Network Peering Dashboard for SURFnet

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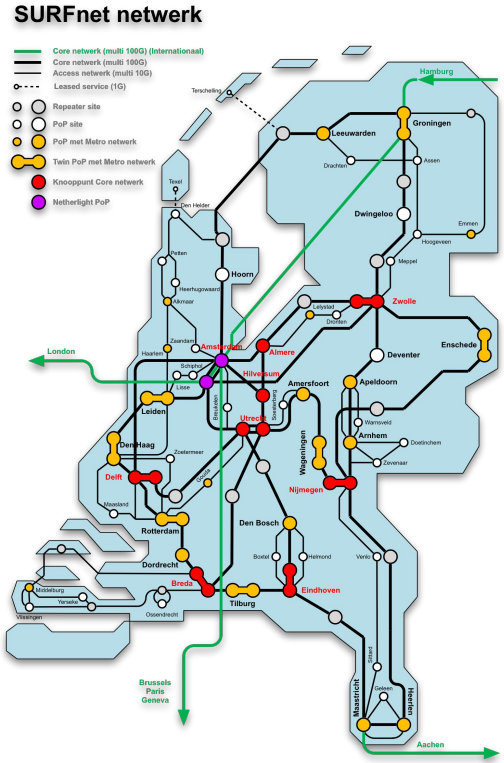
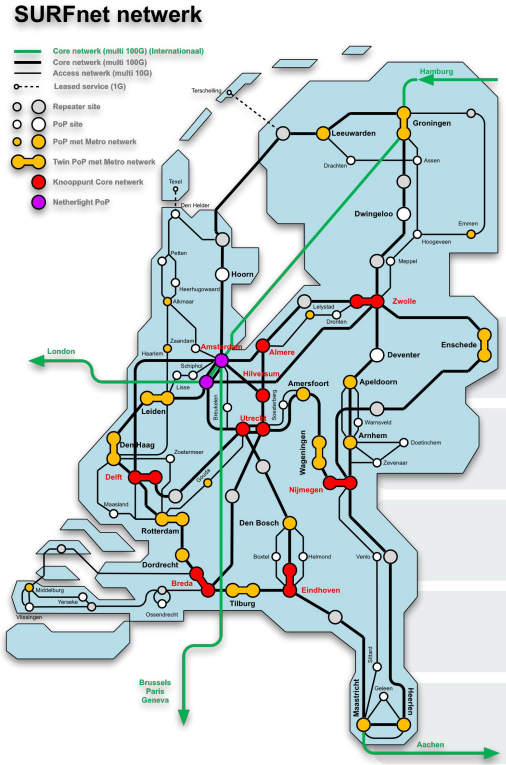
Introduction



SURFnet's AS 1103 Network Topology - Courtesy of SURFnet

Introduction



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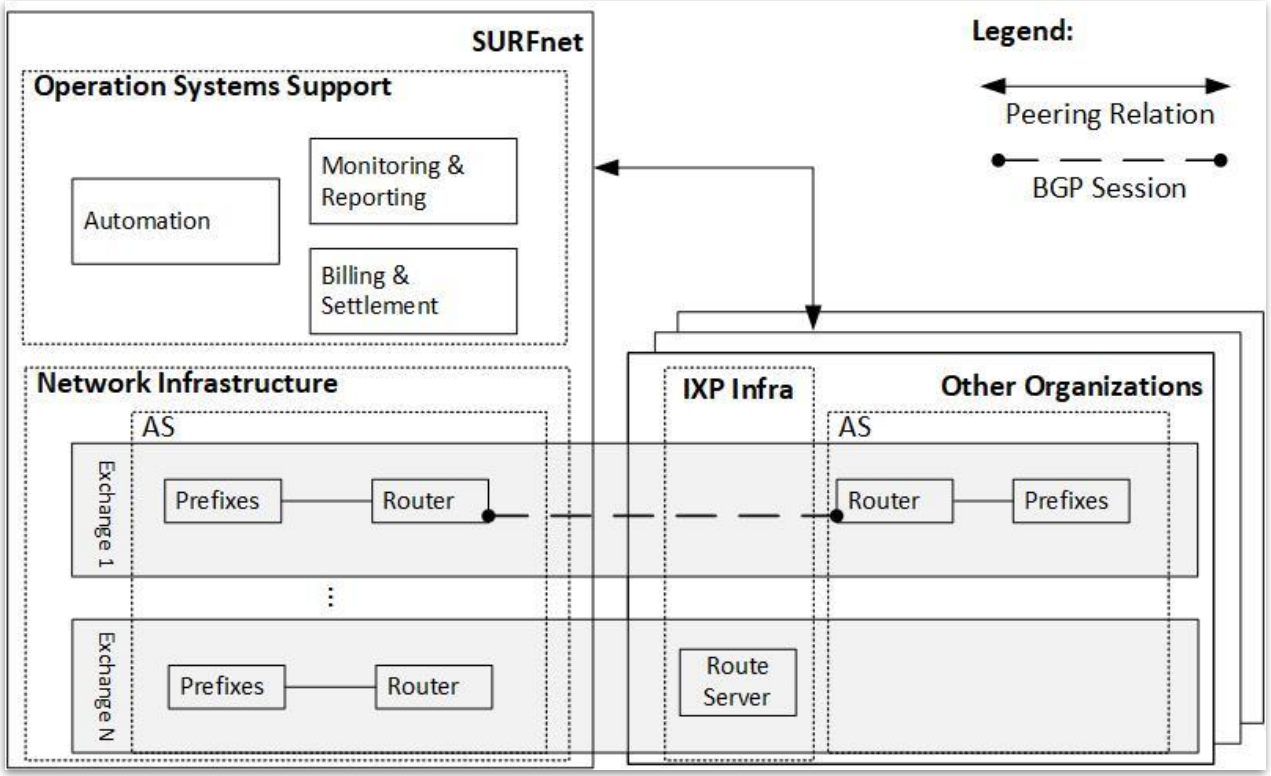
SURFnet's AS 1103 Network Topology - Courtesy of SURFnet

