Impact of BGPsec on the amount of generated BGP update messages

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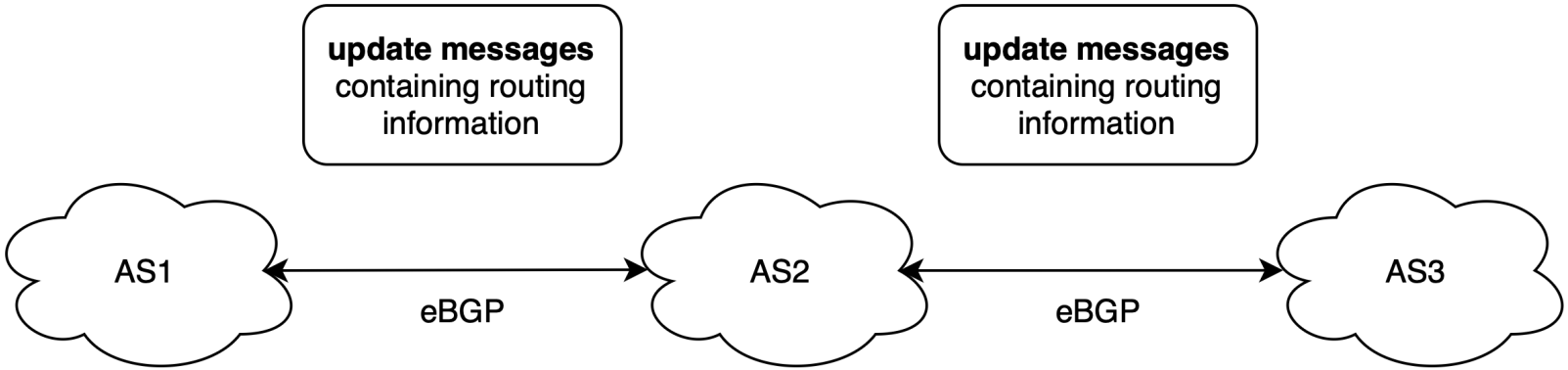
Introduction

Border Gateway Protocol

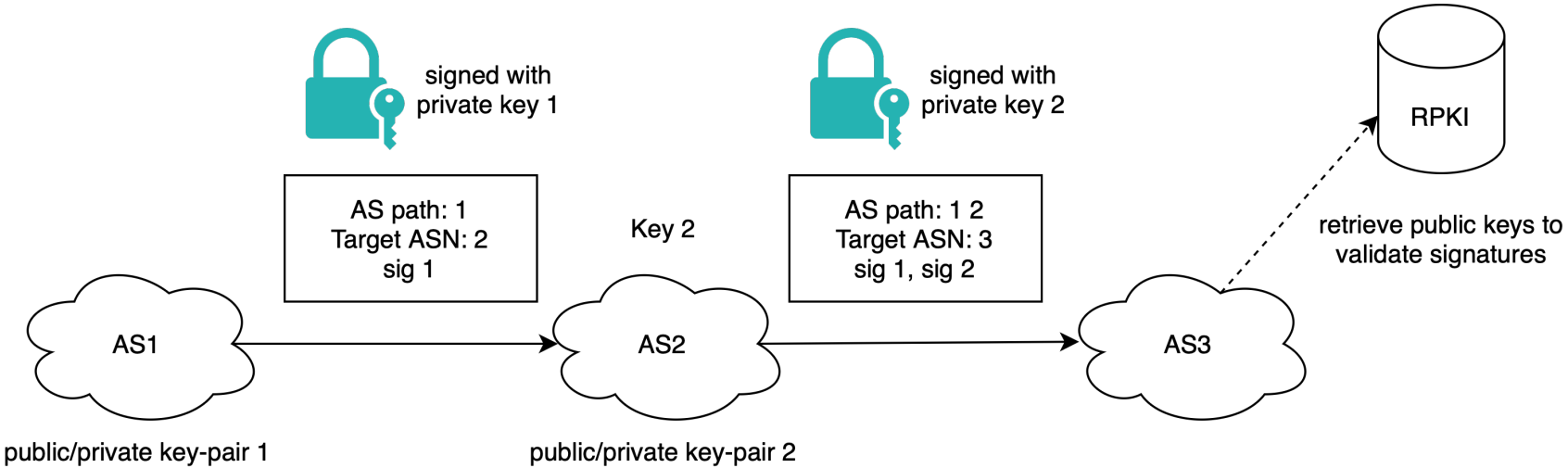


Research Question

What is the effect of BGPsec on update messages exchanged between BGP speakers?

