

# The journey from the heart of Europe

**Marian Rychtecký**

**INEX, Dublin September 12, 2024**



# Journey #1 - Personal

- In 2013 I started as Network Analyst IV in Mallinckrodt Pharmaceuticals – Prague looking after the EMEA region
- In 2016 Mallinckrodt decided to build the production facility in Dublin



# Journey begins



# Journey begins

The task was to

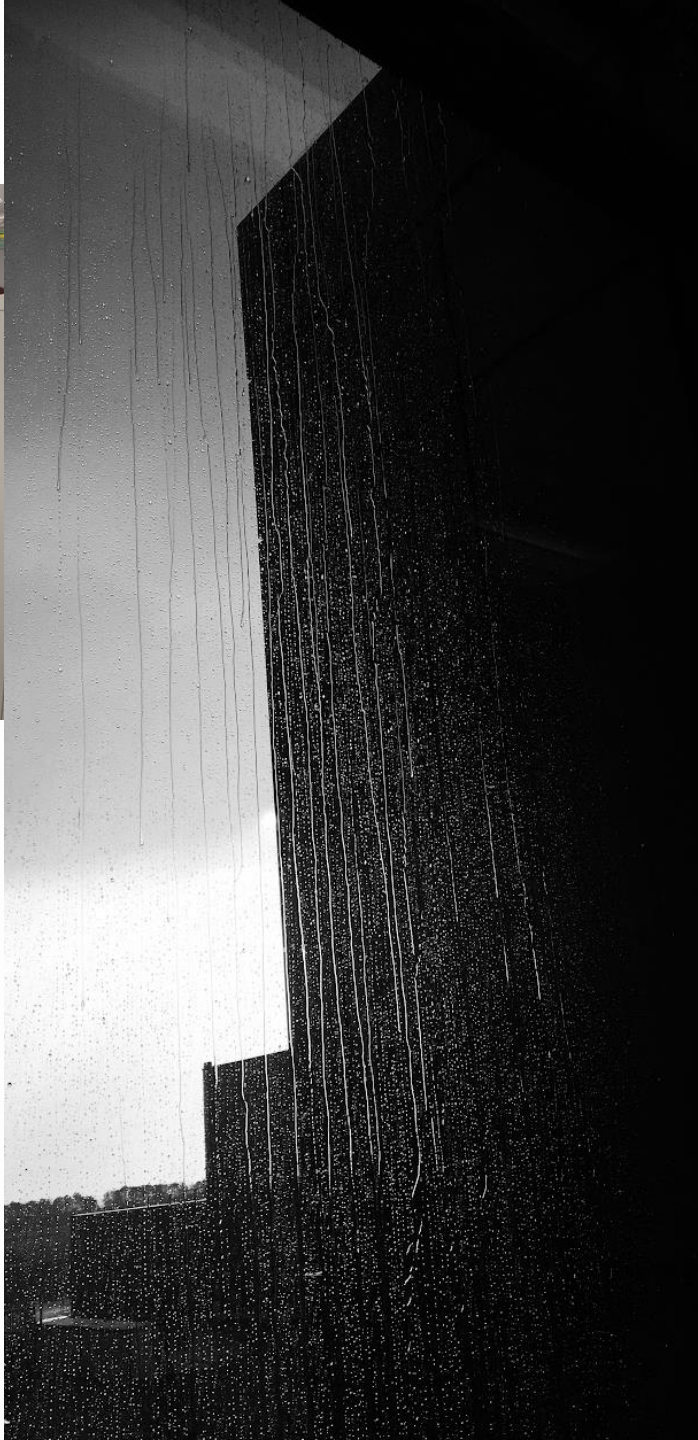
- Design
- Build
- Configure
- Maintain







# Journey ends in 2019



# Final flight to Dublin





# One journey ends, but another one begins



**In 2019 starting as CTO at NIX.CZ**

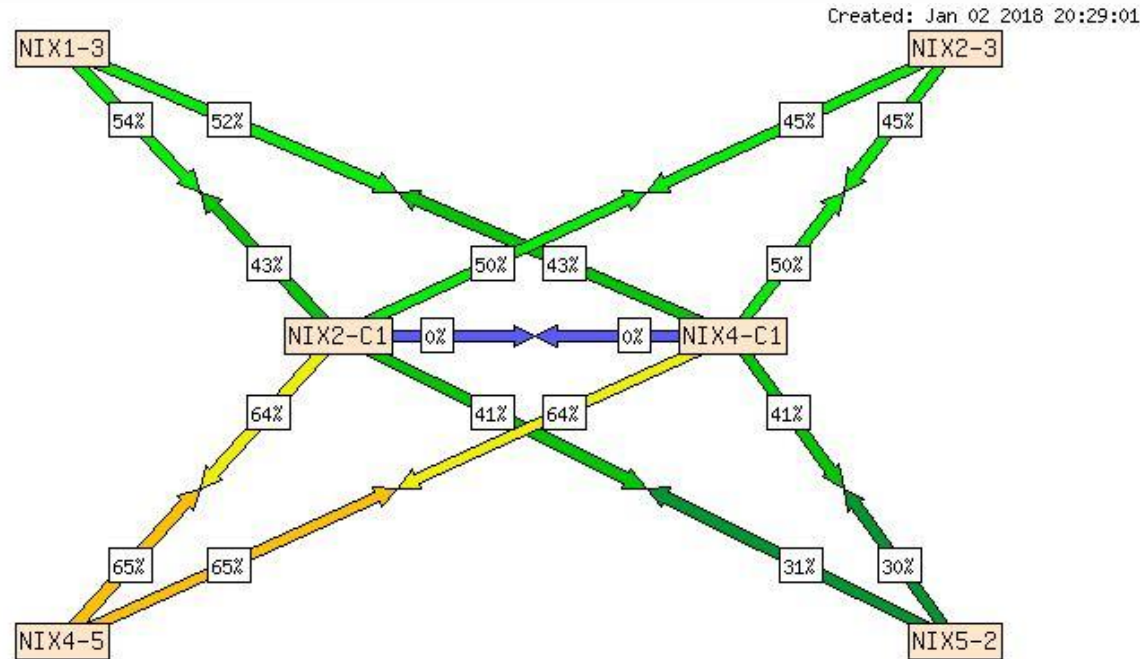
**Devices needs replacement**

**Merging NIX.CZ and NIX.SK**

**Route server / Cluster instability**

**...and Covid-19 started**

# Journey ends, but another begins



## Network in 2019

- 4 POPs
- 4 customer devices
- 2 cores



**In 2020**

**Finished PoC with Cisco Nexus 9300  
VxLAN / EVPN**

**Developing a transition plan**

**Adding two PoP in Slovakia**

**Adding PoP in Austria (Vienna)**



# BGP Protocols Summary

NIX RS-1

Show 100 entries

 Search:  Copy Print CSV Filter Reset Visibility

Peer Name	Table	IP Address	ASN	State	PfxRatio	InvRatio	PfxRcd	PfxExp	PfxInv	Changed	Action
Hurricane Electric	T6_6939x1	2001:7f8:14::6e:1	6939	Est	61%	90%	61 082	13 825	6 168	10. 7. 2024 1:58:45	Show
Hurricane Electric	T4_6939x2	91.210.16.201	6939	Est	60%	99%	98 849	67 698	869	10. 7. 2024 1:58:45	Show
Zayo Infrastructure France	T4_6461x2	91.210.16.228	6461	Est	72%	98%	36 097	131 673	748	30. 8. 2024 7:58:50	Show
