May 2024

Indexing Internet Resilience in Central Asia

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What We'll Discuss Today

Internet Resilience

- What is it?
- Tools to measure it
- What is the situation in Central Asia

Internet Fragmentation

- Threats
- What we can learn from other countries

Discussion

- What data are you collecting and sharing?
- What data can help you in your advocacy efforts?
- How can we collaborate to improve the health of the Internet in your countries?

- Launched December 2020.
- We curate Internet measurement data from trusted sources to help everyone gain deeper, data-driven insight into the Internet.

Trusted data from multiple sources:

- **Benefit**: Helps to assess whether efforts to ensure that the Internet remains open, globally connected, secure, and trustworthy are working.
- **Benefit:** Allows policymakers, researchers, journalists, network operators, civil society groups, and others to better understand the health, availability, and evolution of the Internet.

pulse.internetsociety.org

Pulse Data Partners

- Data is provided by our trusted data partners

Pulse tracks

Shutdowns: Where do Internet Shutdowns take place and what is the economic cost?

Technologies: What is the state of deployment of technologies critical for the evolution of the Internet?

Concentration: How much are services concentrated in the hands of a few?

Resilience: How robust is the Internet ecosystem?

What I'll cover today

Shutdowns: Where do Internet Shutdowns take place and what is the economic cost?

Technologies: What is the state of deployment of technologies critical for the evolution of the Internet?

Concentration: How much are services concentrated in the hands of a few?

Resilience: How robust is the Internet ecosystem?

Country Reports: Consolidate and illustrate critical Internet health metrics

What's impacting the health of the Internet?

Where to start

Where to start

Resilience

A resilient Internet connection maintains an acceptable level of service despite faults and challenges to normal operation.

The Internet Resiliency Index (IRI) pulse.internetsociety.org/resilience

The framework collates around 30 sets of public metric data that relate to **four pillars** of a resilient Internet:

Infrastructure	Performance	Security	Market Readiness
The existence and availability of physical infrastructure that provides Internet connectivity.	The ability of the network to provide end-users with seamless and reliable access to Internet services.	The ability of the network to resist intentional or unintentional disruptions through the adoption of security technologies and best practices.	The ability of the market to self-regulate and provide affordable prices to end-users by maintaining a diverse and competitive market.

Methodology https://pulse.internetsociety.org/wp-content/uploads/2023/07/Internet-Society-Pulse-IRI-Methodology-July-2023-v2.0-Final-EN.pdf

Types of indicators

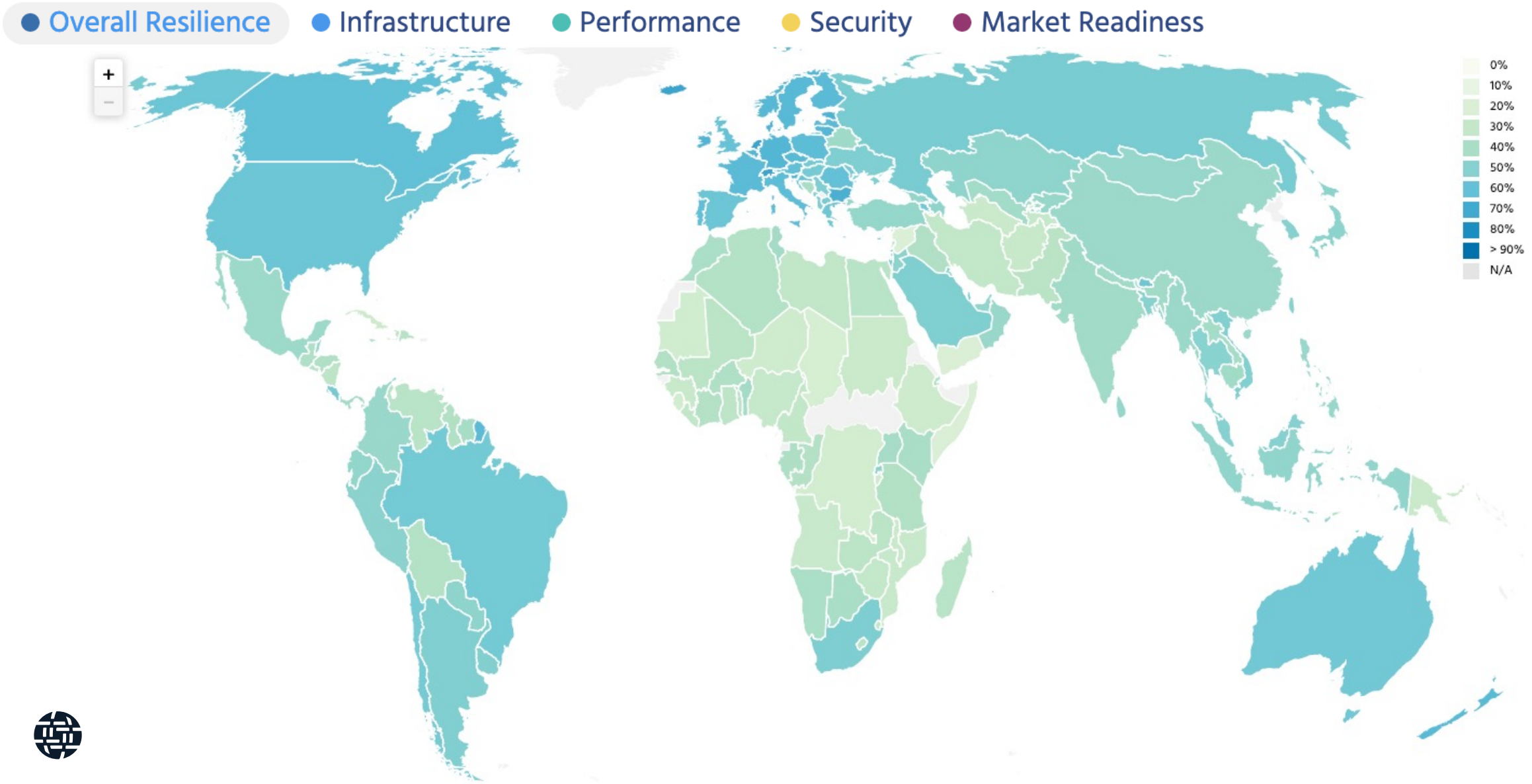
- **Relevance**: The indicator should work towards showing an increase or decline in the resilience of the Internet in a selected country.
- **Accuracy**: The indicator should correctly estimate or describe the quantities or characteristics they are designed to measure.
- **Coverage**: The data should cover as many countries as possible, as the Index is intended to be a global index. An indicator is not included if there is missing data on more than 25% of countries in the Index.
- **Freshness**: Any dataset should be at most two years old. Some datasets such as performance or network coverage should be recent. Some other datasets such as number of exits points do not change considerably over years, so it is acceptable to use a dataset which is a year or two old.
- **Continuity**: To objectively compare the index over the years, it is important to work with a stable list of indicators, which will provide data consistently over time.

Types of indicators

1. **Direct indicator**: A direct indicator is a direct measure of an aspect of resilience e.g., percentage of HTTPS adoption, latency, bandwidth, etc. They have a specific unit of measurement, and the raw value can be on different scales depending on what is being measured.
2. **Composite indicator**: A composite indicator provides a score, which itself has been derived from multiple other variables. Examples are the MANRS score, EGDI index, Market Concentration, etc. The scale of a composite indicator is usually between 0 and 100.
3. **Proxy indicator**: A proxy is used where it is difficult to find a specific metric to measure an aspect of resilience. Proxies can be either direct or composite indicators. For example, the IRI uses “Number of IXPs” and “Number of data centers”, together to quantify the robustness of the local infrastructure.

