

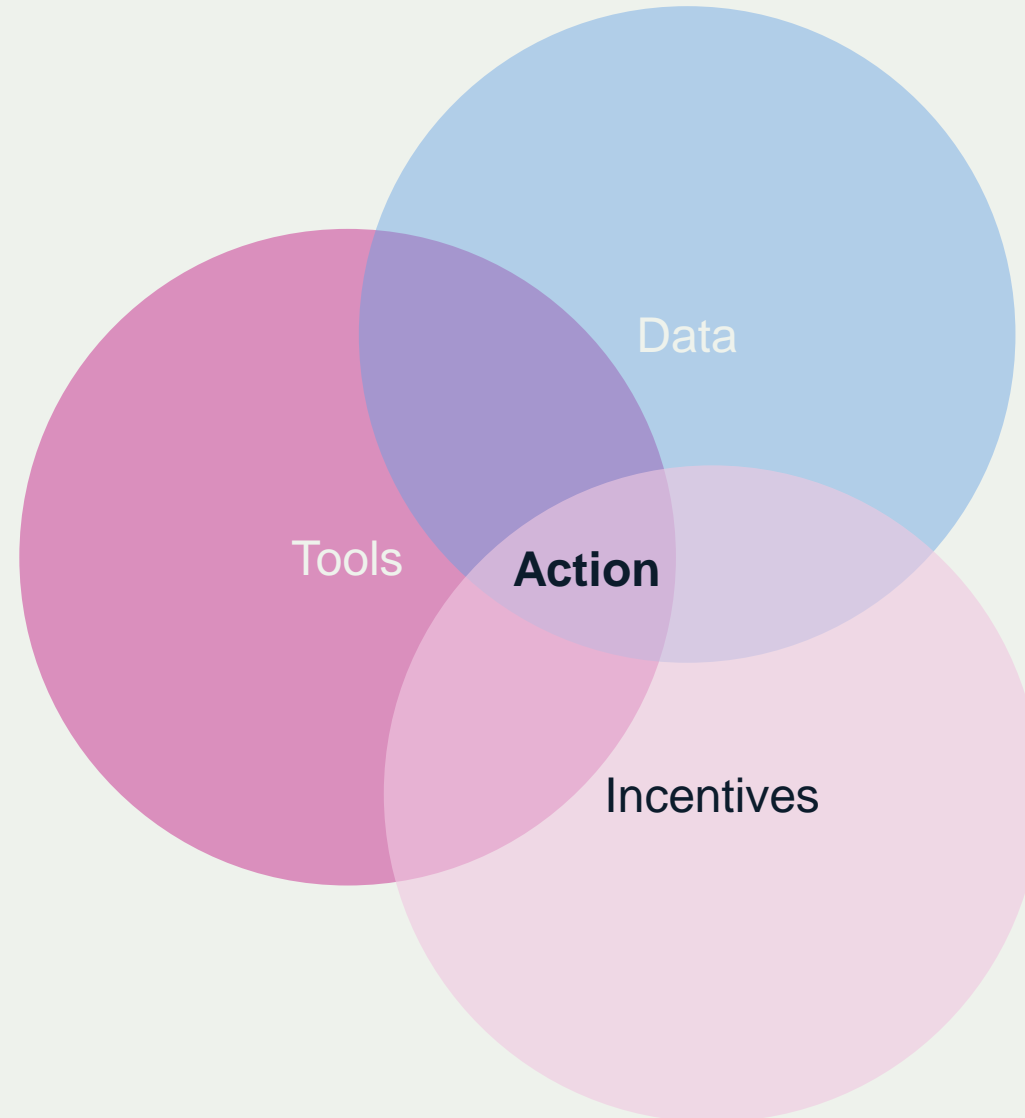
Better routing security through concerted action

2019

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BGP is unsecure – what's missing?



We Are In This Together



Network operators have a responsibility to ensure a globally robust and secure routing infrastructure.

Your network's safety depends on a routing infrastructure that is secure and resilient to attacks. Network operators have a responsibility to ensure a globally robust and secure routing infrastructure.

- ネットワークの安定は偶発的なアクシデントや悪意のある人などのインターネットを破壊行為を排除するインターネット経路制御基盤にかかっています。

The more network operators work together, the fewer incidents there will be, and the less damage they can do.