Background: BGPsec

- BGP extension
- Aims to make the announced AS path **cryptographically verifiable**

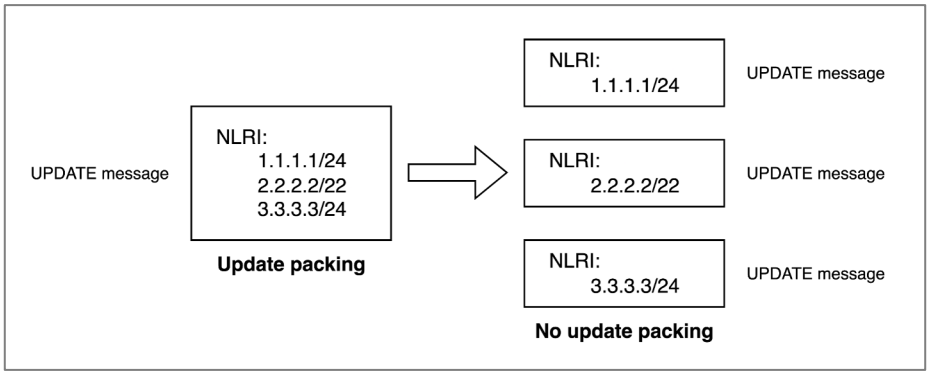


Background: BGPsec

Required modifications to generate valid update messages:

1. **BGPsec_PATH** instead of AS_PATH.

2. **No update packing**: Exactly one prefix announcement per update message.

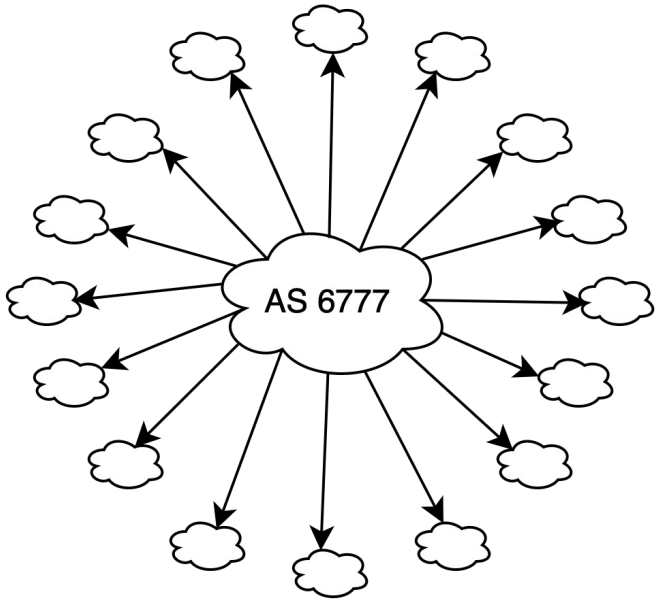


Methodology

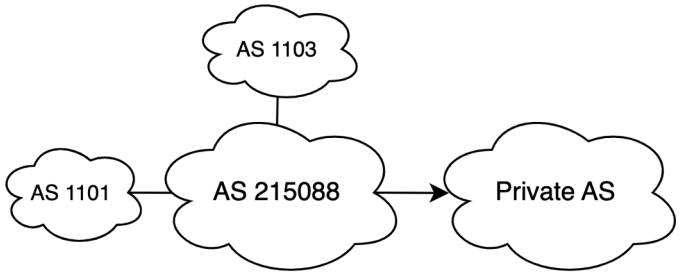
Message announces **exactly one** prefix.	Message announces **two or more prefixes**.	Message **does not announce any prefix**.
Adapted for each target AS.	Adapted for each target AS and packed updates split into individual messages.	No changes required.