Internet Resilience — Globally

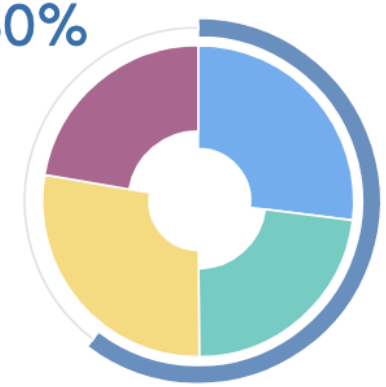
pulse.internetsociety.org/resilience



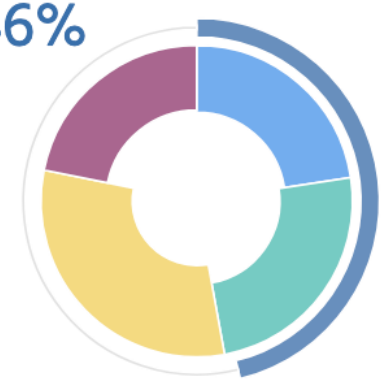
Overall Internet Resilience — By Region

Overall Resilience | Infrastructure | Performance | Security | Market Readiness

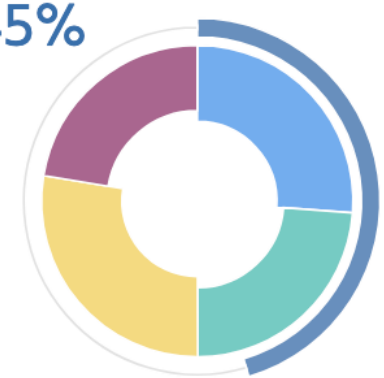
Europe
60%



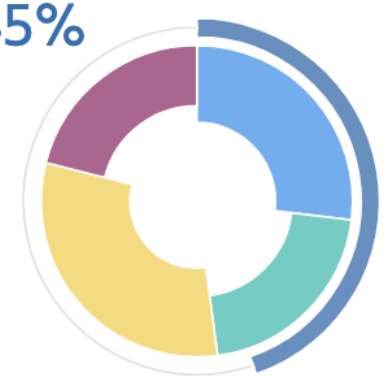
Asia
46%



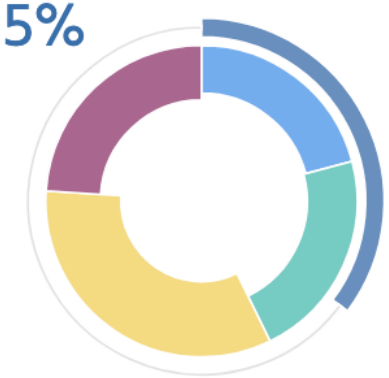
Americas
45%



Oceania
45%



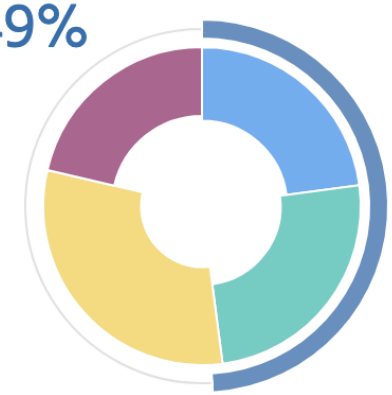
Africa
35%



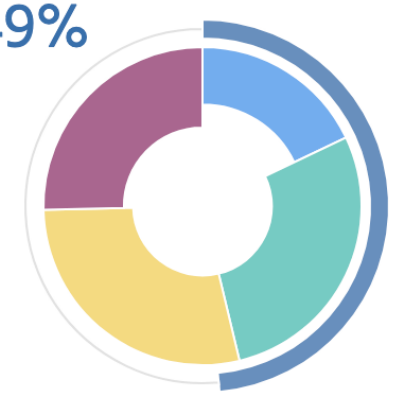
Overall Internet Resilience — Asia

Overall Resilience · Infrastructure · Performance · Security · Market Readiness

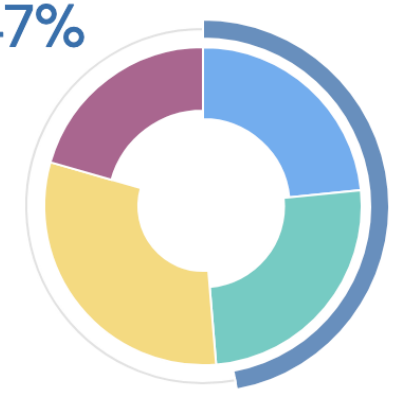
South-Eastern Asia
49%



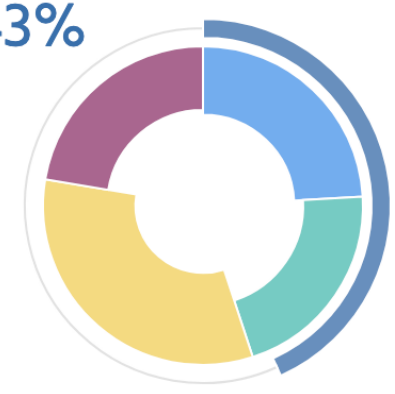
Eastern Asia
49%



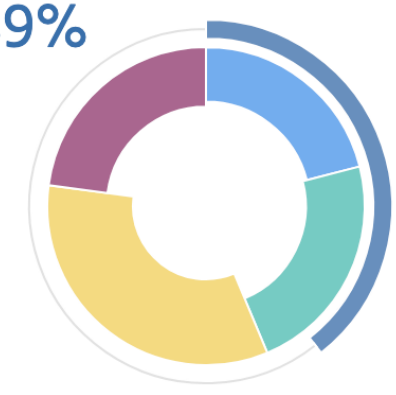
Western Asia
47%



Southern Asia
43%



Central Asia
39%

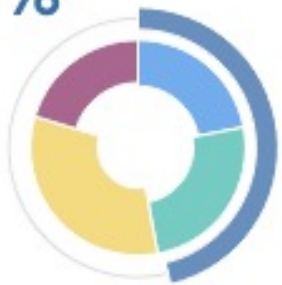


Overall Internet Resilience — Central Asia

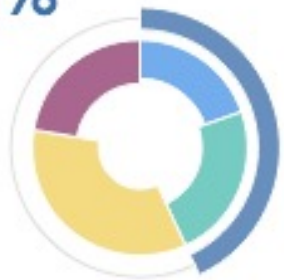
Overall Resilience | Infrastructure | Performance | Security | Market Readiness

