeeringDB.

64503

C

Peering DB Training Sheet

Your AS number: 64503

Your company name: Charles Townsend Consultants

CTC is a Czech consulting agency with a presence in Prague and Brno. Your traffic profile is balanced in and out, usually about 100Mbps, mainly shop systems for your customers. You announce via BGP in IPv4 one /24 and one /23. On IPv6, you announce three /48s. You have a selective peering policy; you want to peer with eyeball networks but not with content providers.

You have a contact for abuse at abuse@ctc.example for your peers.

Your NOC is only reachable for peers and customers at

noc@ctc.example (you do not have a phone contact for your NOC).

You also have a sales contact at info@ctc.example.

You are connected with 1G to NIX.CZ at GTS Telehouse with IPv4 91.210.16.254 and IPv6 2001:7f8:14::fbf7:1. In Brno you are present at DC Kounicova.

Please put the above Information into PeeringDB.

64504

D

Peering DB Training Sheet

Your AS number: 64504

Your company name: Data Shifters

Data Shifters is a Danish backbone operator in Copenhagen and Aarhus. Your traffic profile is balanced in and out, usually about 100Gbps. You announce via BGP in IPv4 three /16s and 20 /24s. On IPv6, you announce one /32 and ten /48s. You also provide transit to 8 other ASes, and your AS Macro is AS64504:AS-DS.

As a backbone provider, you have a restrictive peering policy, require a traffic level of at least 1Gbps balanced traffic for peering.

You have a contact for abuse at abuse@ds.example for your peers.

Your NOC is only reachable for peers and customers at

noc@ds.example (you do not have a phone contact for your NOC).

You also have a sales contact at info@ds.example.

You are connected to DIX with 100G at Interxion with IPv4 192.38.7.253 and IPv6 2001:7f8:1f::fbf8:0:2. In Aarhus, you are present at Global Connect.

Please put the above Information into PeeringDB.

64505

E

Peering DB Training Sheet

Your AS number: 64505

Your company name: Electric Dreams

Electric Dreams is an Estonian web agency with a presence in Tallinn. Your traffic profile is mainly out, usually about 10Gbps. You announce via BGP in IPv4 one /24 and one /18. On IPv6, you announce three /48s.

You have an open peering policy; you are very eager to handle your traffic via peering instead of your two upstream providers.

You have a public contact for abuse at abuse@ed.example and sales at sales@ed.example. Your NOC is only reachable for peers and customers at noc@ed.example (you do not have a phone contact for your NOC).

You are connected to DIX with 100G at Interxion with IPv4 192.38.7.254 and IPv6 2001:7f8:1f::fbf8:0:1. In Aarhus, you are present at Global Connect.

Please put the above Information into PeeringDB.

64506

F

Peering DB Training Sheet

Your AS number: 64506

Your company name: Forever Young

Forever Young is a French DSL provider in Paris and Marseille. Your traffic profile is mainly incoming, usually about 5Gbps. You announce via BGP in IPv4 one /16 and one /17. On IPv6, you announce one /32. You have a restrictive peering policy; you peer with content providers and CDNs but not with other eyeball providers.

You have a contact for abuse at abuse@forever.example for your peers only and press enquiries at press@forever.example. Your NOC is only reachable for peers and customers at noc@forever.example (you do not have a phone contact for your NOC).

You are connected to DE-CIX Marseille with 10G at Interxion with IPv4 185.1.47.254 and IPv6 2001:7f8:36::fbfa:0:1. In Paris, you are present at Interxion Paris 6.

Please put the above Information into PeeringDB.

64507

G

Peering DB Training Sheet

Your AS number: 64507

Your company name: Golf Partners

Golf Partners is a German nationwide DSL provider in Frankfurt and Hamburg. Your traffic profile is mainly incoming, usually about 25Gbps. You announce via BGP in IPv4 one /12 and one /17. On IPv6, you announce one /32 and three /48s.

As a DSL provider, you have a very restrictive peering policy, and you peer only with content providers and CDNs.