Motivation

Management of peering strategies and policies: knowledge and constant monitoring.

- 93000+ ASes
- Dynamic environment
- Data vs Information

SURFnet's Context



Research question

Which methods are available for the **representation and processing of the peering relations** and make optimisation **recommendations**?

What information and which information sources should be available as input for a tool to fulfill SURFnet's requirements?

Can these methods and tools also recommend **peers for the best redundancy**?

Related Research/Work

Problem Characterisation and Methodology:

Burke et al. describe the criteria and a methodology to select the appropriate approaches for information filtering.

Data Sources and tools:

CAIDA's Inferred AS Relationship explained the tools and methods used to collect the data set, and provided a valuable source of information.

Protype design:

Felferny et al. provided an information filtering implementation example.

Methodology

Methodology

How do we **map** the BGP peering optimisation problem to an appropriate **solution?**

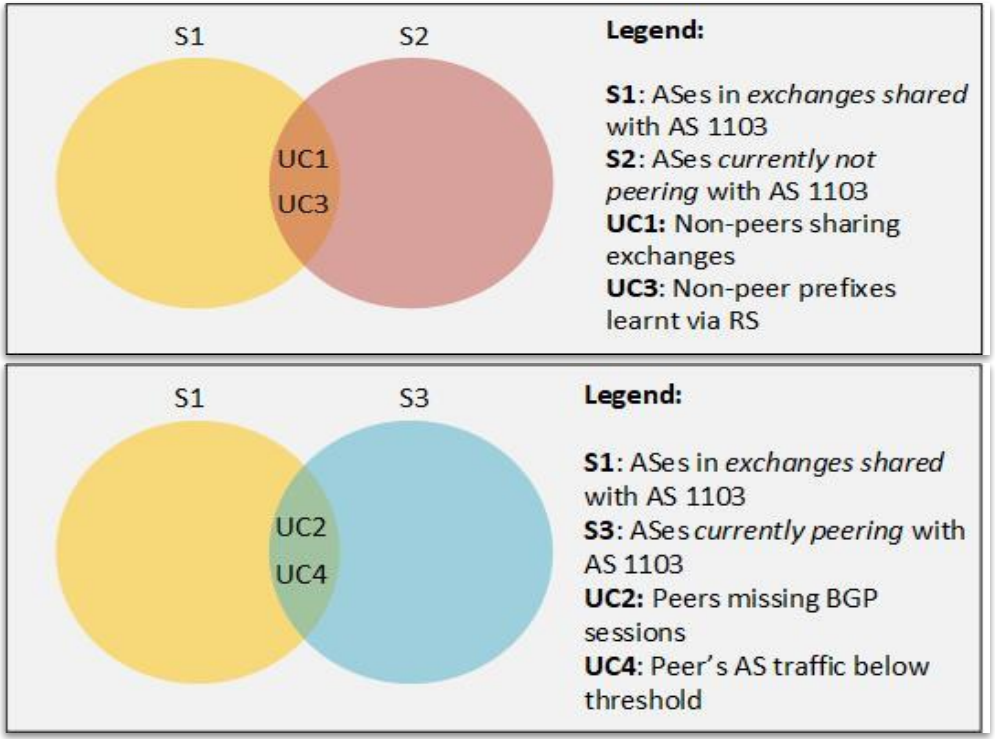
Scenario definitions and problem characterisation