Kazakhstan
49%

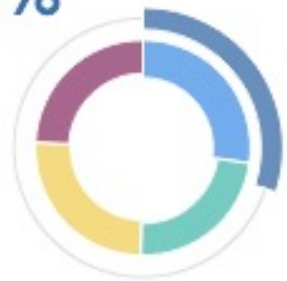
Kyrgyzstan
46%



Uzbekistan
43%

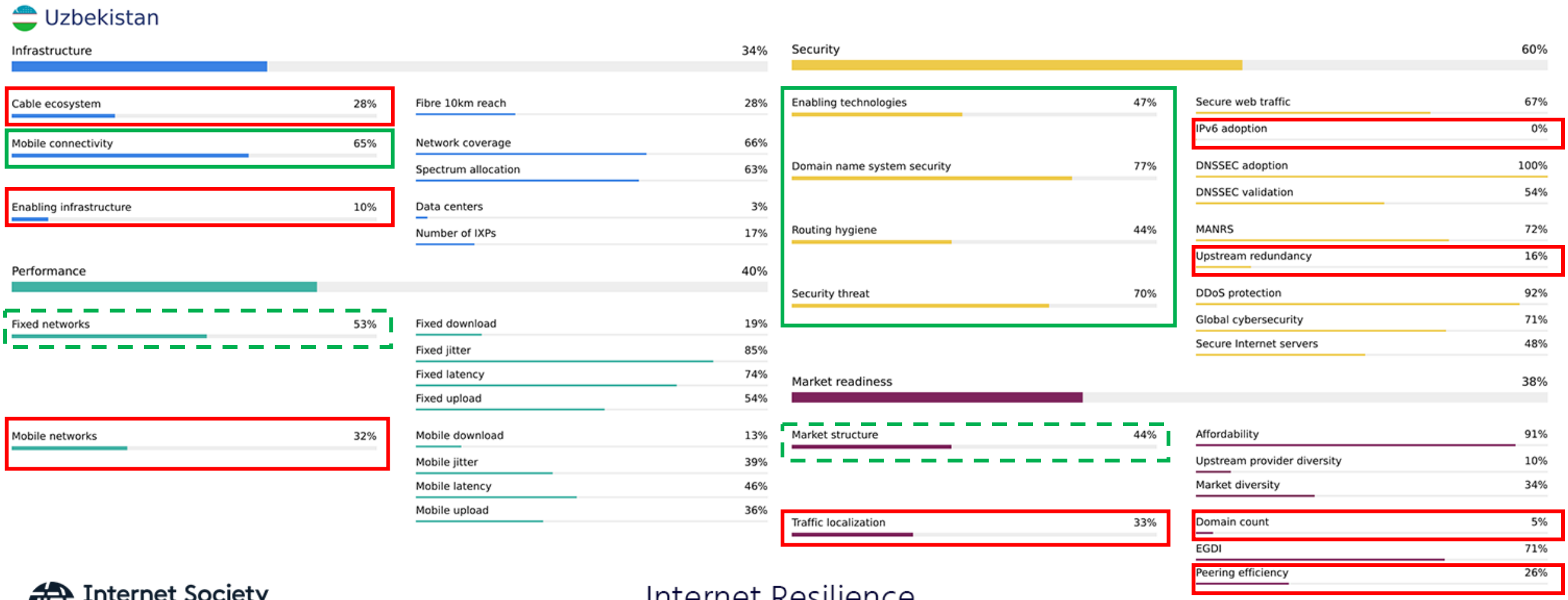


Tajikistan
30%



Turkmenistan
29%

Uzbekistan – Internet Resilience Index



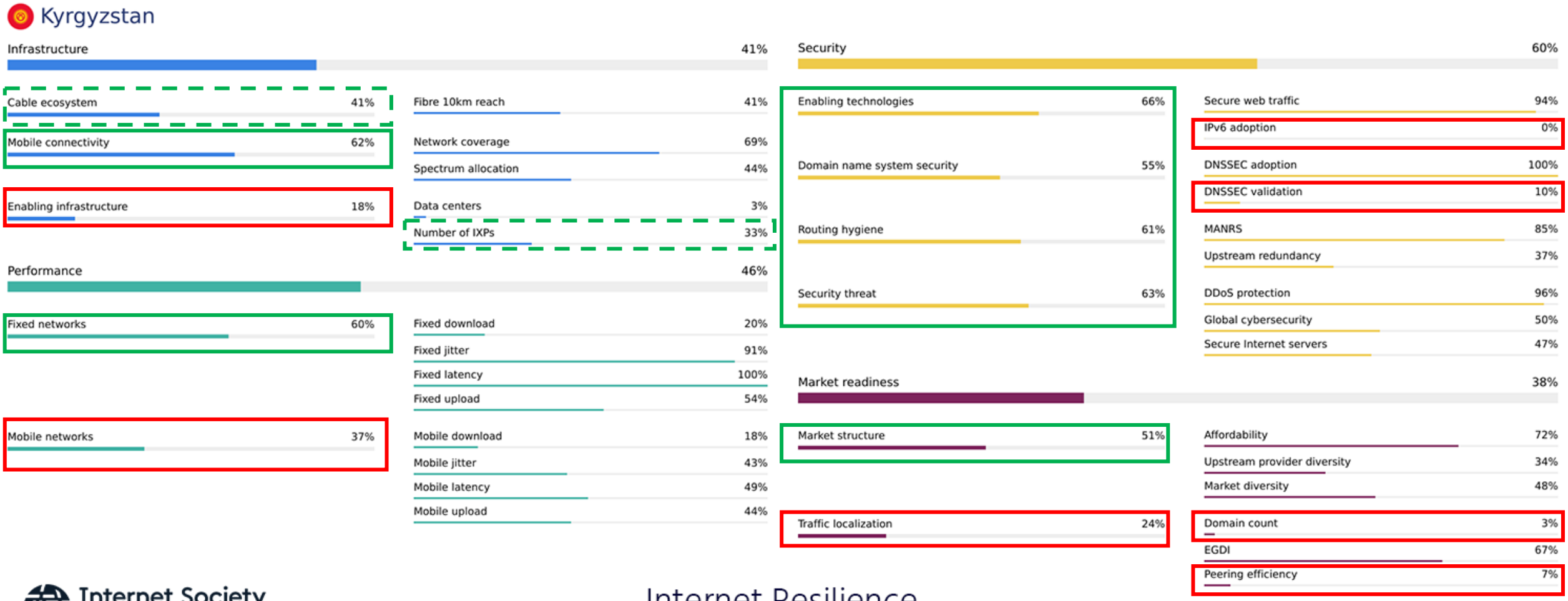
Internet Society Pulse

Internet Resilience

pulse.internetsociety.org

data source: Pulse Internet Resilience Index

Kyrgyzstan – Internet Resilience Index



Internet Society Pulse

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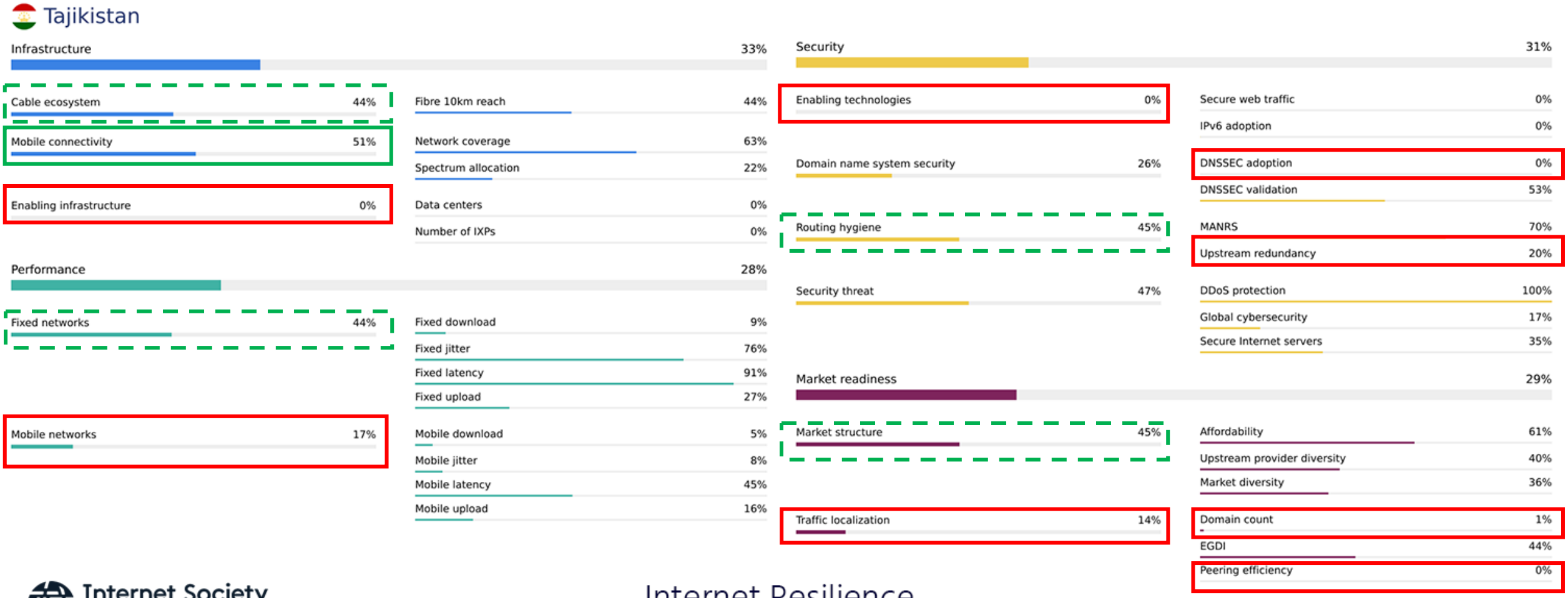
data source: Pulse Internet Resilience Index