- より多くのネットワーク運用者が一体となって行動し、将来のインシデントをより少なくしてゆき、それによるダメージを減少させます。

Mutually Agreed Norms for Routing Security

MANRS provides baseline recommendations in the form of Actions

- Distilled from common behaviors – BCPs, optimized for low cost and low risk of deployment
- With high potential
 - 一般的な動作からの抽出された振る舞い - BCP 低コストでリスクは低い
 - 規範になりうる高い潜在力

MANRS builds a visible community of security minded operators

- Social acceptance
 - MANRSはセキュリティを重視する目立つコミュニティを作っています
 - 受け入れられ仲間同士で”やろう”という誘い



MANRS

Network operators

Filtering

Prevent propagation of incorrect routing information

- あなたやあなたの顧客の広告する経路は正しいことをFilteringによって確かにしよう

Anti-spoofing

Prevent traffic with spoofed source IP addresses

- あなたの顧客がSingleホームならSource Address Validationかけよう

Coordination

Facilitate global operational communication and coordination between network operators

- みんなで共用のDB(WHOISやIRR)は最新情報に更新しよう！

Global Validation

Facilitate validation of routing information on a global scale

- あなたの情報を登録しよう(RPKIやIRRに訳注)。そうすれば他の人が検証できる！

IXPs

Action 1

Prevent propagation of incorrect routing information

- RouteServerでのIRRやRPKIのValidationは必須です。

Action 2

Promote MANRS to the IXP membership

- MANRS参加のIXPsはMANRSの行動を推奨、支援の提供が期待されます。

Action 3

Protect the peering platform

- MANRS参加のIXPsはピアリングにおいて交換すべきでないトラフィックポリシーを明確にしなければならない。

Action 4

Facilitate global operational communication and coordination

- MANRS参加のIXPsはMLと会員へのディレクトリを提供し会員同士のコミュニケーションを促進しよう

Action 5

Provide monitoring and debugging tools to the members.

- MANRS参加のIXPsはメンバーへLooking Glassを提供する

Content

- 準備中！

Action 1

Prevent propagation of incorrect routing information

- 誤った経路情報を伝播させない。

Action 2

Prevent traffic with spoofed source IP addresses

- 送信元を偽装したトラフィックを通過させない

Action 3

Facilitate global operational communication and coordination

- Globalな運用者コミュニティとのコミュニケーションを促進

Action 4

Facilitate validation of routing information on a global scale

- Globalでの経路情報のValidationの促進

Action 5

Promote MANRS

- MANRSのプロモート

Action 6

Provide monitoring and debugging tools to peering partners

- 観測・問題解決ツールのBGPピアへの提供

There is a problem

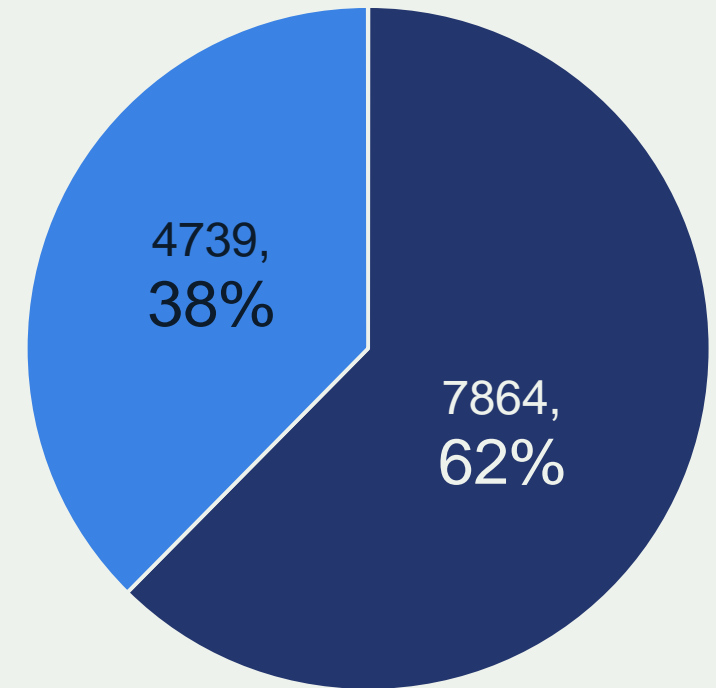
- 12,600 total incidents (either outages or attacks, like route leaks and hijacks)
- About 4.4% of all Autonomous Systems on the Internet were affected
- 2,737 Autonomous Systems were a victim of at least one routing incident
- 1,294 networks were responsible for 4739 routing incidents

• 2737ASが最低1回の問題の犠牲に

• 1294のnetworkが4739の問題に責任がある

• 12ヶ月間のインシデント

Twelve months of routing incidents (2018)