You have a contact for abuse at abuse@golf.example for your peers only. Your NOC is only reachable for peers and customers at noc@golf.example and via phone at +49 1631737743

You are connected to DE-CIX Frankfurt with 40G at Interxion FRA1-15 with IPv4 80.81.197.253 and IPv6 2001:7f8::fbfb:0:2. In Hamburg, you are present at Global Connect HAM1.

Please put the above Information into PeeringDB.

64508

H

Peering DB Training Sheet

Your AS number: 64508

Your company name: Hosting Inc.

Hosting Inc. is a Hungarian hosting provider with a presence in Budapest. Your traffic profile is mainly outgoing, usually about 400Mbps. You announce via BGP in IPv4 one /21 and one /22. On IPv6, you announce two /48s.

As a hosting provider, you have an open peering policy. You are very eager to handle your traffic via peering instead of your two upstream providers.

You have a contact for abuse at abuse@golf.example for your peers only. Your NOC is only reachable for peers and customers at noc@golf.example and via phone at +49 1631737743

You are connected to DE-CIX Frankfurt with 40G at Interxion FRA4 with IPv4 80.81.197.254 and IPv6 2001:7f8::fbfb:0:1. In Hamburg, you are present at Global Connect HAM1.

Please put the above Information into PeeringDB.

64509

Peering DB Training Sheet

Your AS number: 64509

Your company name: Island Computing

Island Computing is an Italian nationwide backbone provider in Milan and Rome. Your traffic profile is balanced, usually about 4Gbps. You announce via BGP in IPv4 one /14 and eight /24s. On IPv6, you announce two /48s and one /32.

As a nationwide backbone provider, you peer with anyone not from Italy.

You have a contact for abuse at abuse@island.example for your peers only. Your NOC is only reachable for peers and customers at noc@island.example, and your sales team is happy to sell paid peering for Italian providers at sales@island.example.

You are connected to Milan Internet Exchange with 10G at Caldera21 with IPv4 217.29.66.249 and IPv6 2001:7f8:b:100:1d1:a5d6:4509:254. In Rome, you are at Interxion ROM1.

Please put the above Information into PeeringDB.

64510

L

Peering DB Training Sheet

Your AS number: 64510

Your company name: LuxRoute Inc.

LuxRoute Inc. is a Luxembourg web hosting provider with a presence in Luxembourg and Frankfurt. Your traffic profile is heavily outgoing, usually about 500Mbps. You announce via BGP in IPv4 one /21 and two /24s. On IPv6, you announce two /48s.

You have an open peering policy and are eager to win new peers.

You have a public contact for abuse at abuse@luxroute.example. Your NOC is only reachable for peers and customers at noc@luxroute.example.

You are connected to LU-CIX with 1G at Luxconnect DC2 with IPv4 188.93.171.254 and IPv6 2001:7f8:4c::fbfe:1. In Frankfurt, you are at Interxion FRA1-15.

Please put the above Information into PeeringDB.

64511

N

Peering DB Training Sheet

Your AS number: 64511

Your company name: Netherlands Best

Netherlands Best is a Dutch business provider with a presence in Amsterdam and The Hague. Your traffic profile is balanced, usually about 1Gbps. You announce via BGP in IPv4 5 /24s and one /21. On IPv6, you announce one /32 and two /48s.

You have an open peering policy but require your peers to have 24h abuse and NOC reachability.

You have a public 24h contact for abuse at abuse@thebest.example.
Your NOC is also reachable 24/7 for peers and customers at
noc@thebest.example.

You are connected to AMS-IX with 1G at Global Switch Amsterdam with IPv4 80.249.208.249 and IPv6 2001:7f8:1::fbff:1. In The Hague, you are at Data Facilities.

Please put the above Information into PeeringDB.

Peering DB Training Sheet

Your AS number: 64512

Your company name: Porto Hosting

Porto Hosting is a Portuguese hosting provider in Lisbon and Porto. Your traffic profile is mainly outgoing, usually about 3Gbps. You announce via BGP in IPv4 one /24 and one /22. On IPv6, you announce one /32.