Domain Model

Information & Sources

Prototype

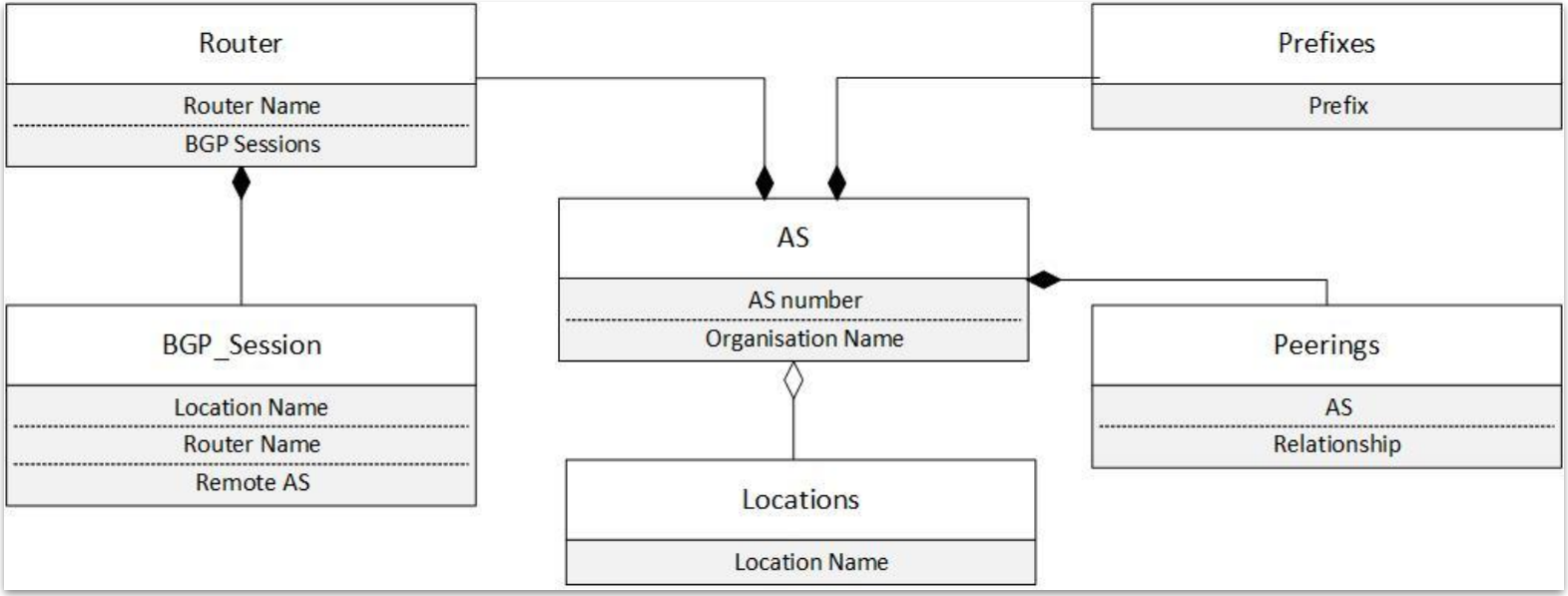
Optimisation Scenarios Overview



Recommendation Systems

A Recommendation Systems is a type of information filtering system, that recommends an item based on predictions of its utility.