■ Outage ■ Routing incident

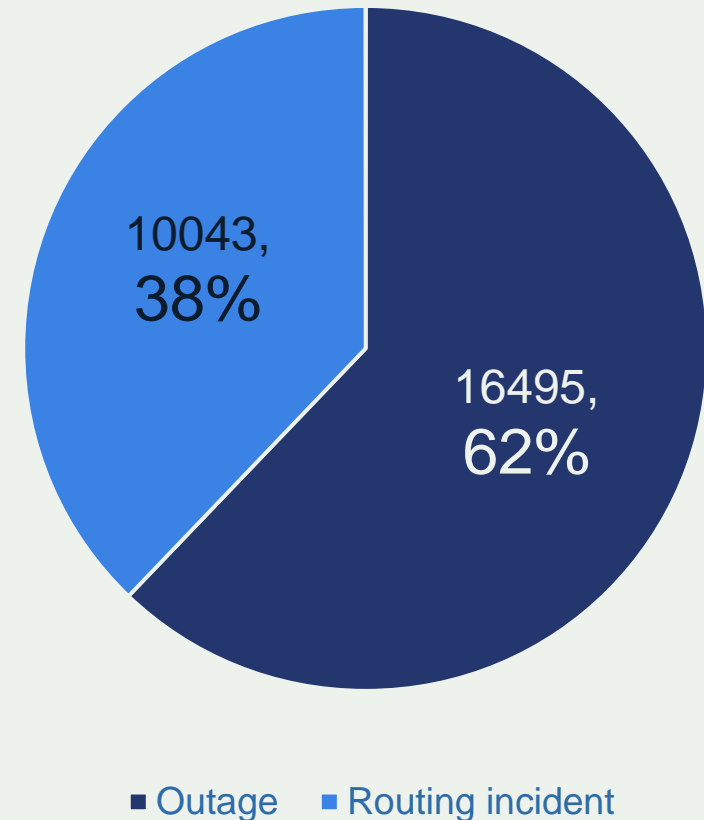
- Outage: 機能停止
- Routing incident

There is a problem (comp. 2017)

- 12,600 (↓9.6%) total incidents (either outages or attacks, like route leaks and hijacks)
- About 4.4% (↓1%) of all Autonomous Systems on the Internet were affected
- 2,737 (↓12%) Autonomous Systems were a victim of at least one routing incident
- 1,294 (↓17%) networks were responsible for 4739 routing incidents

• 訳注: MANRSにより2017年より減っている

Routing incidents (2017-2018)



2 years in review (2017, 2018)

Statistics of routing incidents generated from BGPStream data

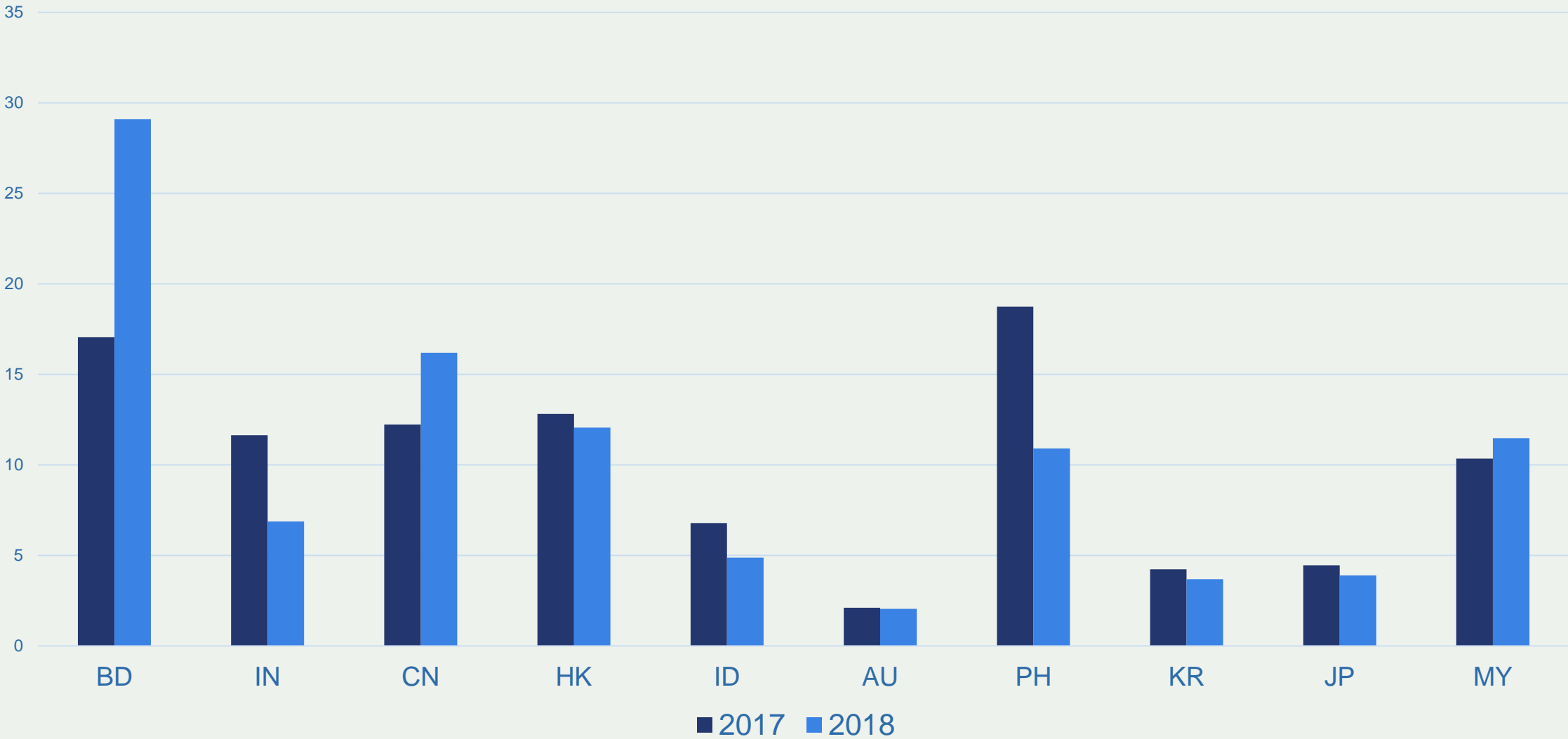
Caveats:

- Sometimes it is (or consented) routing change (or attack) (or
 - CC attribution data set
- 正当な(または同意された)ルーティングの変更と攻撃を区別することが不可能な場合があります。
 - 国別の属性はGeolite city Datasetで見えます。。

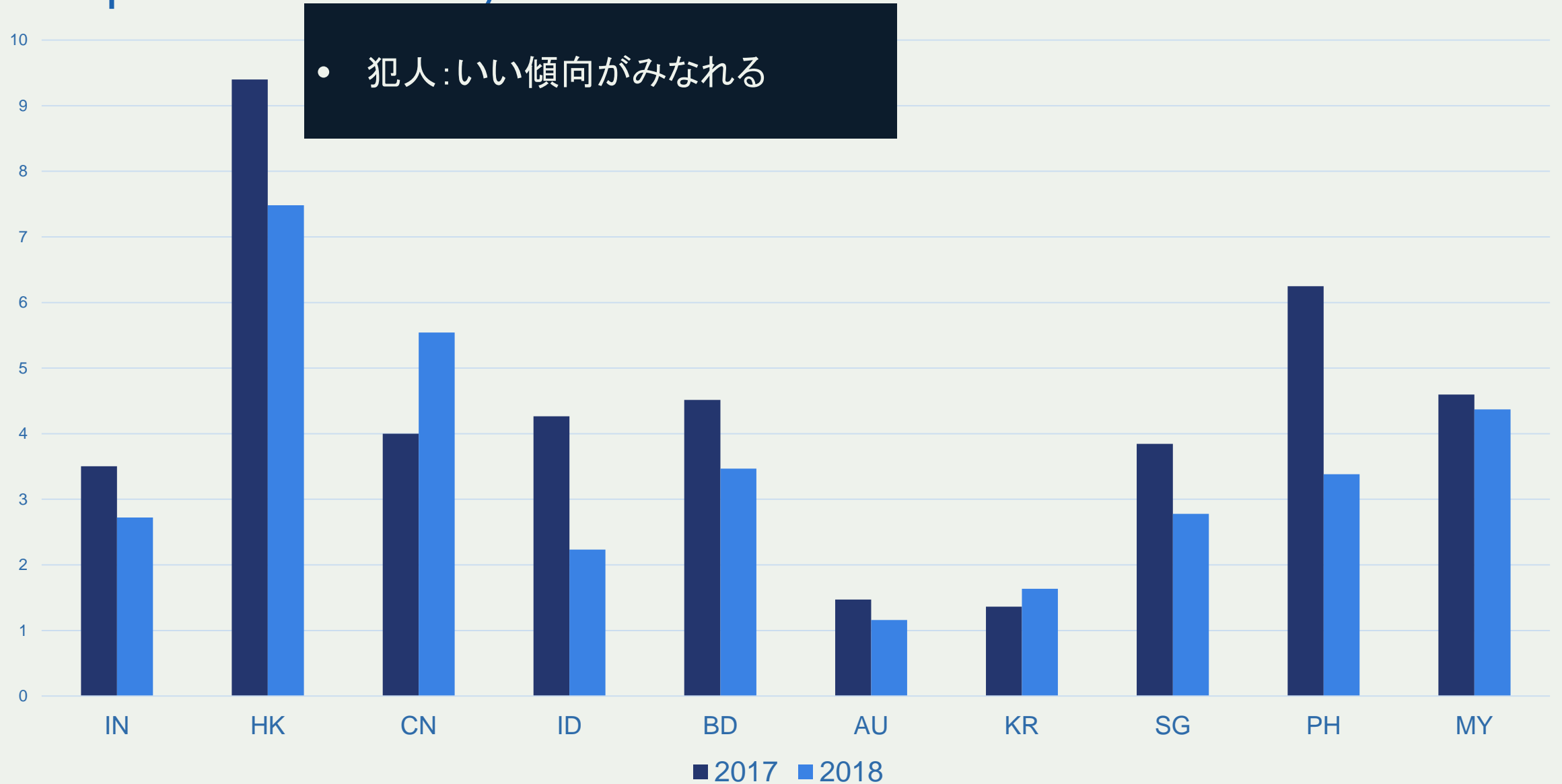
But:

- Using the same methodology we should get a pretty accurate picture of the dynamics
- 長年同じやり方で傾向を見れば動きが正確に観測できる

Potential victims: 2017 → 2018



Culprits: Positive dynamics



Can we track these data long term?