Netia	T4_12741x2	91.210.17.31	12741	Est	38%	74%	1 534	157 457	396	8. 8. 2024 12:13:01	Show
Zayo Infrastructure France	T6_6461x1	2001:7f8:14::a5:1	6461	Est	63%	97%	9 483	57 143	264	30. 8. 2024 7:59:01	Show
NetIX Communication	T4_57463x2	91.210.16.125	57463	Est		75%	843	158 029	208	10. 7. 2024 2:30:35	Show
EPIX	T4_201053x1	91.210.16.54	201053	Est	62%	84%	1 235	157 958	194	10. 7. 2024 2:30:29	Show
Zayo Infrastructure France	T6_8218x1	2001:7f8:14::6f:1	8218	Est	7	52%	211	58 078	110	30. 8. 2024 0:49:33	Show
Zayo Infrastructure France	T4_8218x2	91.210.16.227	8218	Est	28%	94%	1 410	158 049	78	30. 8. 2024 0:49:23	Show



# RS configs rewritten by the INEX examples

## Developing „own“ looking glass

## Jinja2 templates

**In 2021**

**State critical infrastructure  
ISO27001 certification**

**Moving the Slovak part of the network  
to a new Ngk switches**

**The first network connected with 400G  
interfaces**



**In 2022**

**Moving Czech part of the network to a new Ngk switches**

**New core boxes 36 x 400G**

**Starting the automation and network statistics project**



**In 2023**

**Moving biggest PoP in Prague (2T of traffic) to a new Ngk switches**

**Adding PoP in Frankfurt to the network**

**Starting high precision data collection project – 30s collections**



# In 2023

## Upgrading most of the backbone links to 400G

- VIE- BRA 2x 400G
- VIE – PRG 1 x 400G + 3 x 100G
- PRG – BRA 4 x 100G + 1 x 400G
- PRG – FRA 1 x 400G
- VIE – FRA 1 x 400G