Methodology

Internet Exchange route server

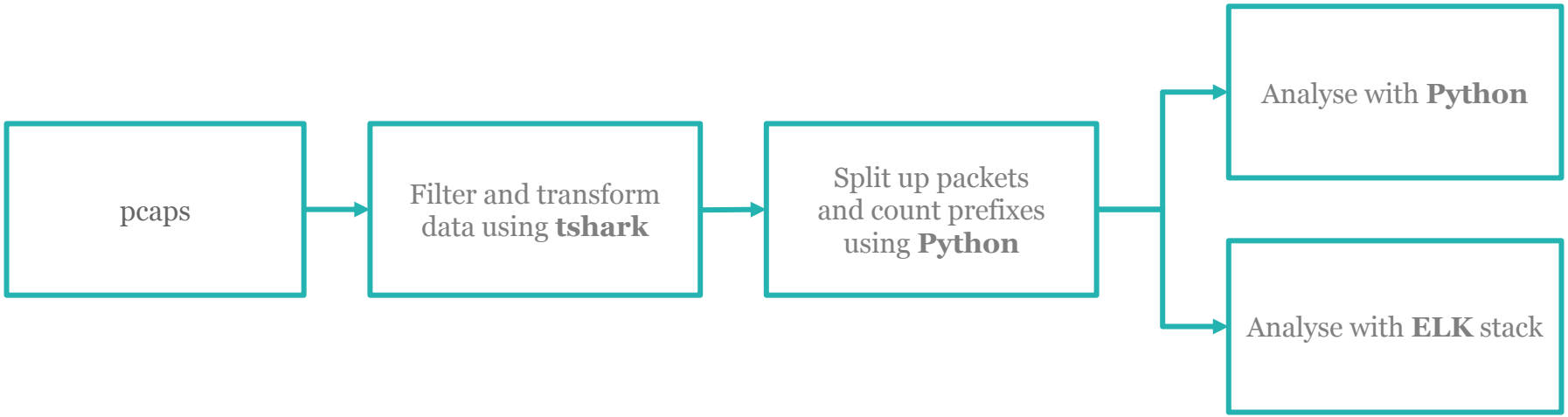


Customer AS of SIDN Labs



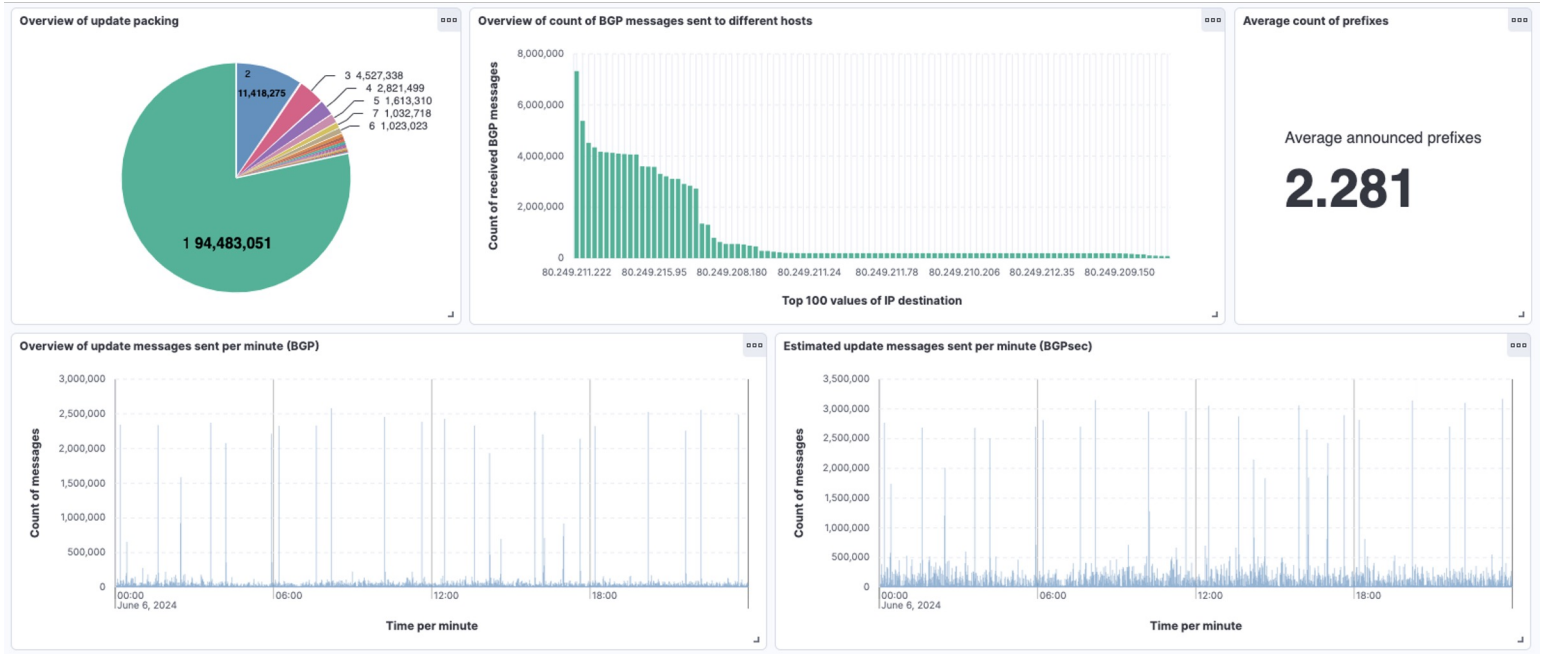
Methodology

Data selection and preparation.