Tajikistan – Internet Resilience Index



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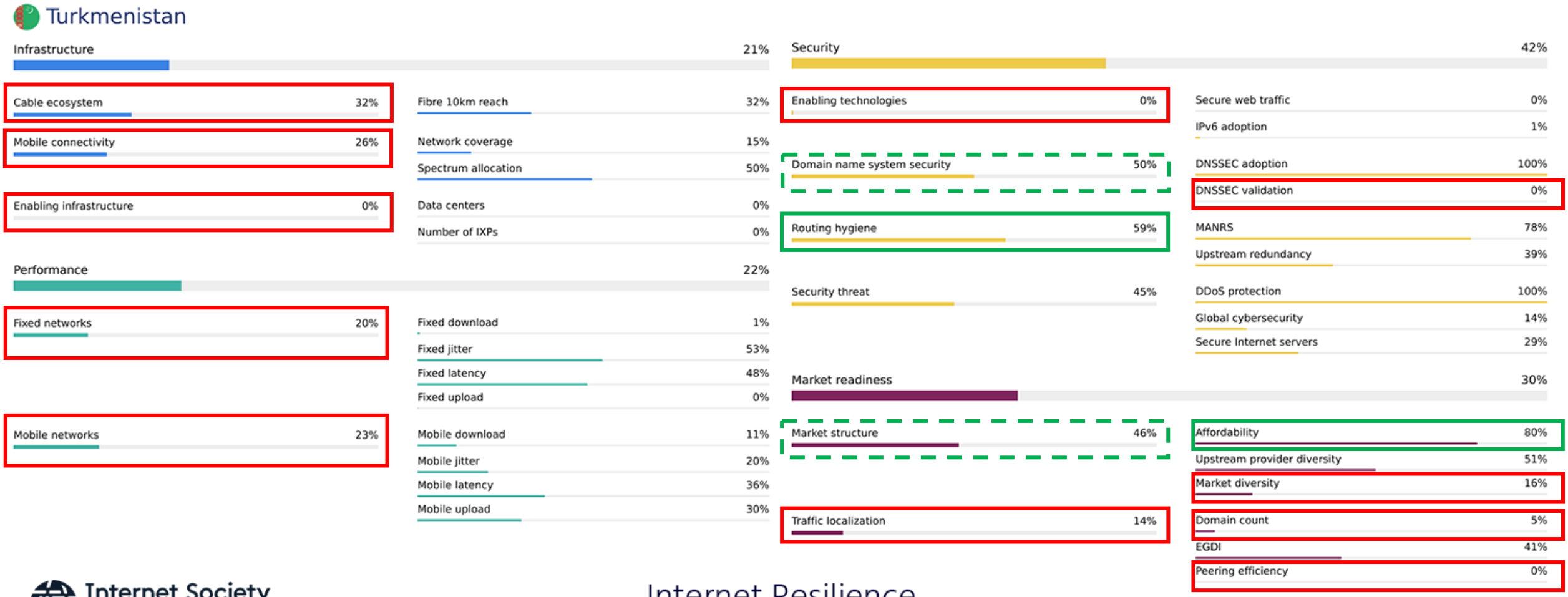
Turkmenistan – Internet Resilience Index



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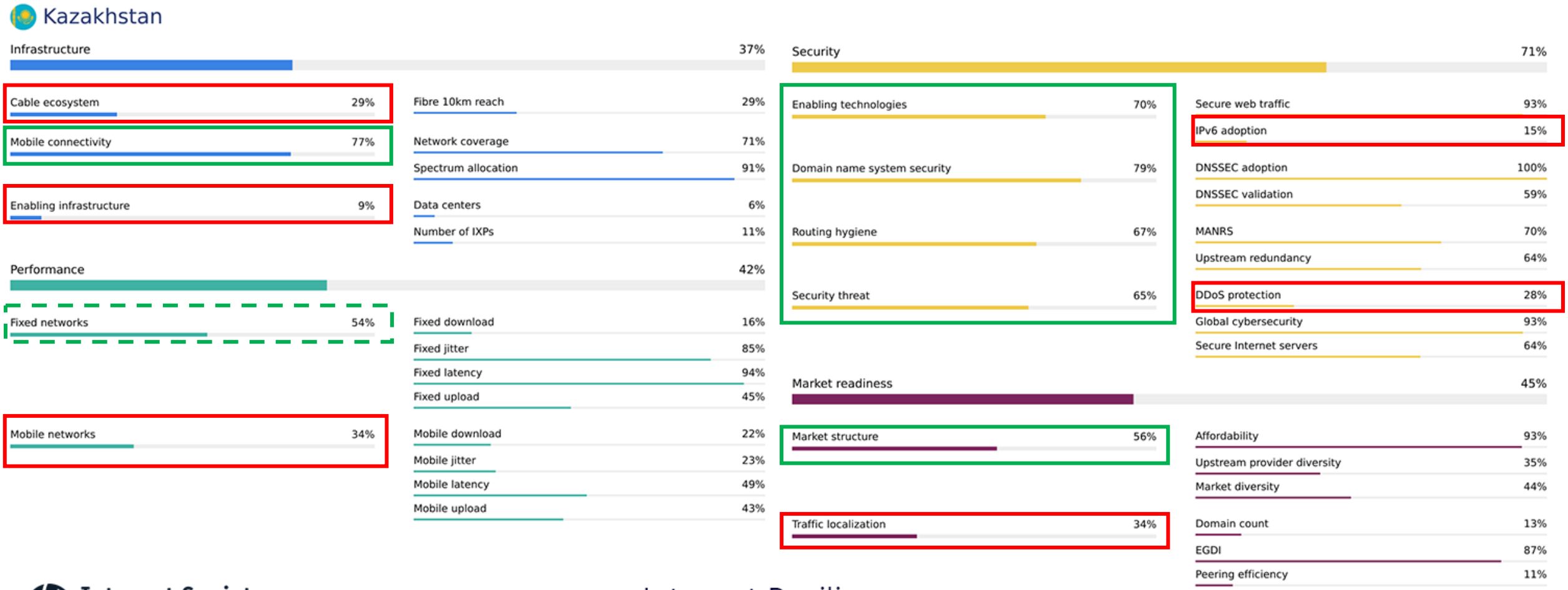
Kazakhstan – Internet Resilience Index



Internet Society Pulse

Internet Resilience

pulse.internetsociety.org

data source: Pulse Internet Resilience Index

Comparison of Overall/Pillar scores

Open Internet Environment, Kazakhstan

An **open** Internet is an accessible Internet – it is easy to connect to the open Internet and use its services.

Internet Use

Individuals using the Internet as a percentage of the total population

92%
Regional
Rank: 12

71%
Asia avg.

Internet Resilience Score

A resilient Internet connection is one that maintains an acceptable level of service in the face of faults and challenges to normal operation

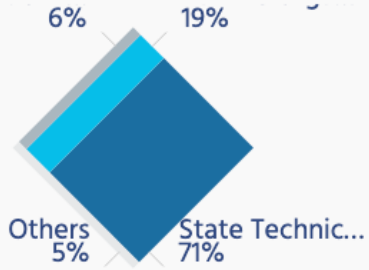
49%
Regional
Rank: 20

46%
Asia avg.