**In 2024**

**Finishing migration to Ngk**

**First version of new customer portal**

**Starting high precision data collection project – 15s network snapshots**



# NIX.CZ historical traffic graph



# NIX migration in numbers

**3 technicians + 1 developer**

**9 PoPs**

**1300 new cables**

**10 new ODFs**

**43 new production switches**

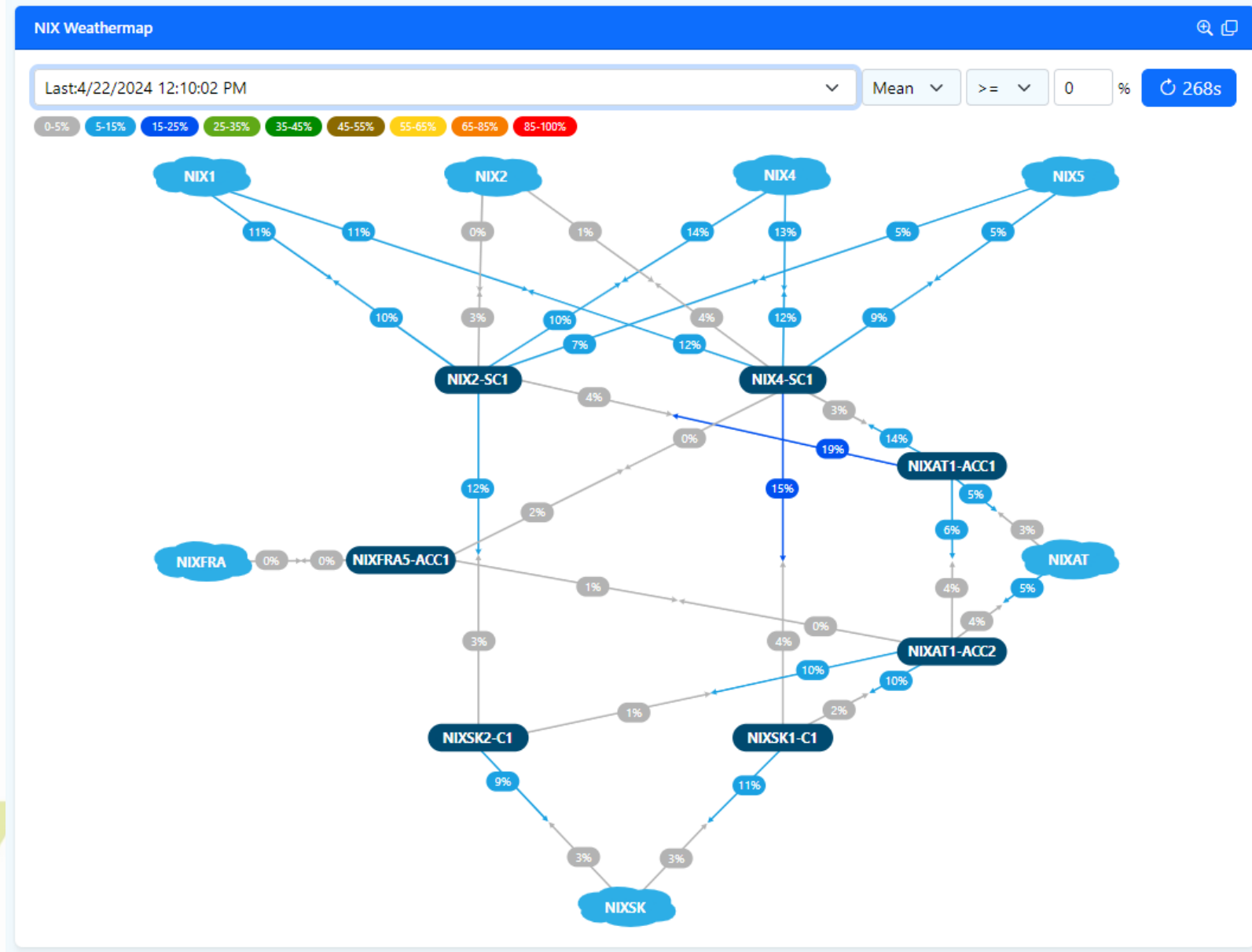