Methodology

Data analysis using Elasticsearch and Kibana.



Results: Analysed metrics

1. **Update packing**

2. Increase of update messages within a certain time span

Results: Update packing

Customer AS

IP version	Average	Median	Maximum	SD[1]
IPv4	2.266	1	999	8.783
IPv6	1.347	1	558	4.691

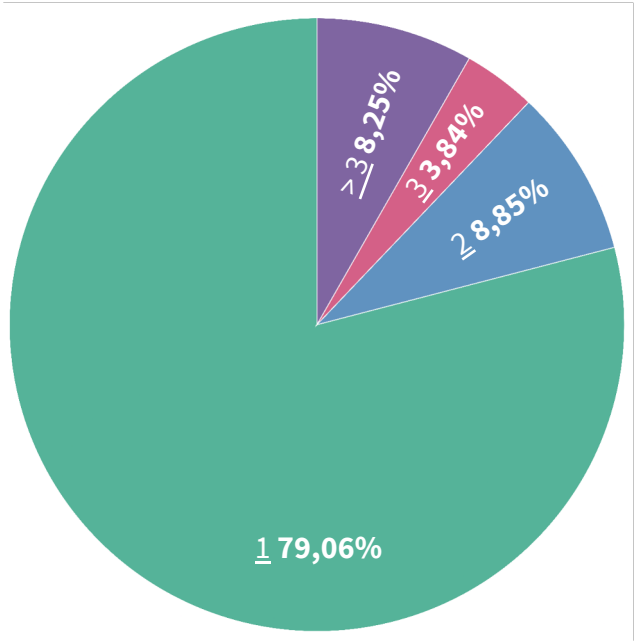
AMS-IX route server

IP version	Average	Median	Maximum	SD[1]
IPv4	2.281	1	1,010	10.351
IPv6	1.558	1	570	7.247