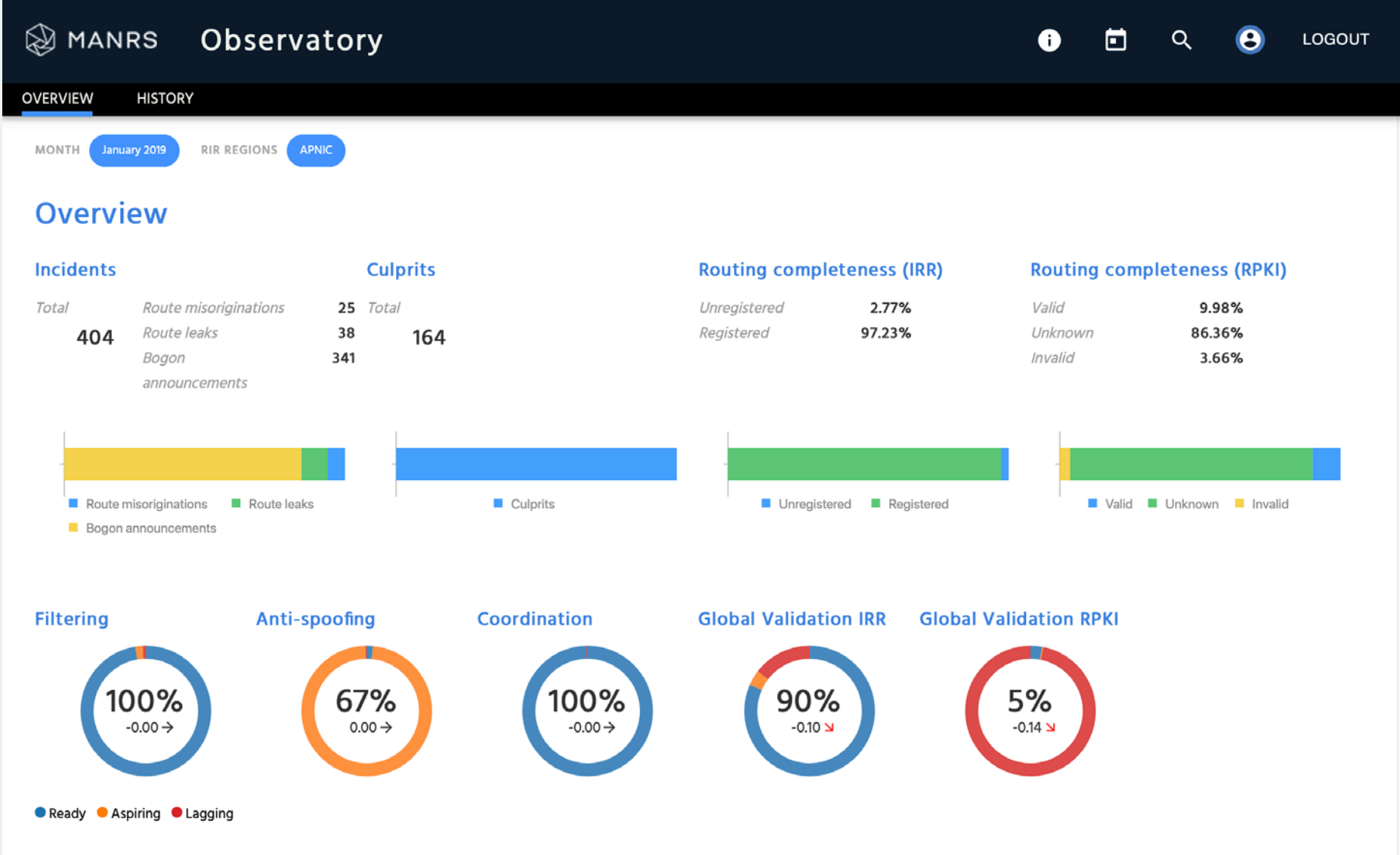
MANRS Observatory & Member Reports

- Longitudinal measurements of how routing security evolves
- MANRS as a reference point - "MANRS Readiness"
- Inform the members of their readiness
- Improve transparency and credibility of the effort