You have an open peering policy but require your peers to have 24h abuse and NOC reachability.

You have a public contact for abuse at abuse@portohosting.example. Your NOC is reachable during business hours for peers and customers at noc@portohosting.example.

You are connected to GigaPIX with 1G at FCCN Lisbon SE03 with IPv4 193.136.250.254 and IPv6 2001:7f8:a::254. In Porto, you are at FCCN Oporto.

Please put the above Information into PeeringDB.

64513

R

Peering DB Training Sheet

Your AS number: 64513

Your company name: Russia Web Presences

Russia Web Presences is a Russian web hoster in Moscow and St. Petersburg. Your traffic profile is outgoing, usually about 2.5Gbps. You announce via BGP in IPv4 five /24s and one /21. On IPv6, you announce one /32.

You have an open peering policy but do not peer with other Russian providers.

You have a public contact for abuse at abuse@russiaweb.example.

Your NOC is reachable during business hours for peers and customers at noc@russiaweb.example.

You are connected to MSK-IX Moscow with 10G at Moscow M10 with IPv4 195.208.209.254 and IPv6 2001:7f8:20:101::209:254. In St. Petersburg, you are at Borovaya 57.

Please put the above Information into PeeringDB.

64514

S

Peering DB Training Sheet

Your AS number: 64514

Your company name: Sevilla Select ISP

Sevilla Select ISP is a Spanish residential DSL provider in Sevilla and Madrid. Your traffic profile is mainly incoming, usually about 12Gbps. You announce via BGP in IPv4 one /19 and two /24s. On IPv6, you announce one /32 and two /48s.

You have an open peering policy but do not peer other eyeball networks.

You have a public contact for abuse at abuse@select.example and sales at sales@select.example. Your NOC is only reachable for peers and customers at noc@select.example (you do not have a phone contact for your NOC).

You are connected to DE-CIX Madrid with 10G at Interxion MAD1 with IPv4 185.1.68.254 and IPv6 2001:7f8:a0::fc02:0:1. In Sevilla you are at Equinix SA1.

Please put the above Information into PeeringDB.

64515

Peering DB Training Sheet

Your AS number: 64515

Your company name: Istanbul Business Connect

Istanbul Business Connect is a Turkish business provider with a presence in Istanbul. Your traffic profile is more or less balanced, usually about 3Gbps. You announce via BGP in IPv4 one /24 and two /22s. On IPv6, you announce one /32 and one /48s.

You have an open peering policy but require that your peers have a 24/7 abuse desk and NOC.

You have a public contact for abuse at abuse@ibc.example and sales at sales@ibc.example. Your NOC is only reachable for peers and customers at noc@ibc.example (you do not have a phone contact for your NOC).

You are connected to DE-CIX Istanbul with 10G at MedNautilus with IPv4 185.1.48.254 and IPv6 2001:7f8:3f::fc03:0:1

Please put the above Information into PeeringDB.

64516

U

Peering DB Training Sheet

Your AS number: 64516

Your company name: Dubai BizConnect

Dubai BizConnect is a United Arab Emirates business provider with a presence in Dubai. Your traffic profile is more or less balanced, usually about 2.5Gbps. You announce via BGP in IPv4 one /16 and two /24s.

On IPv6, you announce one /32 and three /48s.

You only peer with providers who are not from your region.

You have a public contact for abuse at abuse@dbc.example. Your NOC is reachable for everybody at noc@dbc.example (you do not have a phone contact for your NOC).

You are connected to UAE-IX with 10G at Datamena with IPv4 185.1.8.254 and IPv6 2001:7f8:73::fc04:0:1. You also have a presence at Equinix Dubai DX1.

Please put the above Information into PeeringDB.

64517

V

Peering DB Training Sheet

Your AS number: 64517

Your company name: Sofia Web

Sofia Web is a Bulgarian web hoster with a presence in Sofia. Your traffic profile is heavy outgoing, usually about 15Gbps. You announce via BGP in IPv4 two /16s and four /24s. On IPv6, you announce one /32 and eight /48s.