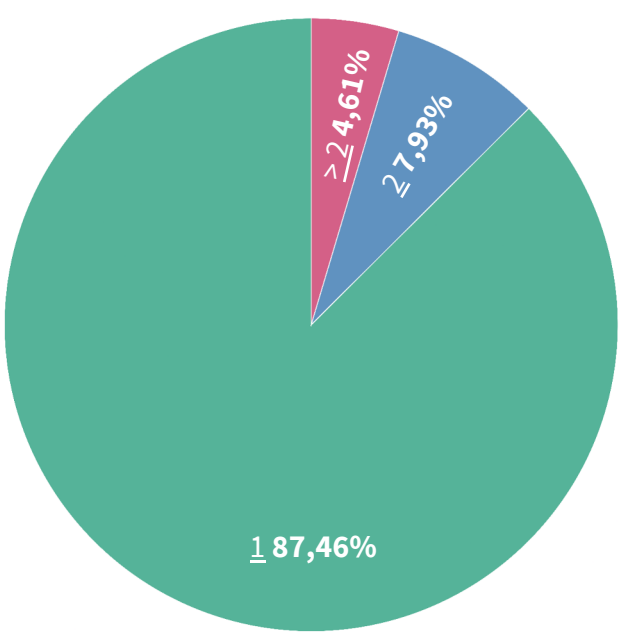
[1]Standard Deviation

Results: Update packing

Customer AS: Distribution



IPv4



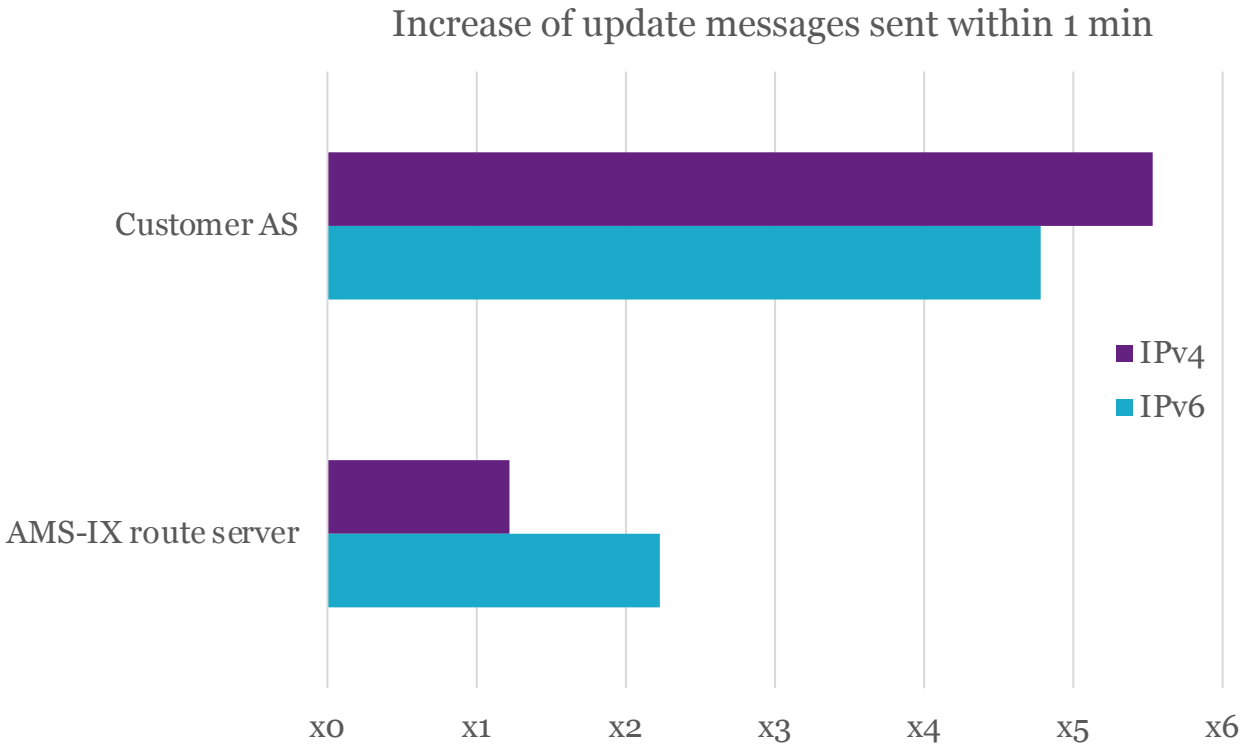
IPv6

Results: Analysed metrics

1. Update packing

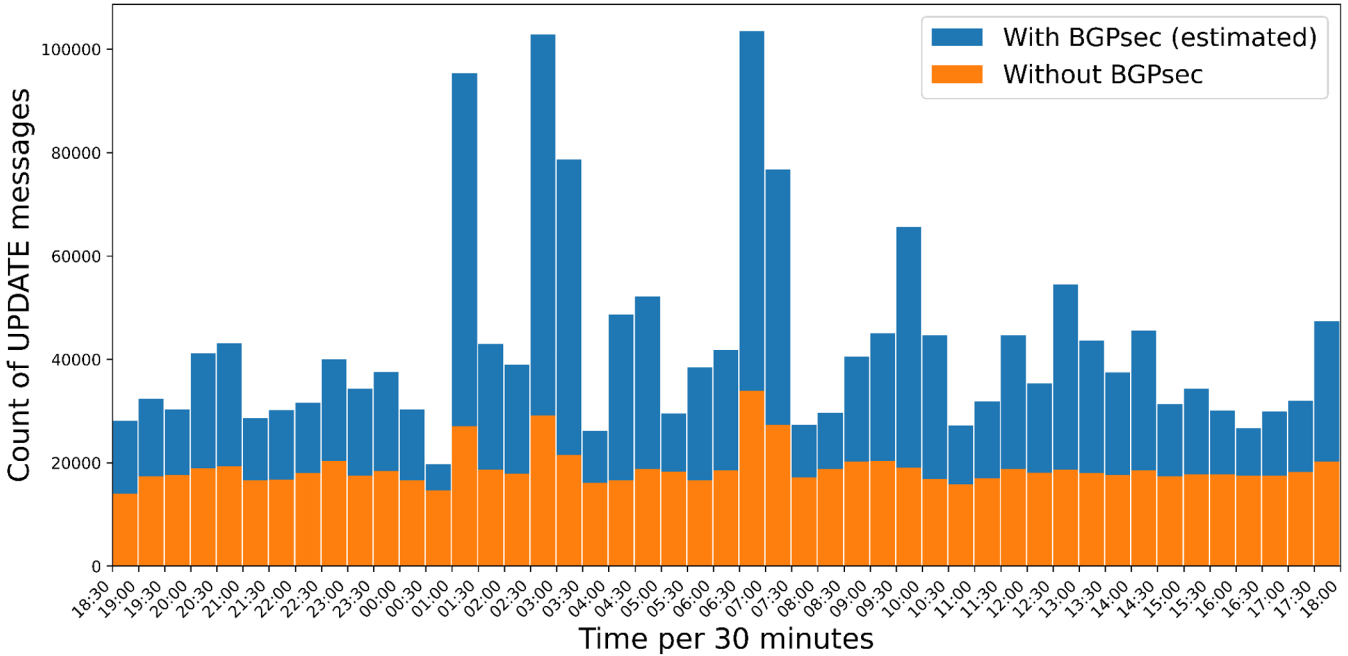
2. **Increase of update messages within a certain time span**