**241 connected networks**

**97 QSFP-DD 400G interfaces**

**20+ Cisco TAC cases**

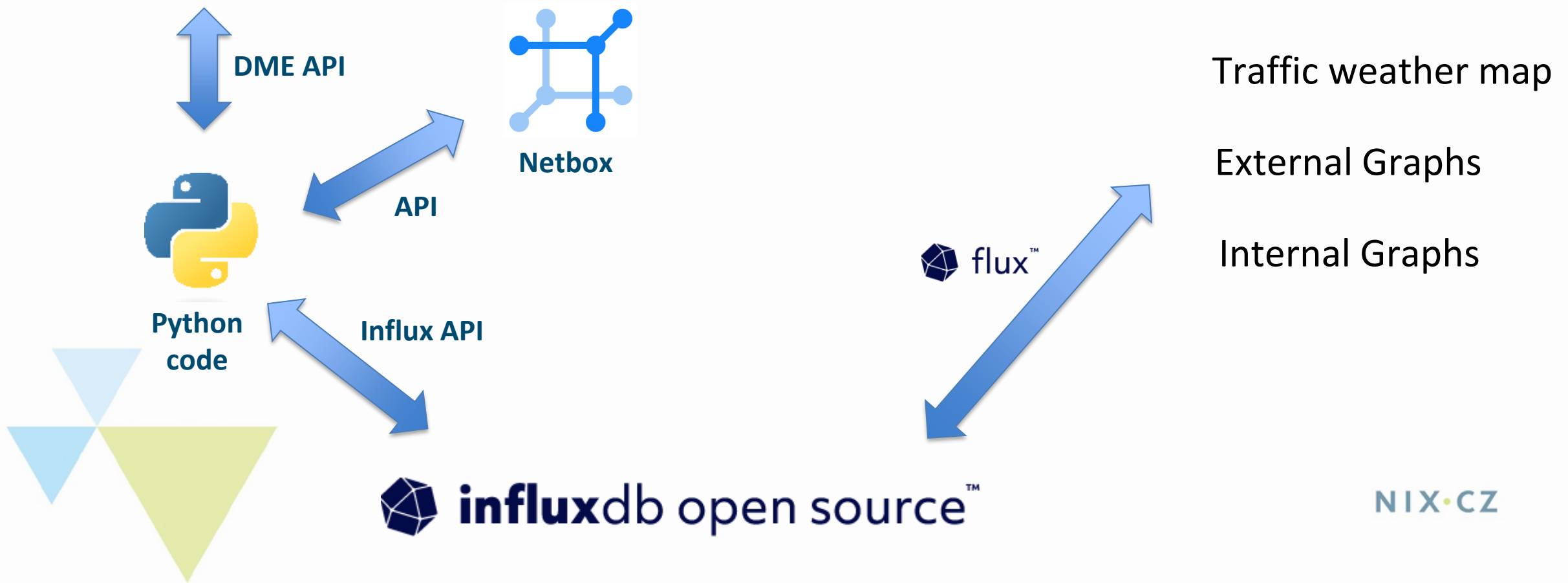


# NIX.CZ network topology



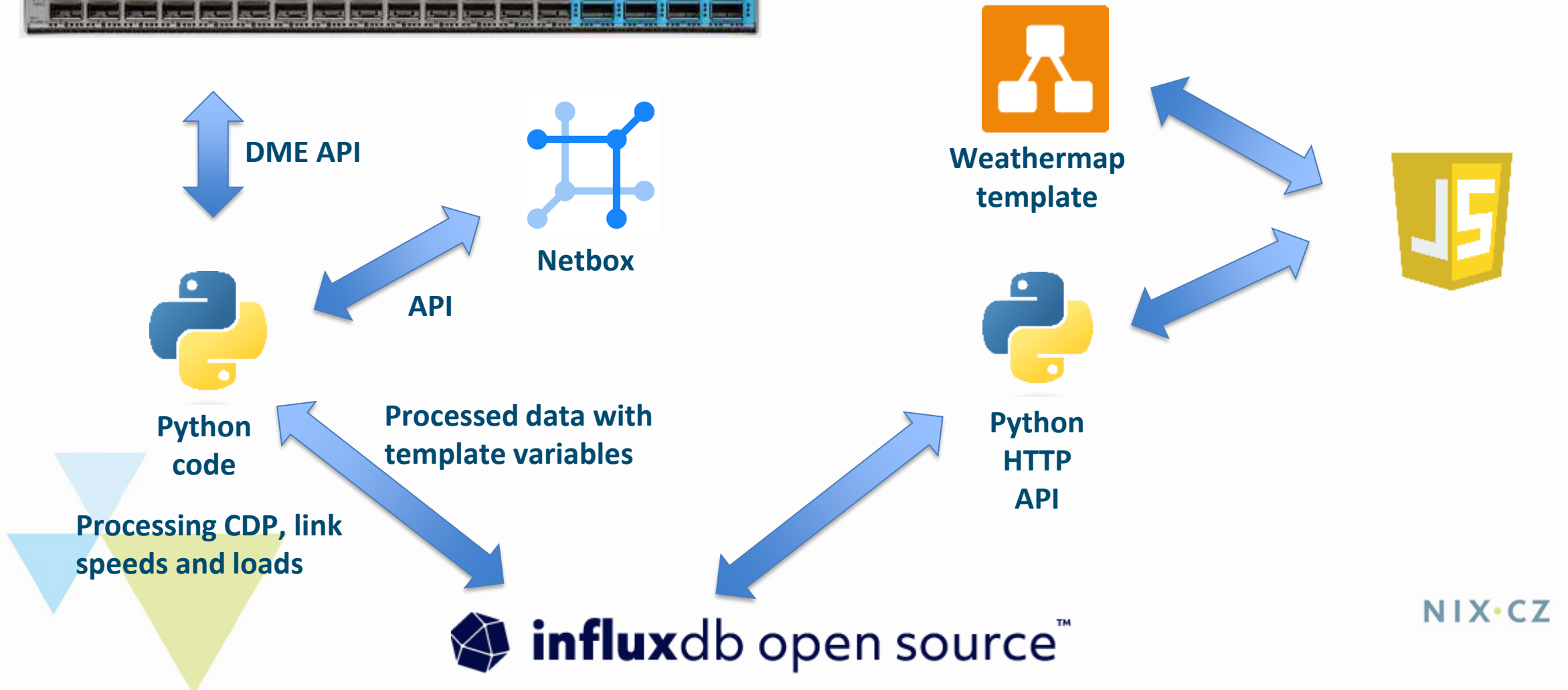
# Network statistics – 15 s network samples

Network device (Cisco Nexus 9300)



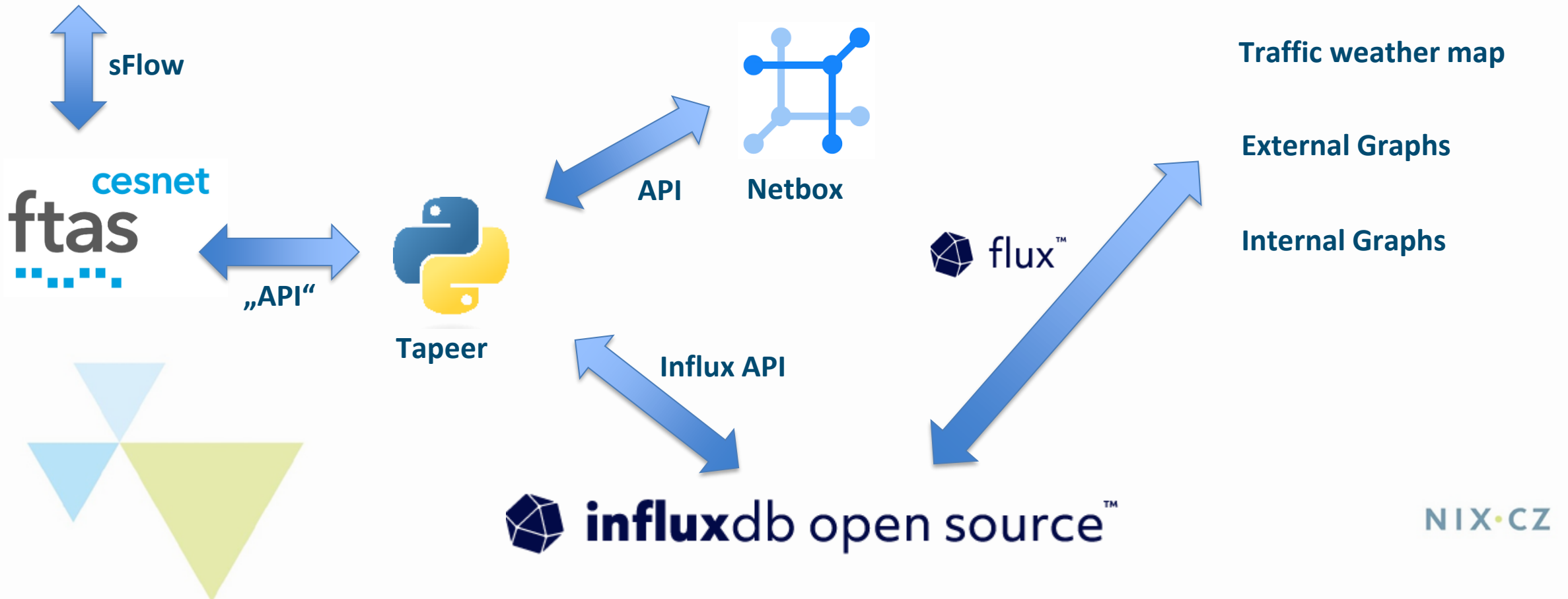
# Weathermap using InfluxDB

Network device (Cisco Nexus 9300)