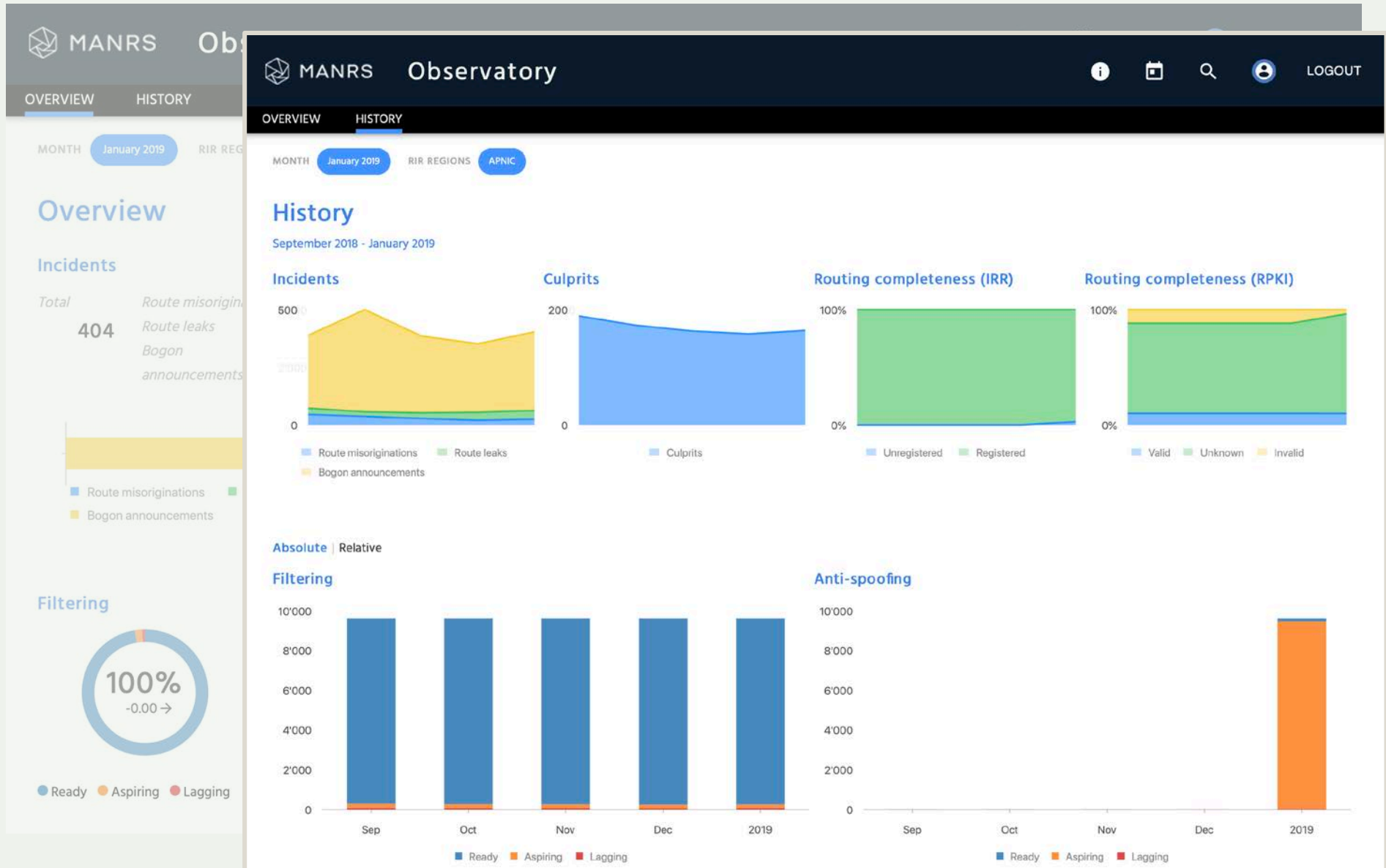
MANRS 観測&メンバーリポート(というのがあるらしい)

- 長期観測によるルーティングセキュリティの発展
- 参照点としてのMANRSの準備できてる度合い
- その準備の度合いのメンバーへの情報提供
- 目的達成への透明性、信憑性の改善

State of routing security: APNIC region, Jan 2019



Evolution: APNIC region, September 2018 - Jan 2019



Comparison on regional level

MANRS Dashboard
LOGOUT

OVERVIEW
HISTORY
DETAILS
COMPARISON

MONTH January 2019

Comparison

RIPE NCC MONTH January 2019 RIR REGIONS RIPE NCC

APNIC MONTH January 2019 RIR REGIONS APNIC

Filtering

M1 - Route leak by a member AS

Metric	Reference	RIPE NCC	APNIC
M1	99.4%	100%	99.8%
M2	99.8%	99.8%	99.8%
M3	99.2%	99.2%	99.2%
M4	99.4%	99.4%	99.4%
M4C	99.6%	99.6%	99.6%
M2C	99.8%	99.8%	99.8%
M1C	99.8%	99.8%	99.8%

M2 - Route misorigin by a member AS

Metric	Reference	RIPE NCC	APNIC
M5	24%	120%	96%
M8	48%	72%	72%
M7IRR	24%	24%	24%
M7RPKI	24%	24%	24%
M7RPKIN	24%	24%	24%

Ready ● Aspiring ● Lagging ●

Ready ● Aspiring ● Lagging ●

Comparison on country level

MANRS Dashboard | **COMPARISON**

MONTH: **January 2019** | UN REGIONS: **Europe**

Comparison

Netherlands (the) | MONTH: **January 2019** | COUNTRY: **Netherlands (the)**

Belgium | MONTH: **January 2019** | COUNTRY: **Belgium**

Filtering

Anti-spoofing, global validation & coordination

Metric	Reference	Netherlands (the)	Belgium
M1	100%	100%	100%
M2	99.6%	99.2%	98.8%
M3	98.8%	96.4%	98.8%
M4	99.2%	98.8%	98.8%
M4C	99.6%	99.2%	98.8%
M3C	98.8%	96.4%	98.8%
M2C	99.6%	99.2%	98.8%
M1C	99.6%	99.2%	98.8%