Results: Impact on BGP traffic



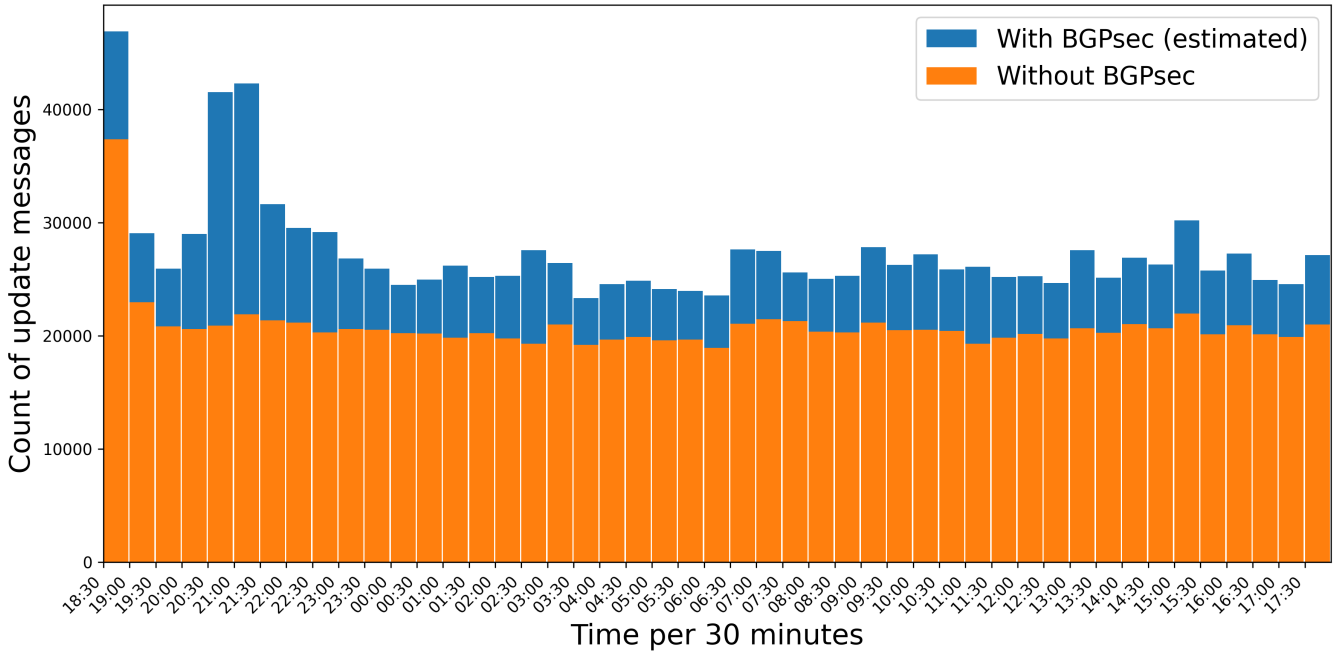
Results: Impact on BGP traffic

Customer AS: Update messages sent per 30 min (IPv4)