You have an open peering policy.

You have a public contact for abuse at abuse@sofiaweb.example.

Your NOC is only reachable for customers at noc@sofiaweb.example (you do not have a phone contact for your NOC).

You are connected to BIX with 20G at Evolink SO1 with IPv4 193.169.199.252 and IPv6 2001:7f8:58::fc05:0:252. You also have a presence at Equinix SO1.

Please put the above Information into PeeringDB.

64518

W

Peering DB Training Sheet

Your AS number: 64518

Your company name: Pint Size Hosting

Pint Size Hosting is a British colocation provider in London and Manchester. Your traffic profile is mainly outgoing, usually about 25Gbps. You announce via BGP in IPv4 one /21 and six /24s. On IPv6, you announce one /32 and three /48s.

You have an open peering policy.

You have a public contact for abuse at abuse@pint.example. Your NOC is reachable for customers and peers at noc@pint.example (you do not have a phone contact for your NOC).

You are connected to Lonap with 20G at Telehouse East with IPv4 5.57.80.251 and IPv6 2001:7f8:17::fc06:1. You also have a presence in Manchester at M247 Ball Green.

Please put the above Information into PeeringDB.

64519

X

Peering DB Training Sheet

Your AS number: 64519

Your company name: Stockholm Online

Stockholm Online is a Swedish DSL provider in Stockholm and Gothenburg. Your traffic profile is mainly incoming, usually about 12Gbps. You announce via BGP in IPv4 one /16 and two /24s. On IPv6, you announce one /32 and two /48s.

You have an open peering policy.

You have a public contact for abuse at abuse@s-online.example. Your NOC is reachable for customers only at noc@s-online.example (you do not have a phone contact for your NOC).

You are connected to Netnod Stockholm with 10G at Interxion STO2 with IPv4 194.68.123.253 and IPv6 2001:7f8:d::249. You also have a presence in Gothenburg at SHG5.

Please put the above Information into PeeringDB.

64520

Y

Peering DB Training Sheet

Your AS number: 64520

Your company name: Gruezi Data Hosting

Gruezi Data Hosting is a Swiss Webhosting provider in Zurich and Geneva. Your traffic profile is heavily outgoing, usually about 45Gbps. You announce via BGP in IPv4 two /16s and one /24. On IPv6, you announce one /32 and one /48s.

You have an open peering policy.

You have a public contact for abuse at abuse@gruezi.example. Your NOC is reachable for everybody only at noc@gruezi.example (you do not have a phone contact for your NOC).

You are connected to SwissIX Zurich with 100G at Interxion Zurich with IPv4 91.206.52.239 and IPv6 2001:7f8:24:ff::fe. You also have a presence in Geneva at CERN.

Please put the above Information into PeeringDB.

API Exercises

Please use <http://16.163.138.205:9001> - <http://16.163.138.205:9020> if you don't have a Unix shell at hand.

Heads up:

- **always provide '-H "accept: application/json" -H "Content-Type: application/json"' to curl when POSTing or PUTing!**
- **create your directory first and cd**
- **Webshells are only available during Tutorials and are shut down after the tutorial ends**

Create an object and re-read

- use data from Track 2 Training Sheets, or use ASN > 64520
- What is the output from the **create (POST)** call?
- What is the output from the **get (GET)** call?

Modify an object and reread

- What is the output from the **modify (PUT)** call?

Delete an object

- What is the output from the **delete (DELETE)** call?

Specific exercises

- How many **org** objects are in PeeringDB?
- How many networks (**net**) does Google LLC (org_id=574) have?
- How many Internet exchanges (hint: use **netixlan**) does ASN 15169 peer?
- What is the total peering capacity (hint: use **speed** of **netixlan** object) of ASN 15169?
- How many European Internet exchanges does ASN 15169 peer?
- Compile a list (asn, ipv4, ipv6) (hint: use **netixlan** object) of participants at IX.br (PTT.br) São Paulo
- *Propose actions to be done*