See details

IXP Operator Market

A measure of the diversity and concentration of the local market for Internet Exchange Point operations



Retail ISP Diversity

Diversity of retail Internet providers improves resilience and user choice

Very Good

Transit Provider Diversity

More diversity in routes to the global Internet improves connection resilience

Fair

Internet Freedom

Freedom on the Net measures Internet freedom in 70 countries

Not Free

See details on freedomhouse.org

https://pulse.internetsociety.org/reports/kz

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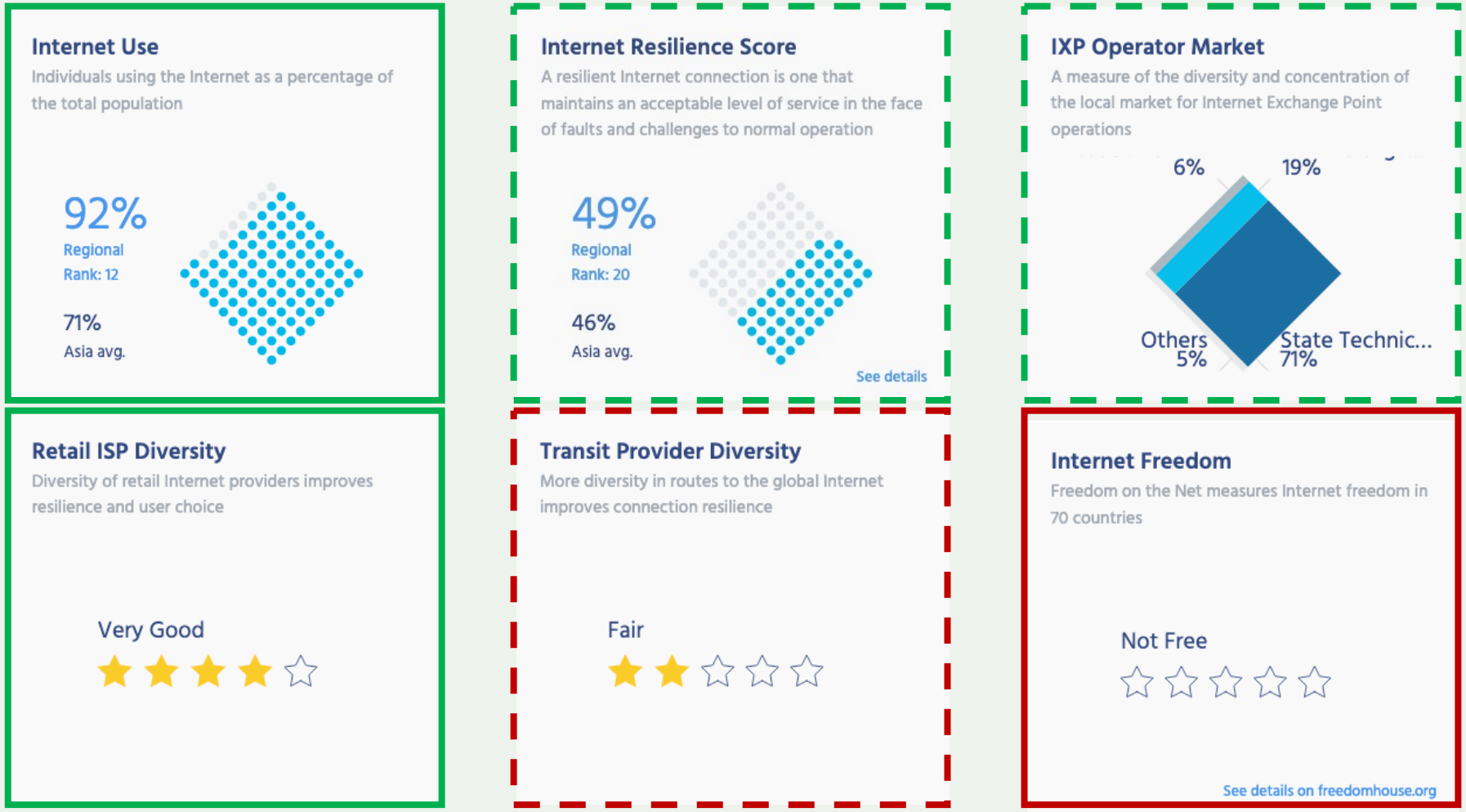


https://pulse.internetsociety.org/reports/kz

Not if, but when

9 September 2022

Rogers Outage: What do we Know After Two Months?

Jim Cowie
Former Resident Advisor, Internet Society

Categories: Concentration, Resilience

Hiding operational failures in darkness helps nobody.

Canada, July 2022

15 November 2023

Optus Outage Exposes Australia's Internet Resilience

Aftab Siddiqui
Senior Manager, Internet Technology - Asia-Pacific, Internet Society

Categories: Resilience

A minor technical slip-up by Australia's second-largest operator causes one-third of Australians to lose Internet and mobile connectivity.

Australia, November 2023

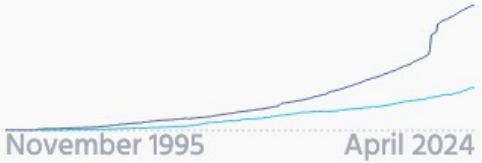
Who's next?

Globally Connected Infrastructure

Networks Assigned
A measure of how many Internet networks are active here

203
Regional Rank: 18

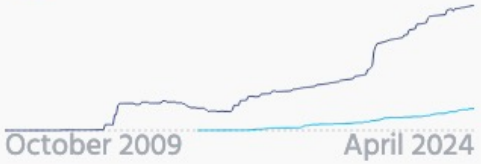
598
Asia avg.



Addresses Assigned IPv6
A measure of how many Internet addresses are assigned here

26.4M
Regional Rank: 18

153.3M
Asia avg.



IPv6 Adoption
Enabling the Internet to support more users and more uses

13%
Regional Rank: 26

19%
Asia avg.

Internet Exchange Points
IXPs help strengthen local Internet connectivity, develop local Internet industry, improve competitiveness, and serve as a hub for technical activity

4
Regional Rank: 15

7
Asia avg.

Addresses Assigned IPv4
A measure of how many legacy addresses are assigned here

3.3M
Regional Rank: 18

17.6M
Asia avg.

Peering Networks
Peering networks help to keep Internet traffic local, provide faster connections, and improve the experience of the people relying on them

23
Regional Rank: 22

122
Asia avg.

https://pulse.internetsociety.org/reports/kz

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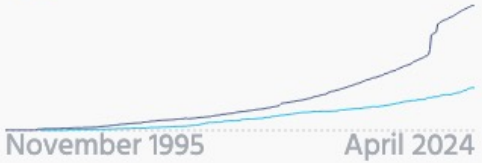

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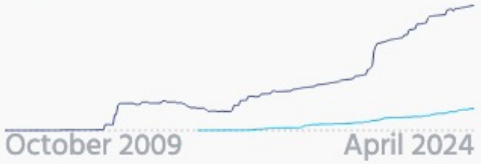