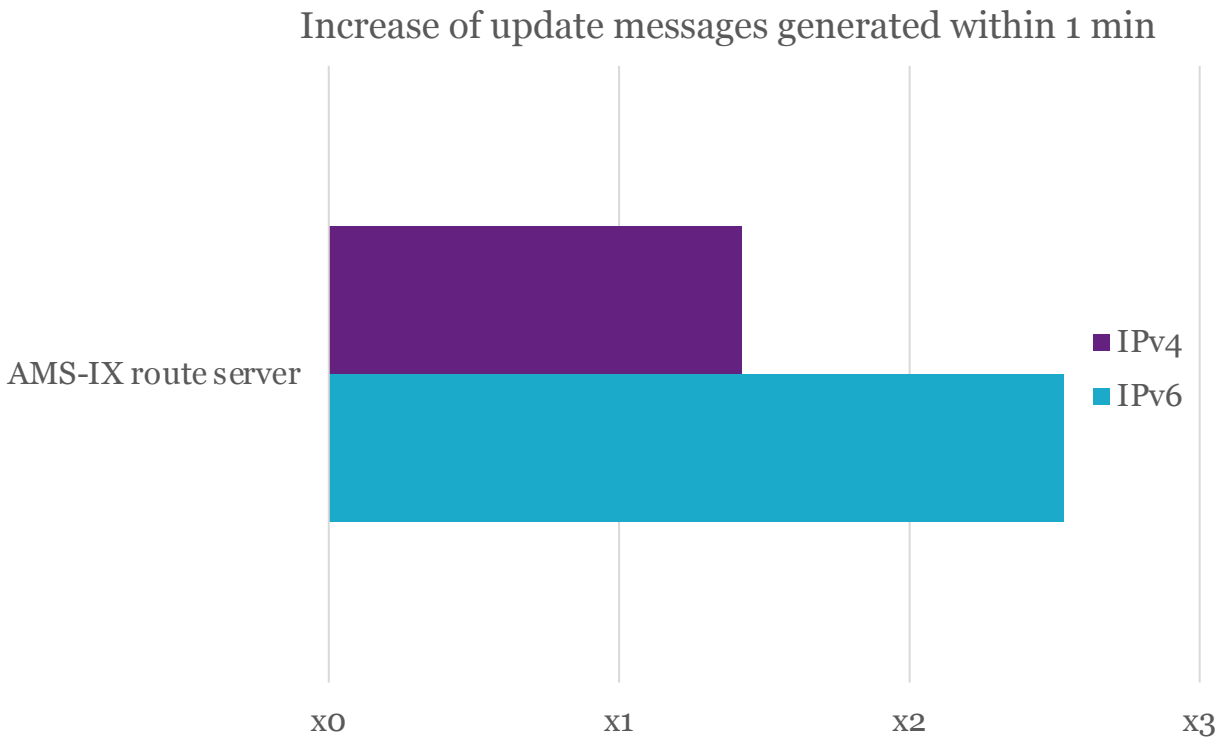


Results: Impact on BGP traffic

Customer AS: Update messages sent per 30 min (IPv6)