Data organisation and sources



Data organisation and sources - Example

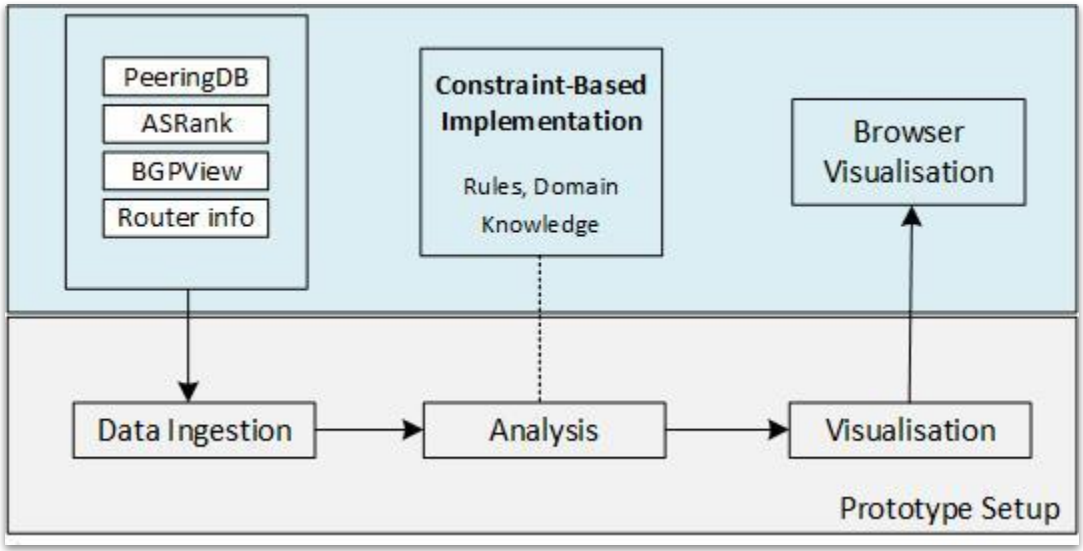
CAIDA's **AS Relationship** for AS1103 (excerpt)

```
rp1_dashboard\proto_data_ingestion> more .\Resources\CAIDA_AS_REL_20190101.as-rel2
...
1103|5580|0|bgp
1103|5583|0|bgp
1103|5588|0|bgp
1103|5607|0|bgp
...
```

Network Prefixes from BGP View for AS1103

```
rp1_dashboard\proto_data_ingestion> more .\Resources\prefixes\prefixes_1103
as_number,prefix,ip,cidr,roa_status,name
 1103,129.125.0.0/16,129.125.0.0,16,None,RUGNET
 1103,130.37.0.0/16,130.37.0.0,16,None,VU-NET
 1103,132.229.0.0/16,132.229.0.0,16,None,RUL-NL
 1103,134.221.0.0/16,134.221.0.0,16,None,TNO
…
```

Prototype Design - Components



Results

Overview of results

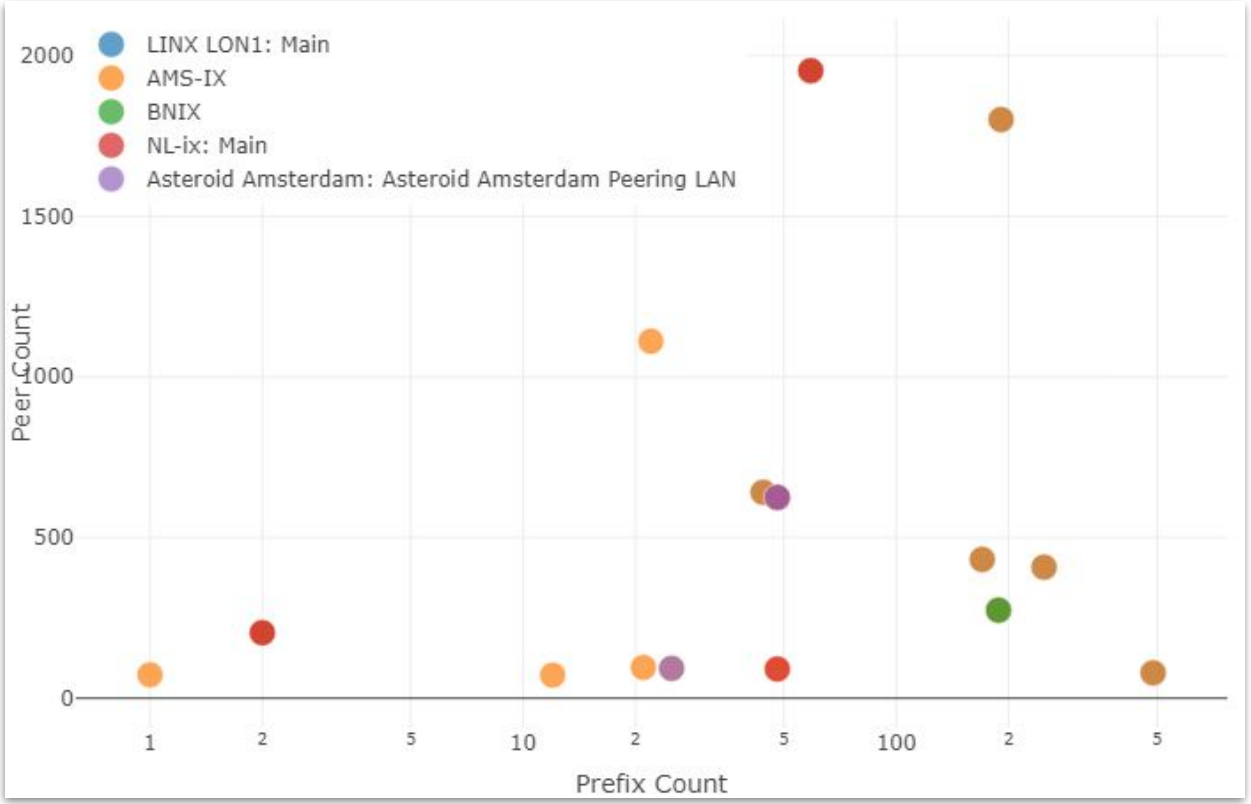
	Name	Data Input	Analysis
1	Propose suitable new Peers		
2	Propose the establishment of BGP sessions if Peer missing on a router		
3	Propose migrating traffic handled by Route Servers to a new Peer		
4	Propose disconnecting Peers when traffic is no longer significant		