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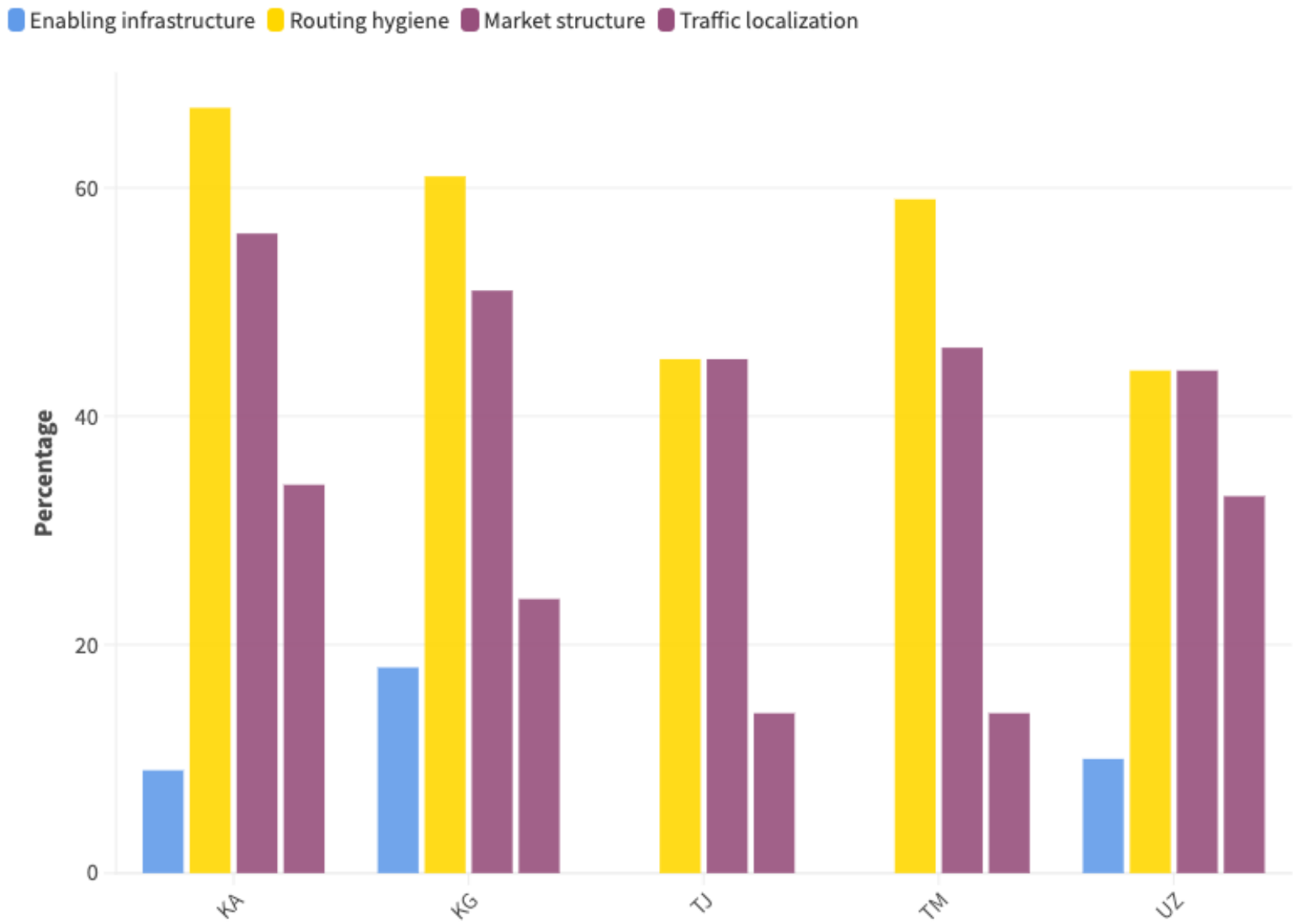
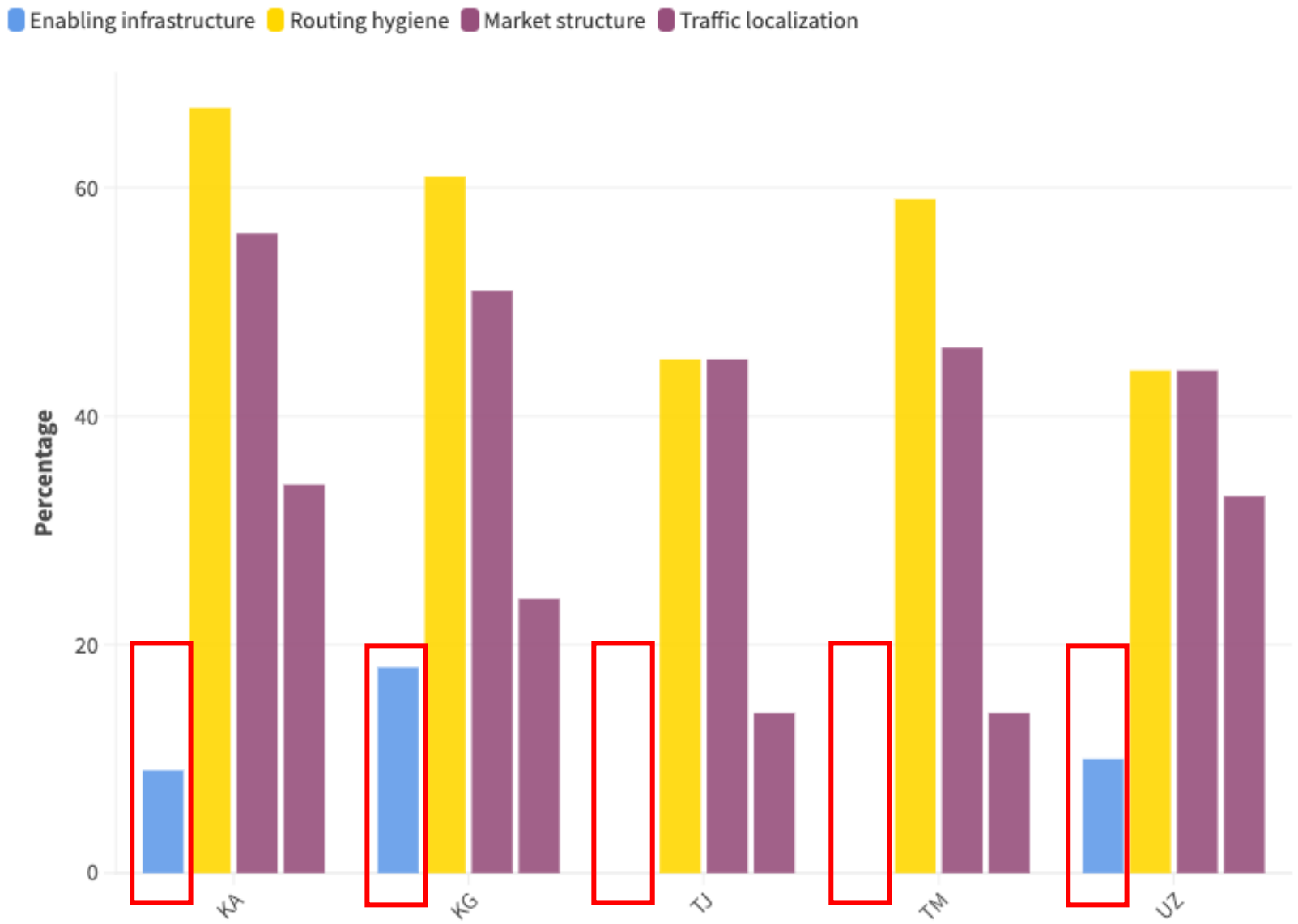
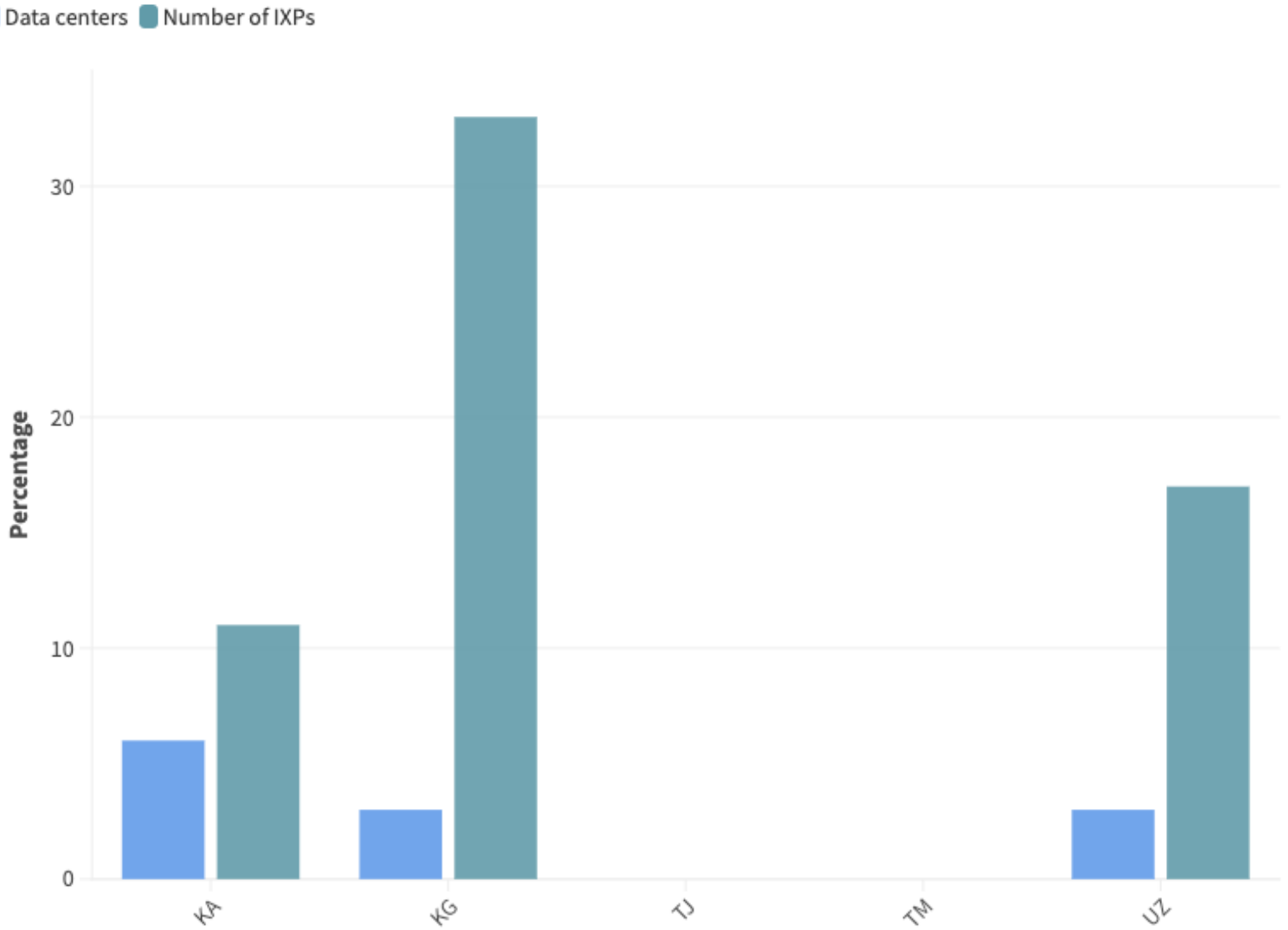
Traffic localization