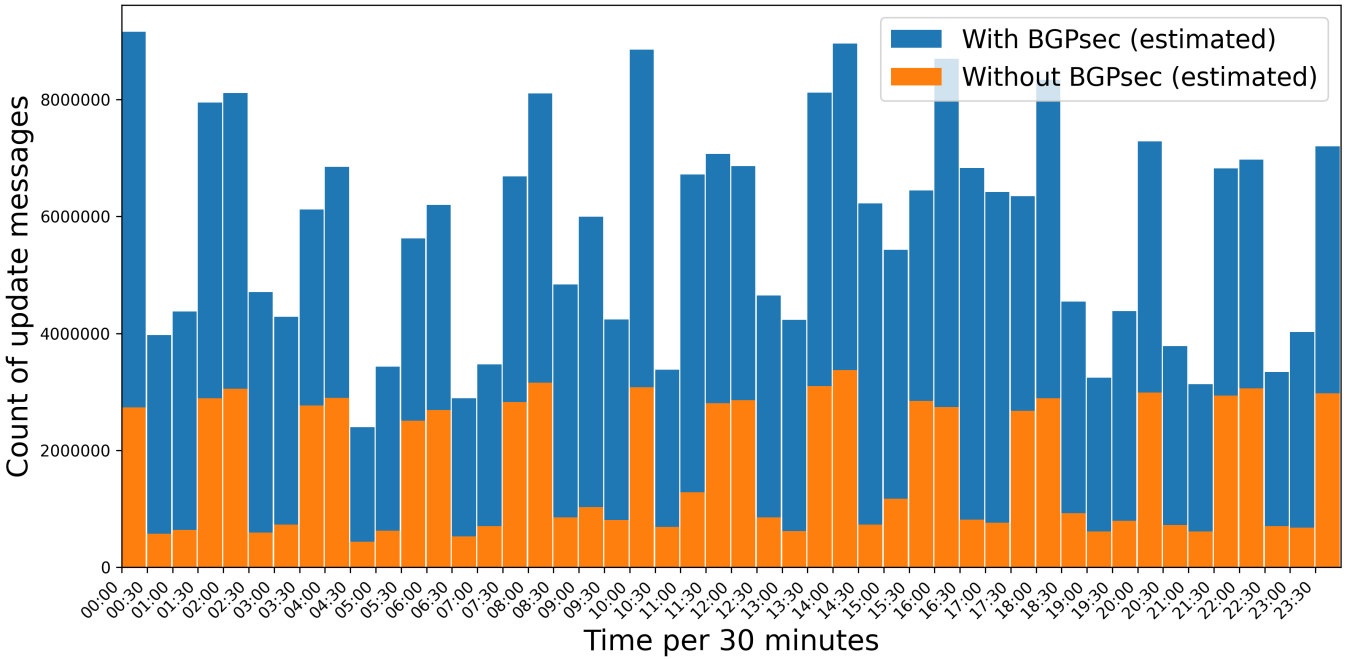


Results: Impact on message generation



Results: Impact on message generation

AMS-IX route server: Update messages generated per 30 min (IPv4)



Discussion

- BGPsec requires a **higher amount** of update messages
- Impact on **IPv4** is higher than on IPv6
- High count of BGP messages does not imply **high count of packed prefixes**
- BGP speaker with a **lot of peers** has to create more BGPsec messages
- Results are only an **estimation**

Conclusion

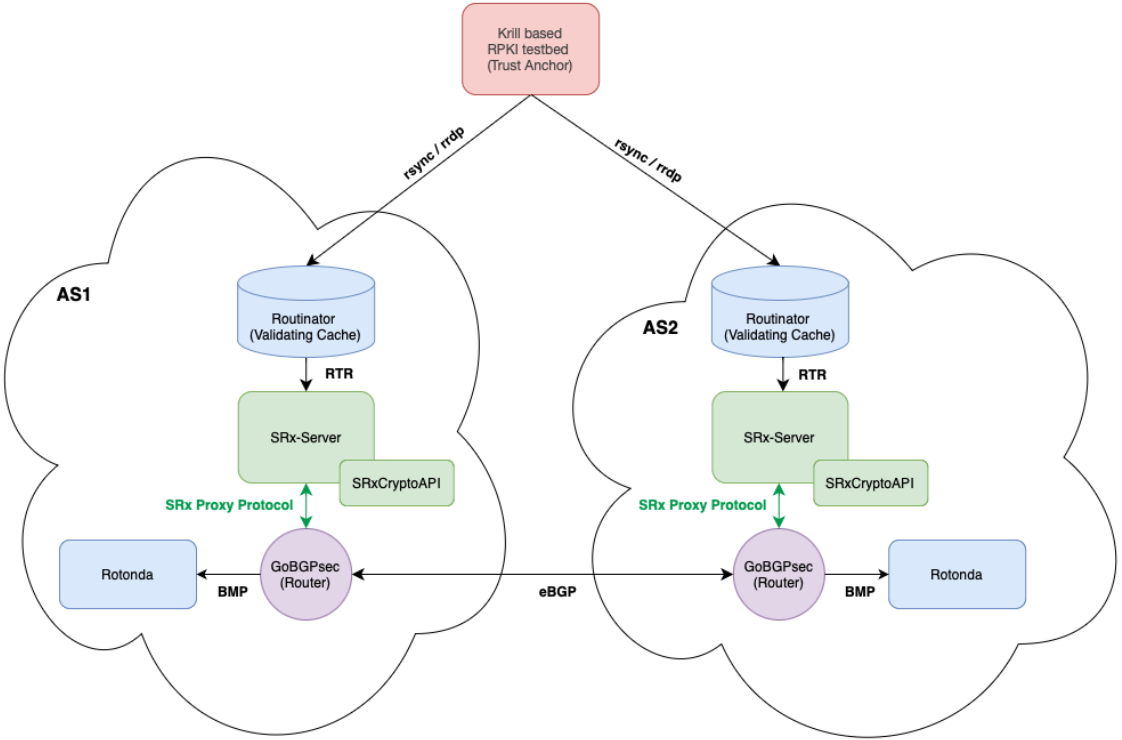
- **Did not find an average of 4 announced prefixes** per BGP message as determined by earlier work (Sriram et al. 2011)
- **Median** of announced prefixes is **1** for all analysed data
- Impact of BGPsec on BGP traffic **could be smaller than expected**
- Messages are **regularly** sent to multiple peers

Future Work

- Investigation of existing **BGPsec implementations**
- Analysis using BGPsec data
- Detailed analysis of **differences between IPv4 and IPv6**

What now?

BGPsec testbed as basis for further research



Full report is available on sidnlabs.nl

Any questions or further ideas?

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Thanks for listening!