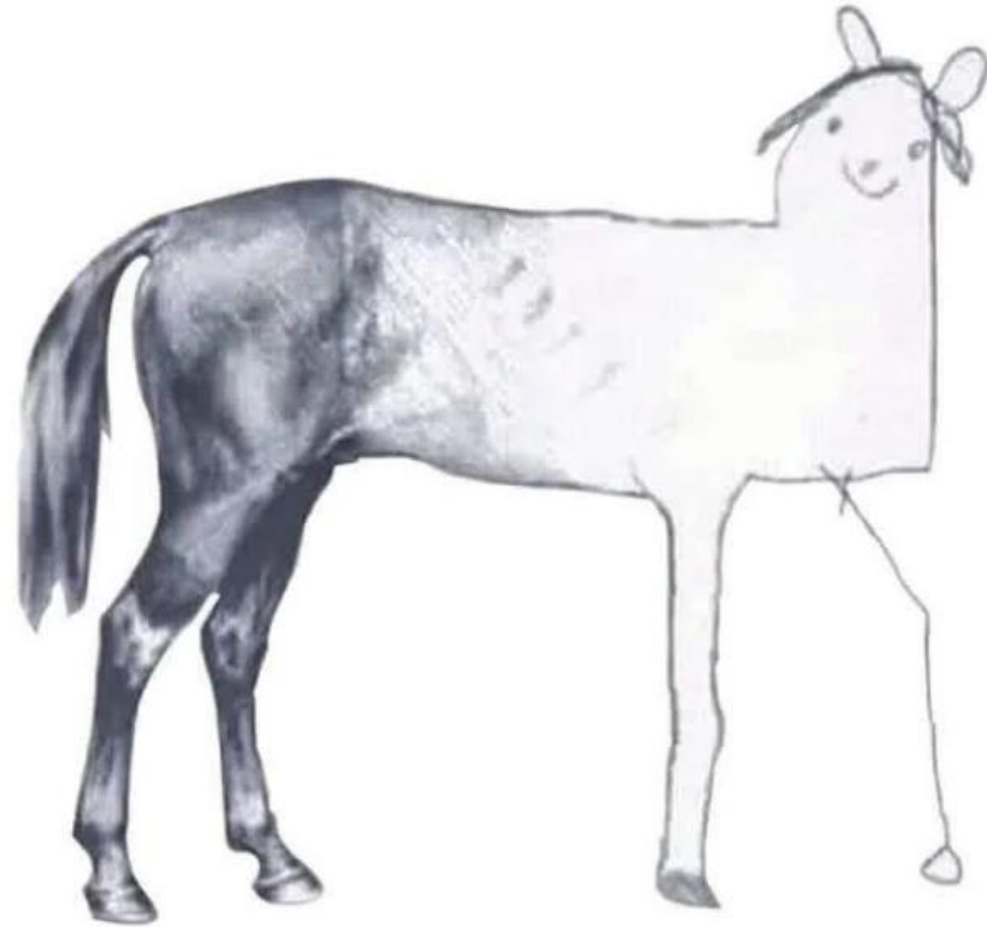


# sFlow statistics

Network device (Cisco Nexus 9300)