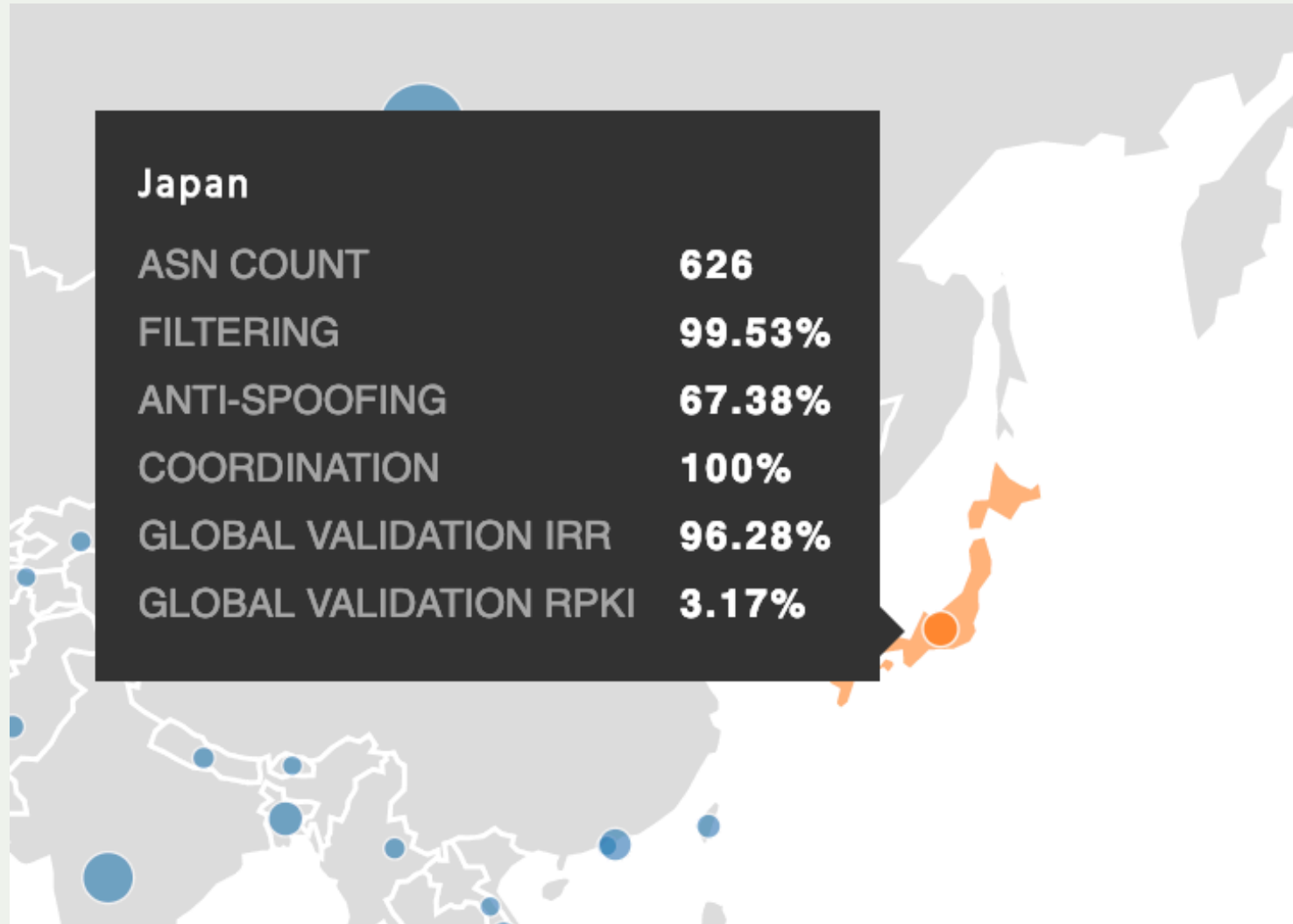
Metric	Reference	Netherlands (the)	Belgium
M5	110%	66%	66%
M8	88%	44%	44%
M7IRR	22%	11%	11%
M7RPKI	11%	11%	11%
M7RPKIN	11%	11%	11%

Routing completeness (RPKI)

Stacked bar chart showing Valid, Unknown, and Invalid RPKI routing completeness for Nov, Dec, and 2019.