 Objective accomplished

 Objective partially accomplished

 Inconclusive

UC2: New BGP sessions if missing



UC2: New BGP sessions if missing - output

We analysed 63468 ASes, of which 980 are peers present in at least one exchange where SURFnet is present. Of these ASes, **15** are configured only on one of the routers of SURFnet.

An **example AS** from the resulting set is: **AS3267** (Verizon Com).

Additionally, the following **remark** was generated for this AS:

Missing session in: Asd001b, location: AMS-IX.

Discussion and Future Work

Data aspects:

Accuracy, Availability and Completeness. Extraction time and alternative data sources. Limitations.

Analysis and Visualisation:

Performance, Real-time availability, Ranking capabilities. Limitations

Future Work:

Data inconsistency management, exploratory analysis and new scenarios. Performance optimisations.

Conclusion

Conclusion

Which methods are available for the **representation and processing of the peering relations** and make optimisation **recommendations**?

Proposed an approach and built a prototype, after evaluating alternatives.

Defined the information required and corresponding **sources**.

From our results, we identified limitations in th datasets and highlight the **importance** of **obtaining accurate and complete information**, and managing it. Also, the need for more **ranking capabilities** and real-time interactivity.

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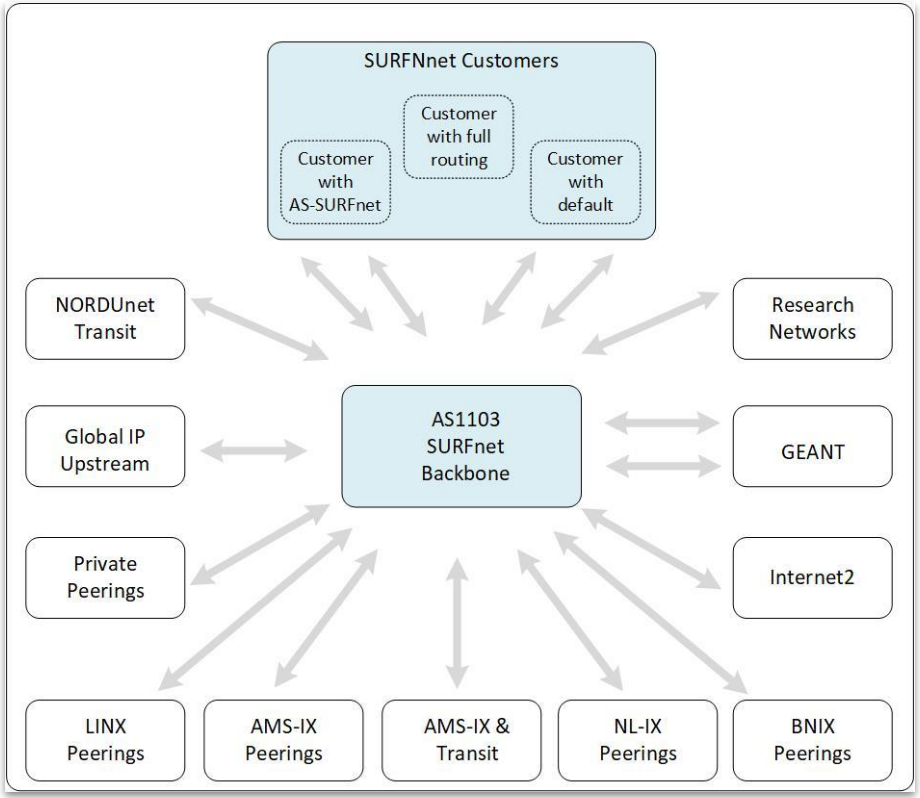
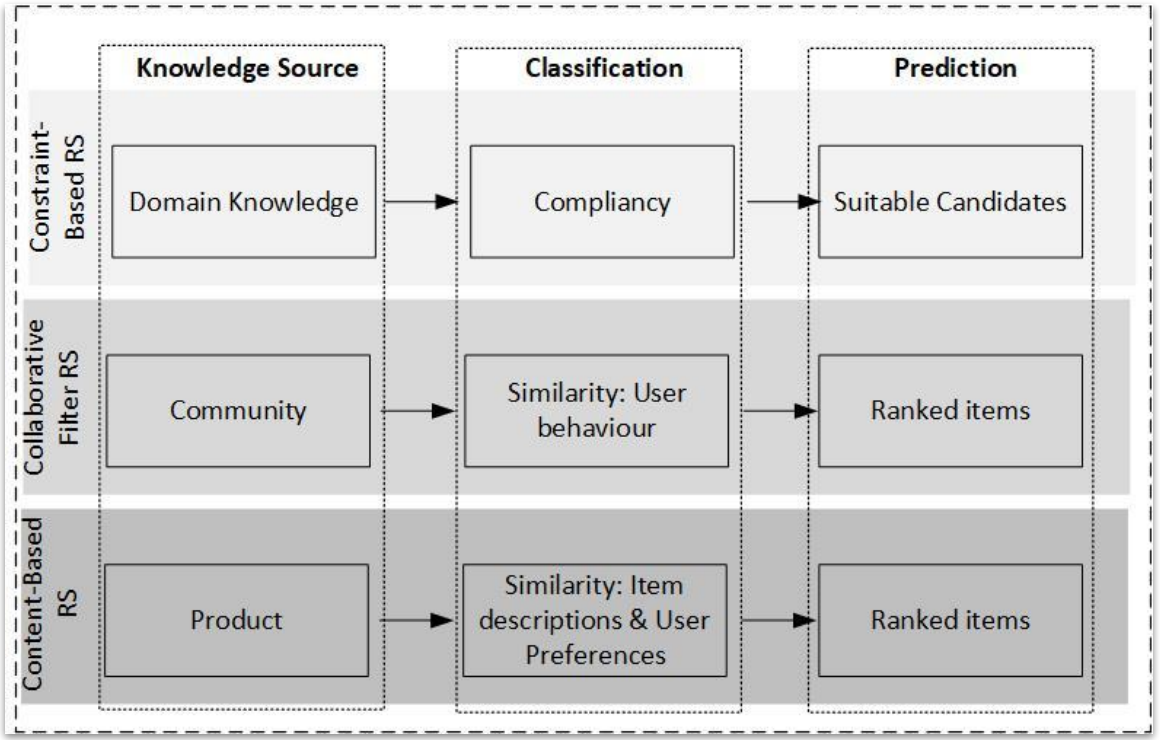
Questions?