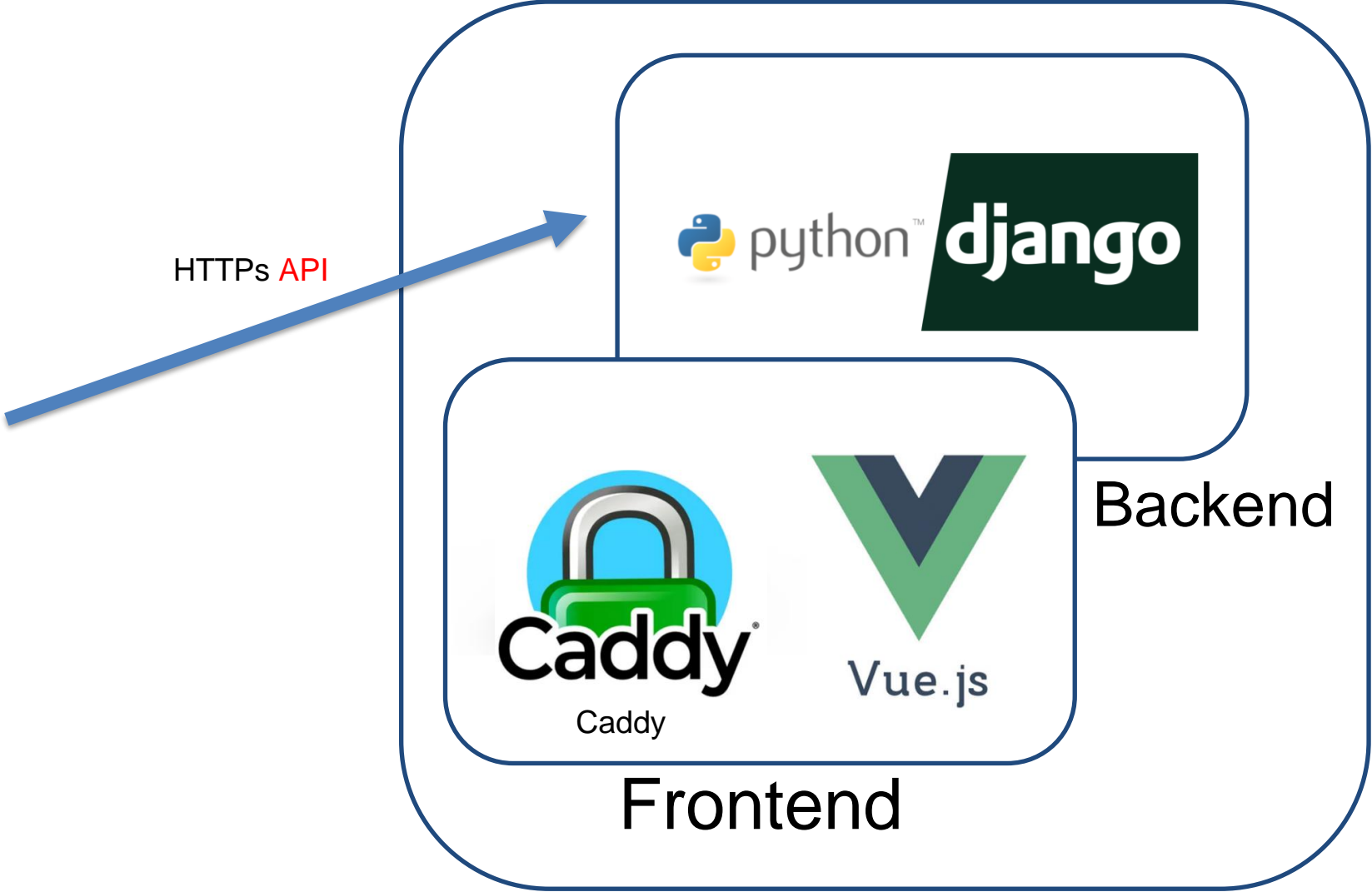


# A new customer portal



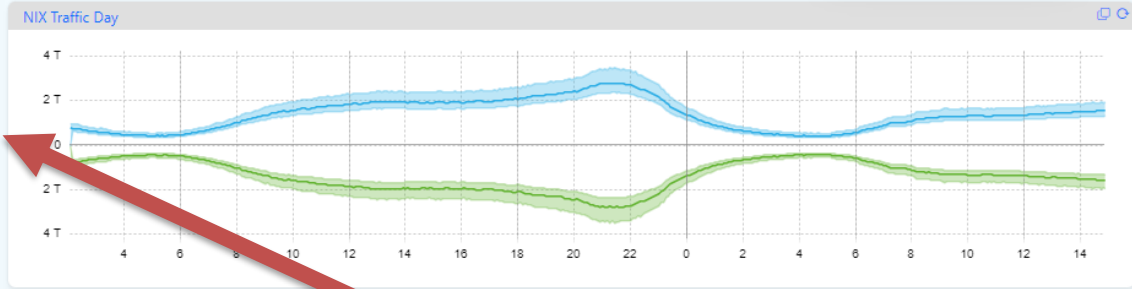


# A new portal



# Dashboard

FOR TESTS ONLY



**NIX-CZ**

Partnership: Special / From: 01.10.1996

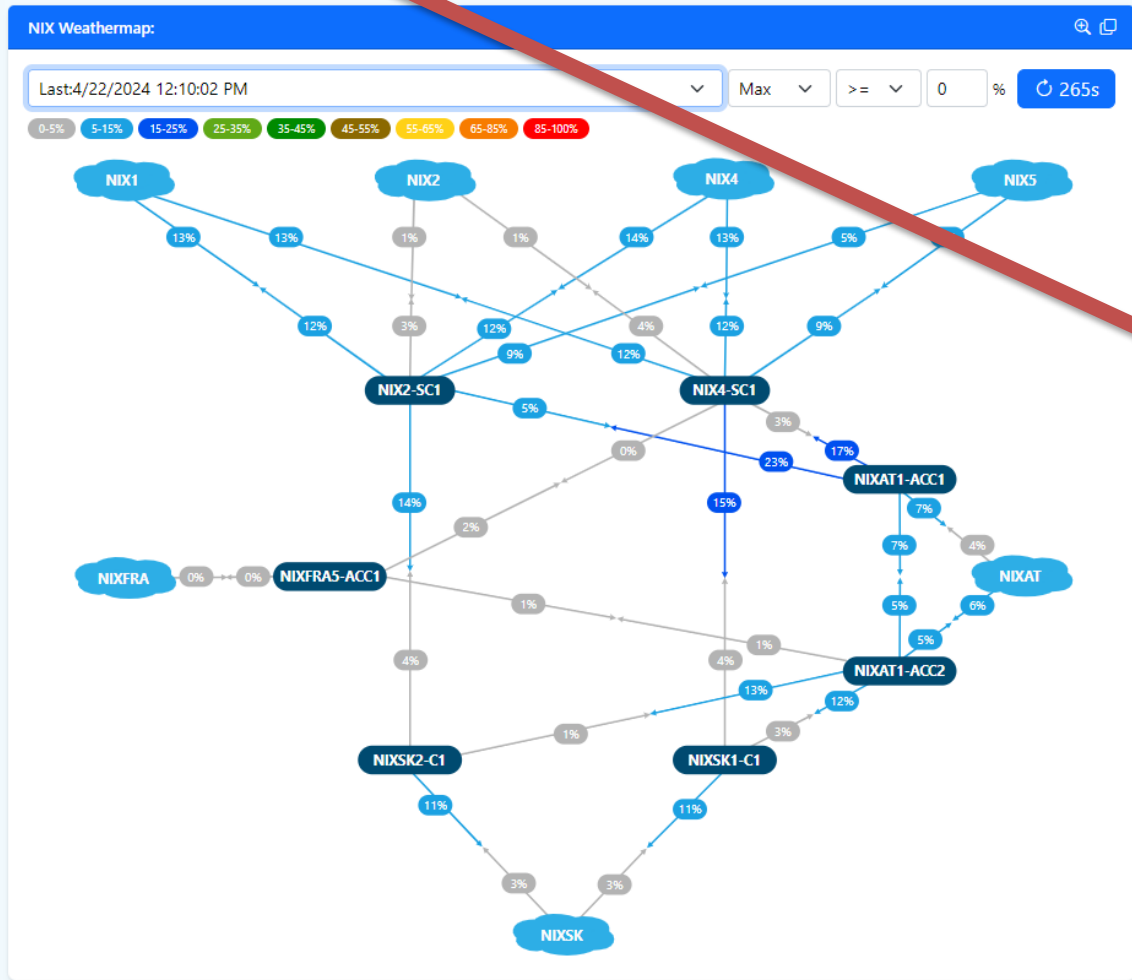
**FENIX SCORE**  
**100**

Lastly tested: 2024-04-08 (+20)

aaa, aabcde  
NIX.CZ, z.s.p.o.

User & roles

Company info



2 Services

<b>NIX2-acc5</b> eth1/1 100G (INZ3004403)	<b>NIX4-acc7</b> eth1/97 100G (INZ3003781)
NIX.CZ (VLAN: 10)	NIX.CZ (VLAN: 10)
FENIX (VLAN: 11)	FENIX (VLAN: 11)
NIX.SK (VLAN: 111)	NIX.SK (VLAN: 111)

List of services

Sites

<b>NIX0</b> Americká 23, Prague, CZ	<b>NIX1</b> T-Mobile THP Mahlerovy sady, Prague, CZ	<b>NIX2</b> T-Mobile THP Vinohradská 190, Prague, CZ
<b>NIX4</b> CE Colo Nad Elektramou 411, Prague, CZ	<b>NIX5</b> TTC Teleport DC1 Tiskarska 10, Prague, CZ	<b>NIX6</b> Teleport DC2 Sazcevska 10, Prague, CZ
<b>NIX7</b> DCT CEColo K Perovne 1616 2, Prague, CZ	<b>NIXAT1</b> Intexion Vienna Louis-Haflinger-Gasse 10, Vienna, AT	<b>NIXFRA5</b> Equinix FR5 Kleyerstrasse 90, 60326 Frankfurt am Main, Germany
<b>NIXSK1</b> SITE1 DC1 Kopclanska 20, Bratislava, SK	<b>NIXSK2</b> SITE2 DC2 Kopclanska 18, Bratislava, SK	<b>NIXSK3</b> VNET - DIGITALIS Trnavska cesta 110 B, Bratislava, SK

Main menu



# Project Fenix

- Group of operators with high network security hygiene