Month	Valid	Unknown	Invalid
Nov	99.98%	0.02%	0%
Dec	86.36%	13.64%	0%
2019	9.98%	86.36%	3.66%

Japan Statistics



Network Operators from Japan

Organization	Service Area	ASNs	Action 1: Filtering	Action 2: Anti Spoofing	Action 3: Coordinati on	Action 4: Global Validation
APAN-JP	HK, JP, SG, TH, US	7660	✓		✓	✓
IJ*	JP	2497	✓	✓	✓	✓

* Founding Member

Internet Exchange Points from Japan

Organization	Service Area	Action 1: Prevent	Action 2: Promote	Action 3: Protect	Action 4: Coordinate	Action 5: Tools
JPNAP	JP	✓	✓	✓		✓

* Founding Member

Why join MANRS?

- Improve your security posture and reduce the

- セキュリティ体制を改善し、ルーティングインシデントの数と影響を減らす

- これらの実践が現実的で効果があることをみんなで証明しよう！

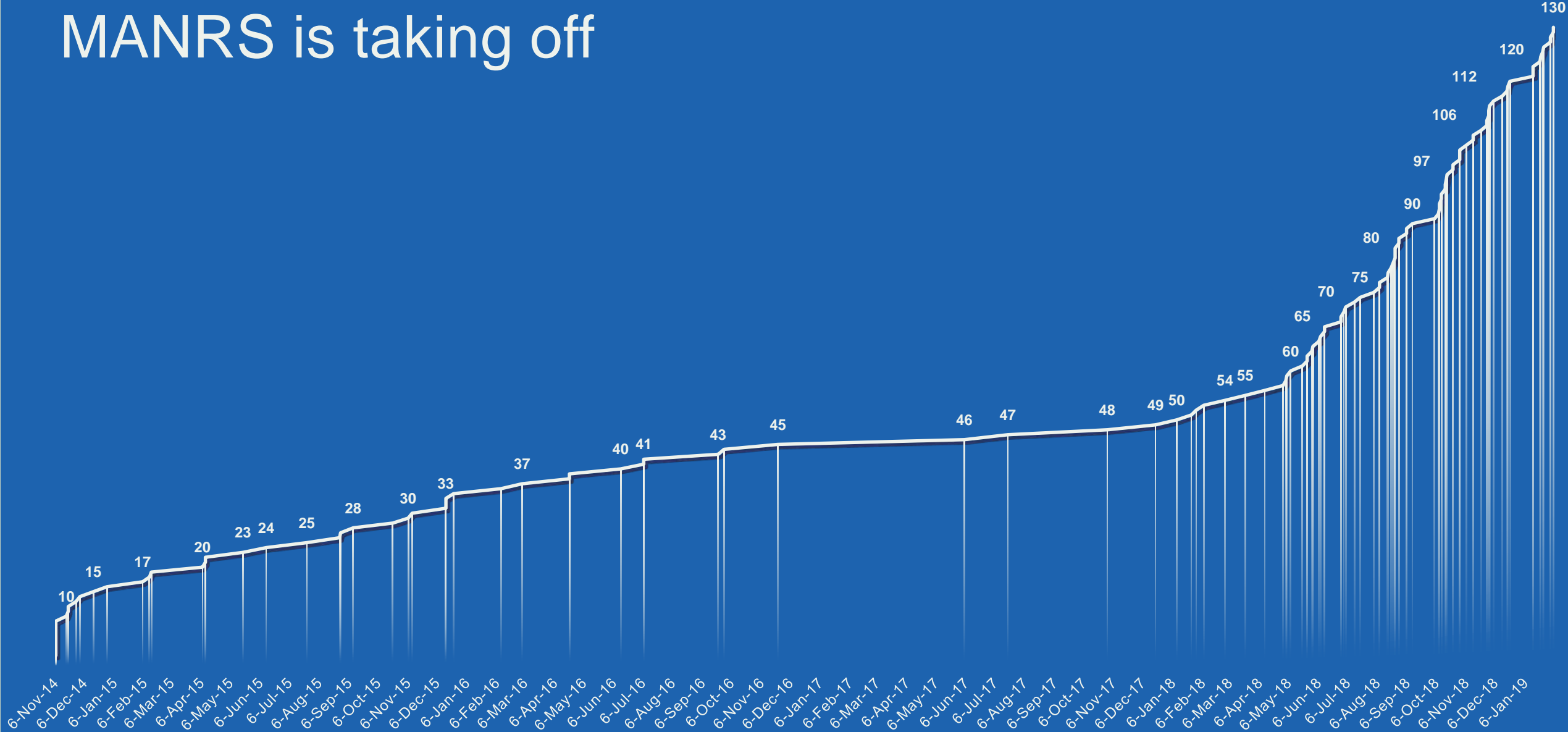
- Join a community of security-minded operators

- セキュアマインドのあるオペレータ同士がこみゆにちへ参加することによりインターネットがよりよくなる

- Use MANRS as a competitive differentiator

- MANRSへの参加は競争力のある差別化要因である

MANRS is taking off



only together

manrs.org

#ProtectTheCore

MANRS Video:

<https://www.youtube.com/embed/nJINk5p-HEE>