Backup slides

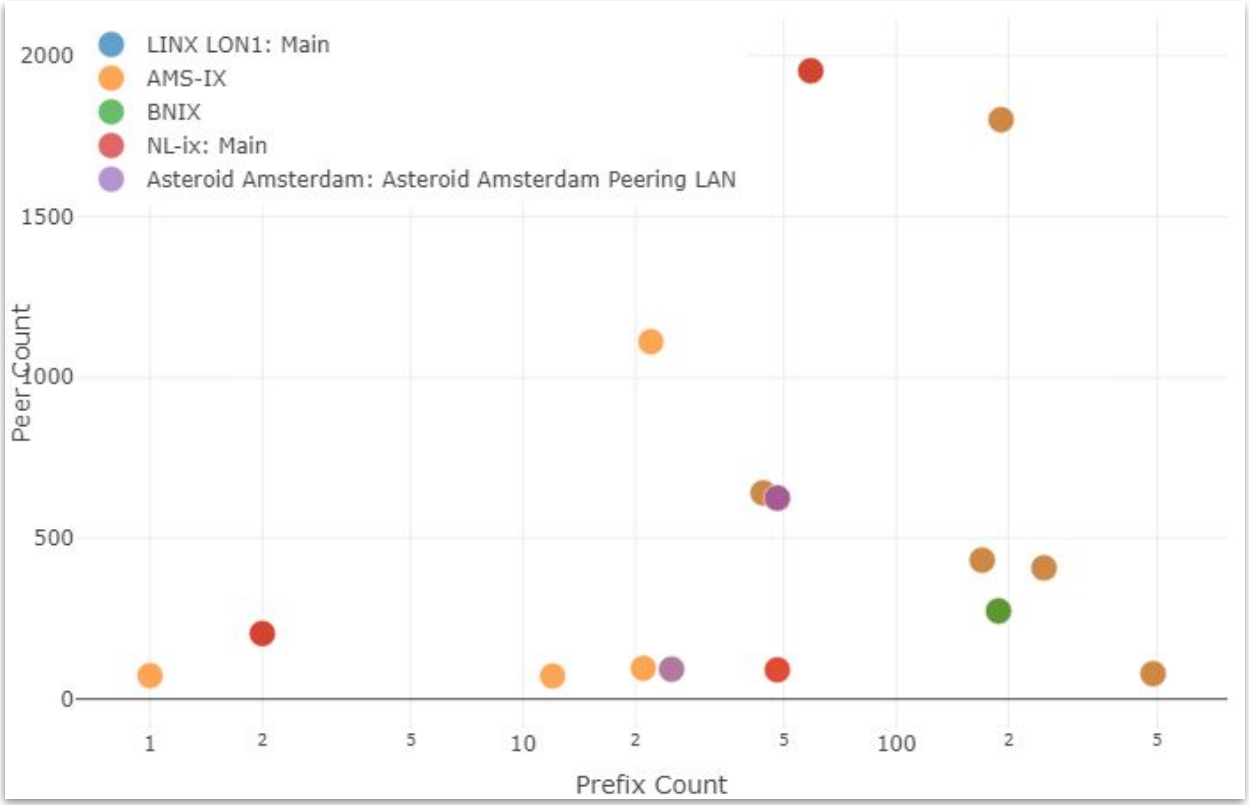
Background - SURFnet's Routing Policy



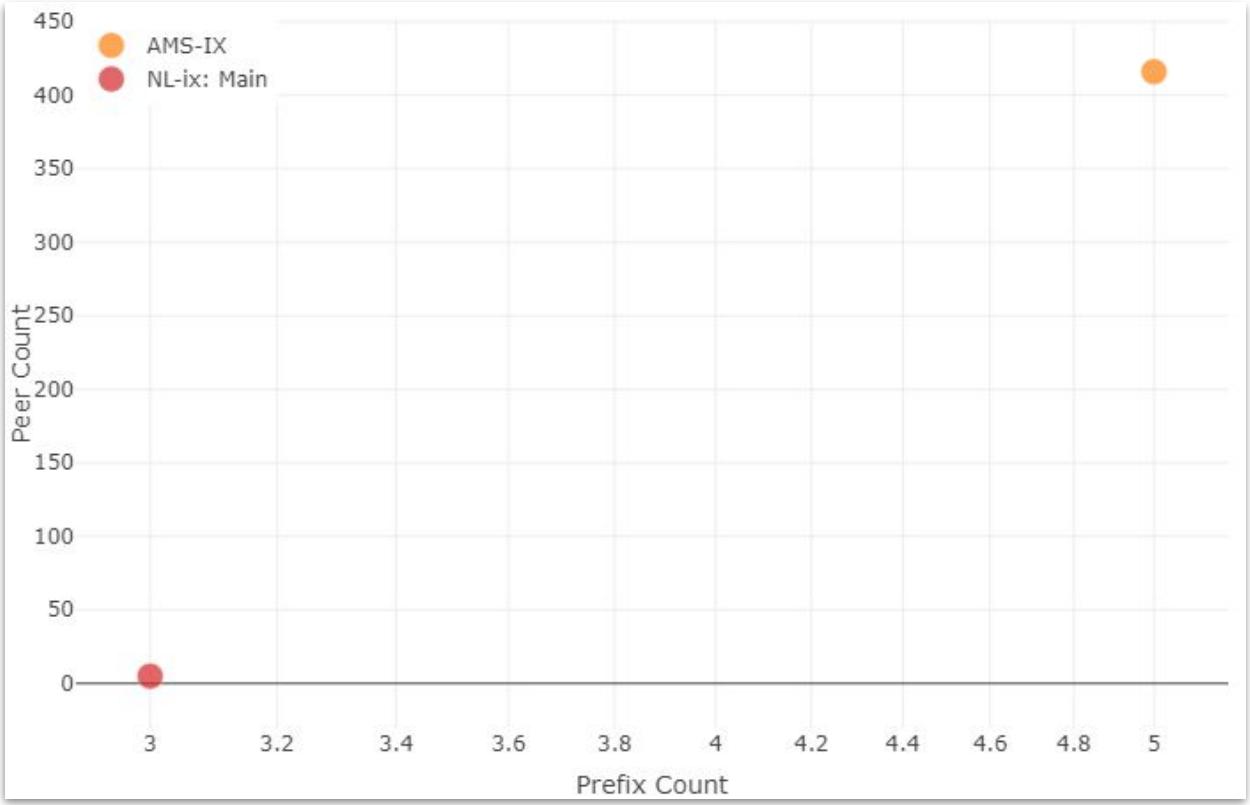
Background - Recommendation Systems



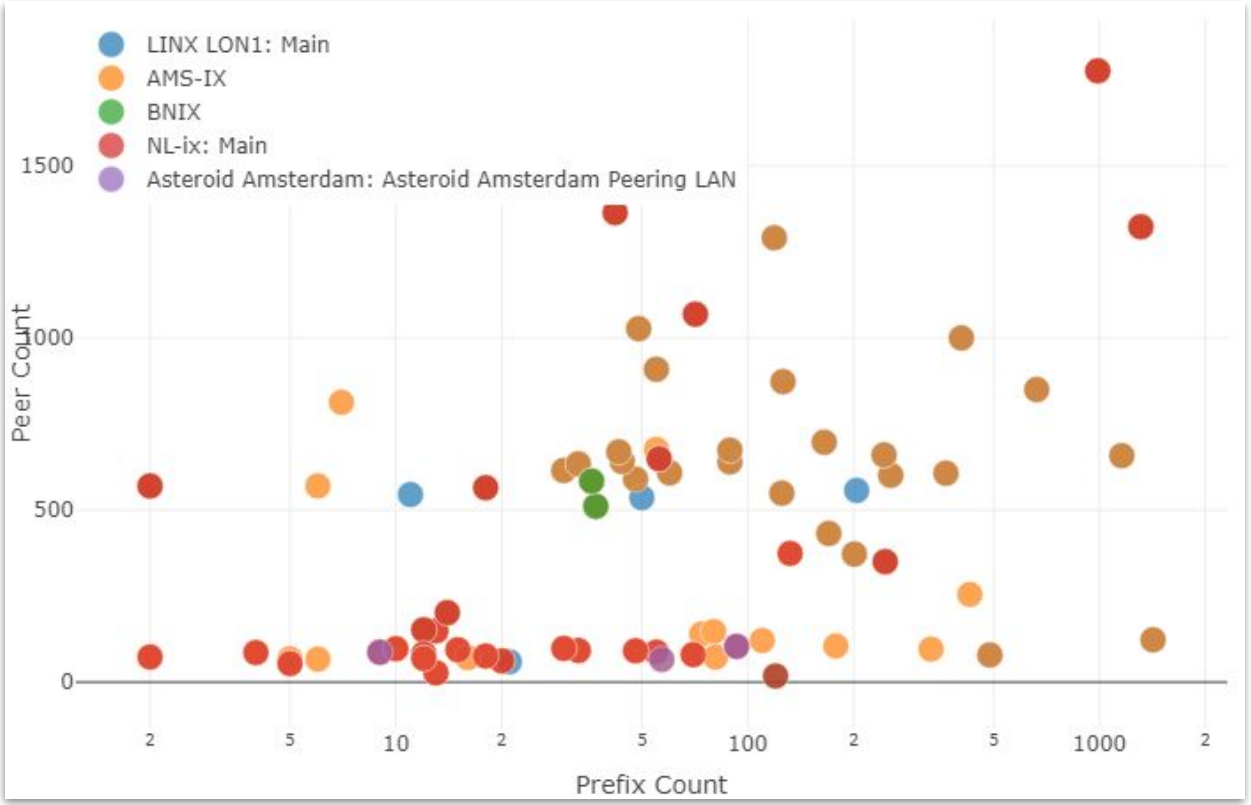
UC2: Peers missing BGP sessions



UC3: Non-peer prefixes learnt via RS



UC4: Peer's AS traffic below threshold



Future Work

Due to time/environment constraints, further use cases were not evaluated. These are listed below:

- Further explore other **recommendation approaches** to further rank ASes according to refined criteria (SURFnet mentioned, for instance: traffic, AS Path length, delay, destinations available).
- With regards to **performance**, evaluate data-processing oriented frameworks, in particular the open-source project PNDA.