- Organizational, Technical and Operational requirements
- Mandatory RPKI, CoPP policy, DNSSEC, IPv6, RTBH etc...
  
- Operated as a separated infrastructure
- Self-testing on weekly basis – Fenix-checker

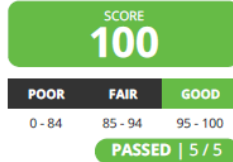


# Project Fenix



## Report for domain: nic.cz | ASN: 25192

Date: 2024-09-06T15:09:03



### DNS and IPv6 records in domain

DNS records in the zone for domain - A, AAAA, NS

NAME	IP	IPV6	PING	TYPE
www.nic.cz	217.31.205.50	false	true	A
www.nic.cz	2001:1488:0:3::2	true	true	AAAA
nic.cz	217.31.205.50	false	true	A
nic.cz	2001:1488:0:3::2	true	true	AAAA
a.ns.nic.cz	194.0.12.1	false	true	NS
a.ns.nic.cz	2001:678:f::1	true	true	NS
b.ns.nic.cz	194.0.13.1	false	true	NS
b.ns.nic.cz	2001:678:10::1	true	true	NS
d.ns.nic.cz	193.29.206.1	false	true	NS
d.ns.nic.cz	2001:678:1::1	true	true	NS
mail.nic.cz	217.31.204.67	false	true	MX
mail.nic.cz	2001:1488:800:400:400	true	true	MX
mx.nic.cz	217.31.57.157	false	true	MX
mx.nic.cz	2001:1ab0:7e1e:d150::8:157	true	true	MX

### Reachability

Testing reachability of the destination - ICMP, UDP, TCP - 80, 443, 21, 22, 25 and 53. Network address for name servers is also checked - /24 network for IPv4 and /48 for IPv6

<b>NS NETWORK</b>	Name servers network OK
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### DNS AAAA for NS and MX

Testing AAAA records for NS and MX in the zone. MX is required to response on TCP 25.

<b>NS IP</b>	2001:678:f::1
<b>MX IP</b>	2001:1488:800:400:400

### CAA DNS RECORDS

**PASSED | 0**

### SMTP DANE / MTA-STS

**PASSED | 0**

Testing SMTP DNS-based Authentication of Named Entities (DANE) / SMTP MTA Strict Transport Security (MTA-STS)

<b>MTA-STS</b>	TXT record for _mta-sts.nic.cz not found
<b>DANE</b>	_25_tcp.mail.nic.cz IN TLSA 3 1 1 4f9736249ab586f37fc110856f6a3358adadb99db03628866466194f5bb2e09

### TLS/SSL test

**PASSED | 5 / 5**

Testing of the SSL/TLS against WWW

### RPKI test

**PASSED | 10 / 10**

Testing RPKI ROV

PASSED
217.31.202.63
2001:1488:ffff:0:0:0:0:63
217.31.202.163
2001:1488:ac15:ff80:0:0:0:72
217.31.192.72
2001:1488:ffe:6:da58:d7ff:fe00:2152
217.31.205.50
2001:1488:0:3::2

### RTBH test

**PASSED | 10 / 10**

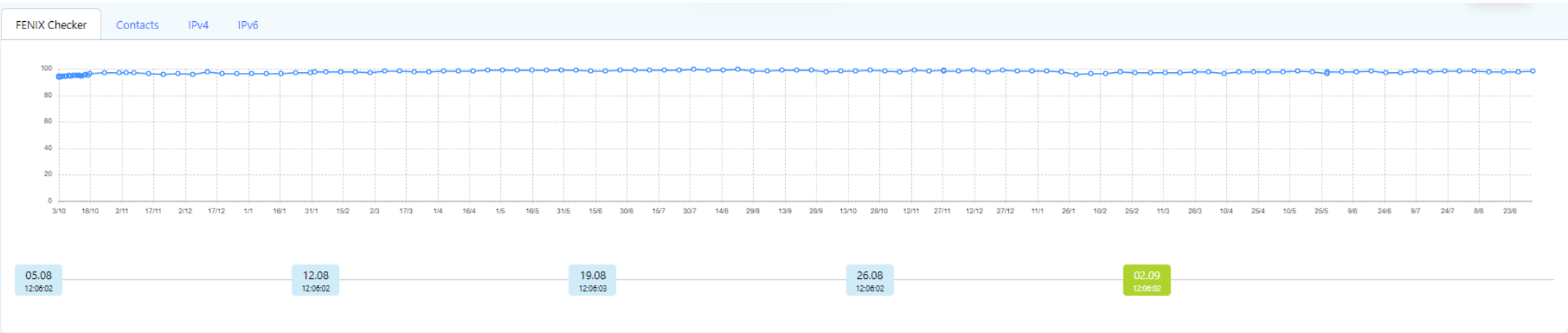
Testing RTBH acceptance

PASSED
217.31.202.63
2001:1488:ffff:0:0:0:0:63
217.31.202.163
2001:1488:ac15:ff80:0:0:0:72
217.31.192.72
2001:1488:ffe:6:da58:d7ff:fe00:2152
217.31.205.50
2001:1488:0:3::2

### BGP validity

**PASSED | 10 / 10**

# Project Fenix



**GOOD | 98.59 / 32** [Download all results](#)

Test has been started at: 02.09.2024 12:06

Domain	company	Asn	Score	
2connect.cz	2 connect	35236	100	
active24.cz	ACTIVE 24	25234	100	
cesnet.cz	CESNET	2852	100	
cetin.cz	CETIN	28725	100	
nic.cz	CZ.NIC	25192	100	
nic.cz	CZ.NIC	200070	100	
casablanca.cz	Casablanca	15685	100	
comsource.cz	ComSource	199803	100	
faster.cz	Faster CZ	24641	100	
inext.cz	INTERNEXT 2000	25424	95	

# The Meet app

The screenshot shows the Meet app interface for an event titled "EmergeTech Fusion". At the top left is the Meet logo. The user profile "Doe, John" from "Virevo" is shown at the top right. Below the header, there's a breadcrumb "Home / EmergeTech Fusion". The event title "EmergeTech Fusion" is displayed with an "Invite" button and a menu icon. The event dates are "01.03.2024 02:00 - 03.03.2024 02:00". A description follows: "Description: Enter the world of EmergeTech Fusion, where different spheres of technology and creativity meet. This conference serves as a place of connection and fusion of innovation that brings new possibilities and perspectives. Join us and lets discover together how different worlds can come together for the benefit of the future." Below the description are tabs for "Overview", "Attendees 25", "Chats 1", and a help icon. The main content area shows a calendar view for "01.03.2024" with a toggle switch. A highlighted event "10:00 ~ 10:30 | natus perspiciatis obcaecati exercitationem" is shown with "Automatic Location: Table 0 (2/5)". Attendees listed are "Doe, John" (Virevo), "Sterling, Caleb" (Quorix), and "Williams, Harry" (Solvix). Below this are "Unavailable slot" entries for 10:30-11:00 and 11:00-11:30, and an "Available slot" for 11:30-12:00. The next date "02.03.2024" is also shown with available slots for 10:00-10:30 and 10:30-11:00. The final entry is "11:00 ~ 11:30 | Meeting - Nice to meet you!".

## MAIN FEATURES

- **Web user interface** - only an internet browser is sufficient for operation
- **Reactive, modern application** - responds immediately to requests with a minimum number of page reloads
- **Responsive appearance** - suitable for use on mobile phones, including the option to switch to a dark appearance
- **Websockets** - instant notification of changes and comments made by other users
- **Push Notifications** NEW - Option to set push notifications for multiple devices at once
- **Emailing** - sending notification emails directly to users, bulk sending of infomails
- **Multilingualism** - can be translated into any language (including support for countries with reversed text direction, e.g. Hebrew)
- **Favorites and bulk events** NEW - Ability to bulk invite multiple participants at once, mark as favorites and filter
- **Backend** - for administrators with the possibility to manage the entire event. The administration part is carefully documented NEW
- **Help** - the application tries to be as intuitive as possible, but there is still a short help integrated just to be sure

# What's next

- Communication and data sharing
  - Open API for all the data
  - New Ticketing system
  - Maintenance Information via API
  - Billing system
    - Budget tracking
    - Invoice tracking