Traffic localization

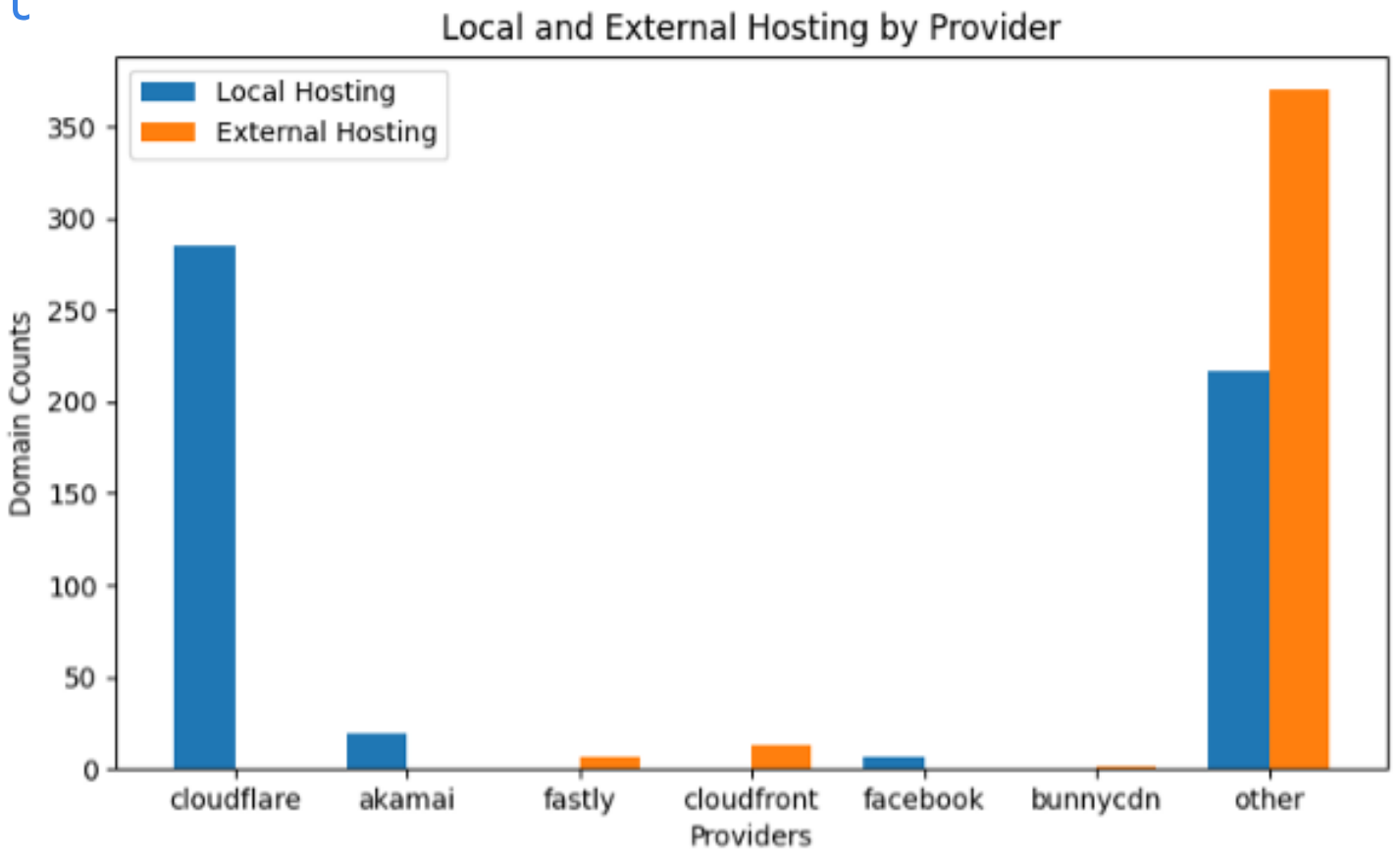


Enabling Technologies



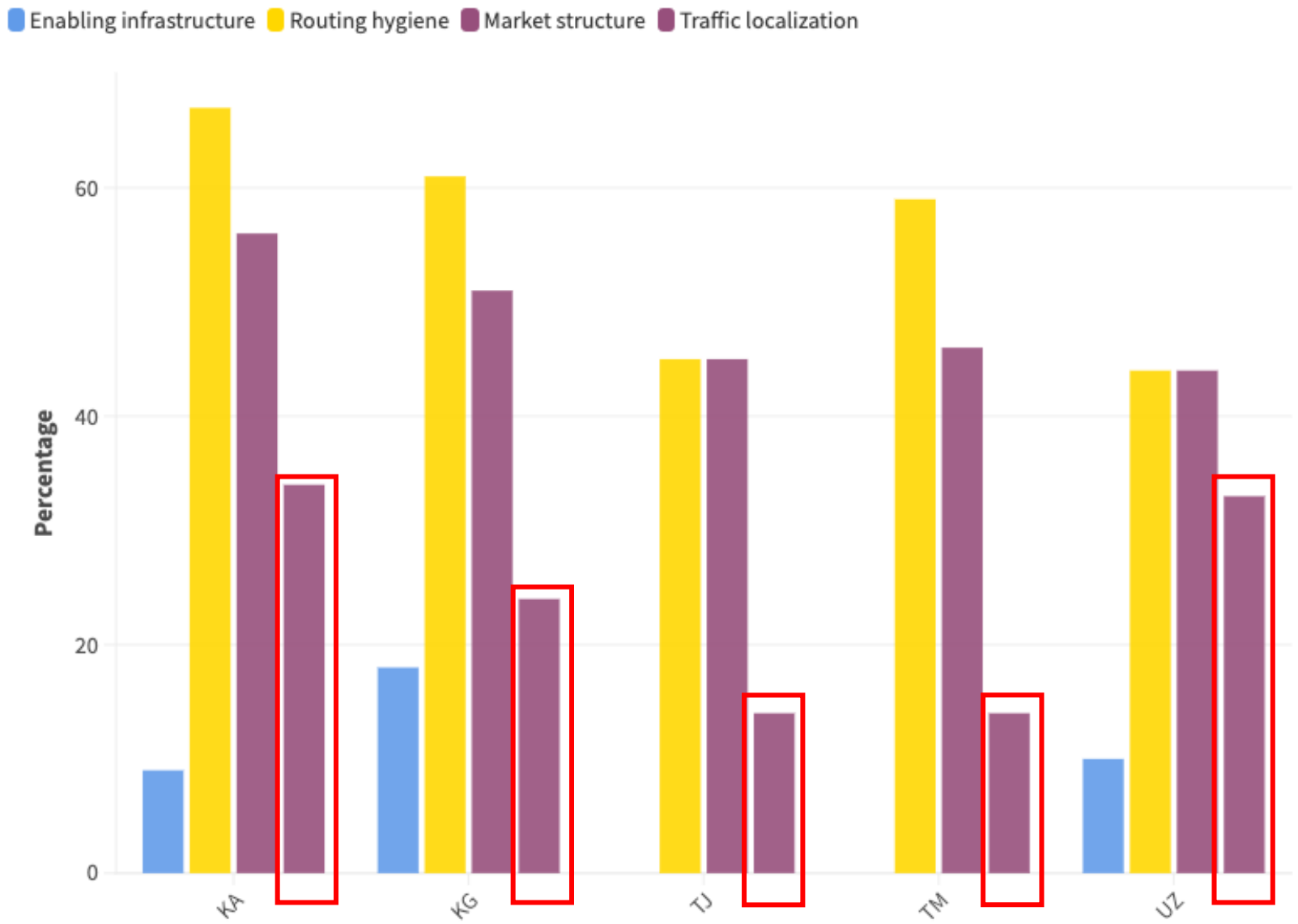
Local vs External Content

	% of top 1,000 domains hosted locally
KZ	>50%
KG	<20%
TJ	<10%
TM	<10%
UZ	<25%



Read report: https://pulse.internetsociety.org/blog/reviewing-internet-resilience-and-efficiency-in-central-asia

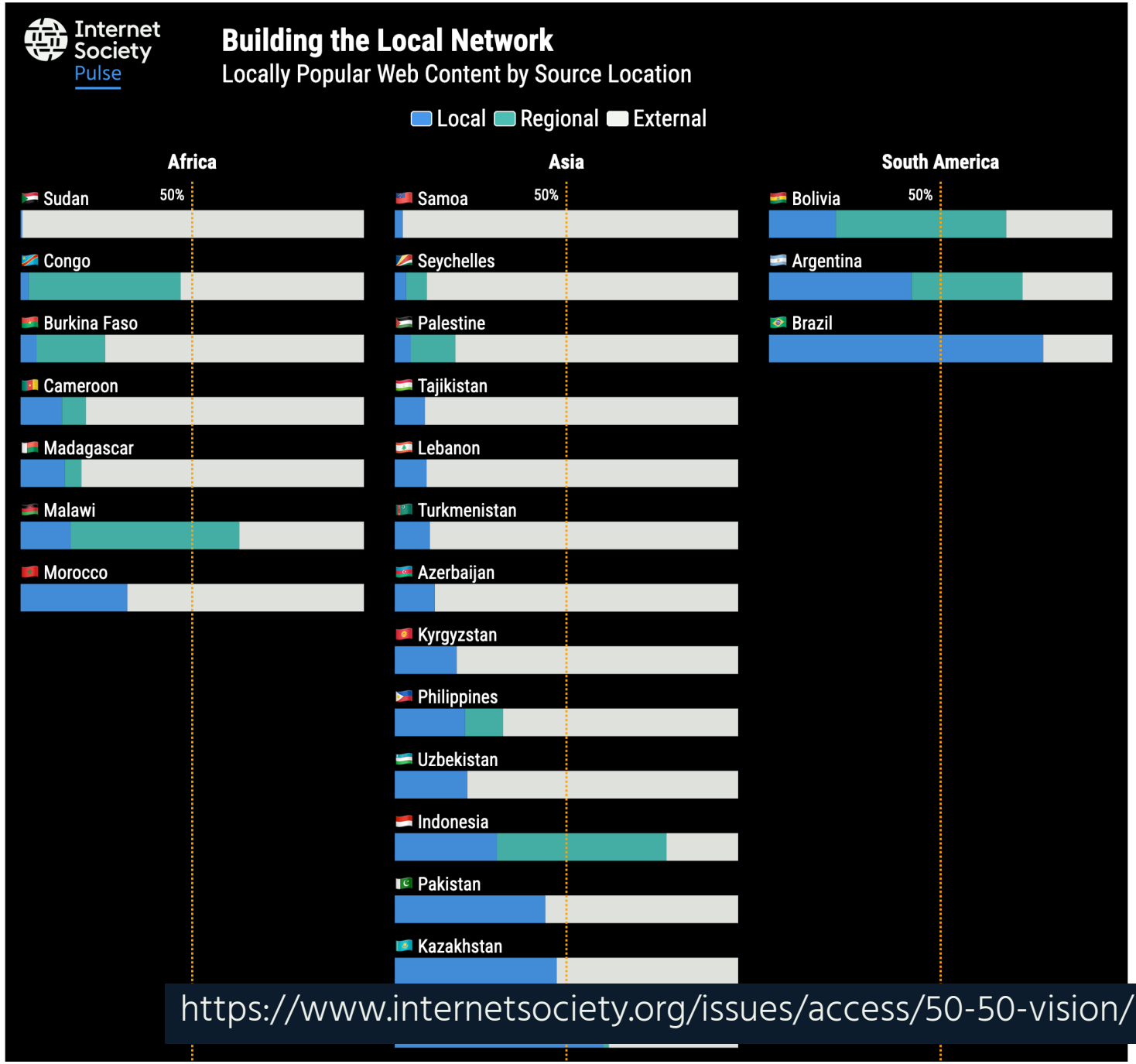
Traffic localization



Traffic localization – domain count

50/50 Vision

1. Top 1000 websites (Google CrUX)
2. Categorize websites CDN or “Native”
3. IP geolocation local, regional or external



https://www.internetsociety.org/issues/access/50-50-vision/

Secure and Trustworthy Internet

Routing Security Coverage IPv4

One measure of how much local Internet network providers are securing their infrastructure

13%
Regional
Rank: 49

73%
Asia avg.

Routing Security Coverage IPv6

One measure of how much local Internet network providers are securing their infrastructure

63%
Regional
Rank: 37

73%
Asia avg.

Routing Security Adoption

A measure of how much local Internet providers are checking validity of connectivity information they receive from other networks

2%
Regional
Rank: 31

15%
Asia avg.

Naming Security Status

Adopting DNSSEC improves trustworthiness of Internet communications

.kz

Active

Naming Security Coverage

A measure of how much local web content supports DNSSEC for improved trustworthiness

0%
Regional
Rank: 14

1%
Asia avg.

Naming Security Adoption

A measure of how much local Internet users are protected by DNSSEC

32%
Regional
Rank: 24

36%
Asia avg.

https://pulse.internetsociety.org/reports/kz

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.kz  Active

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https://pulse.internetsociety.org/reports/kz

Limitations

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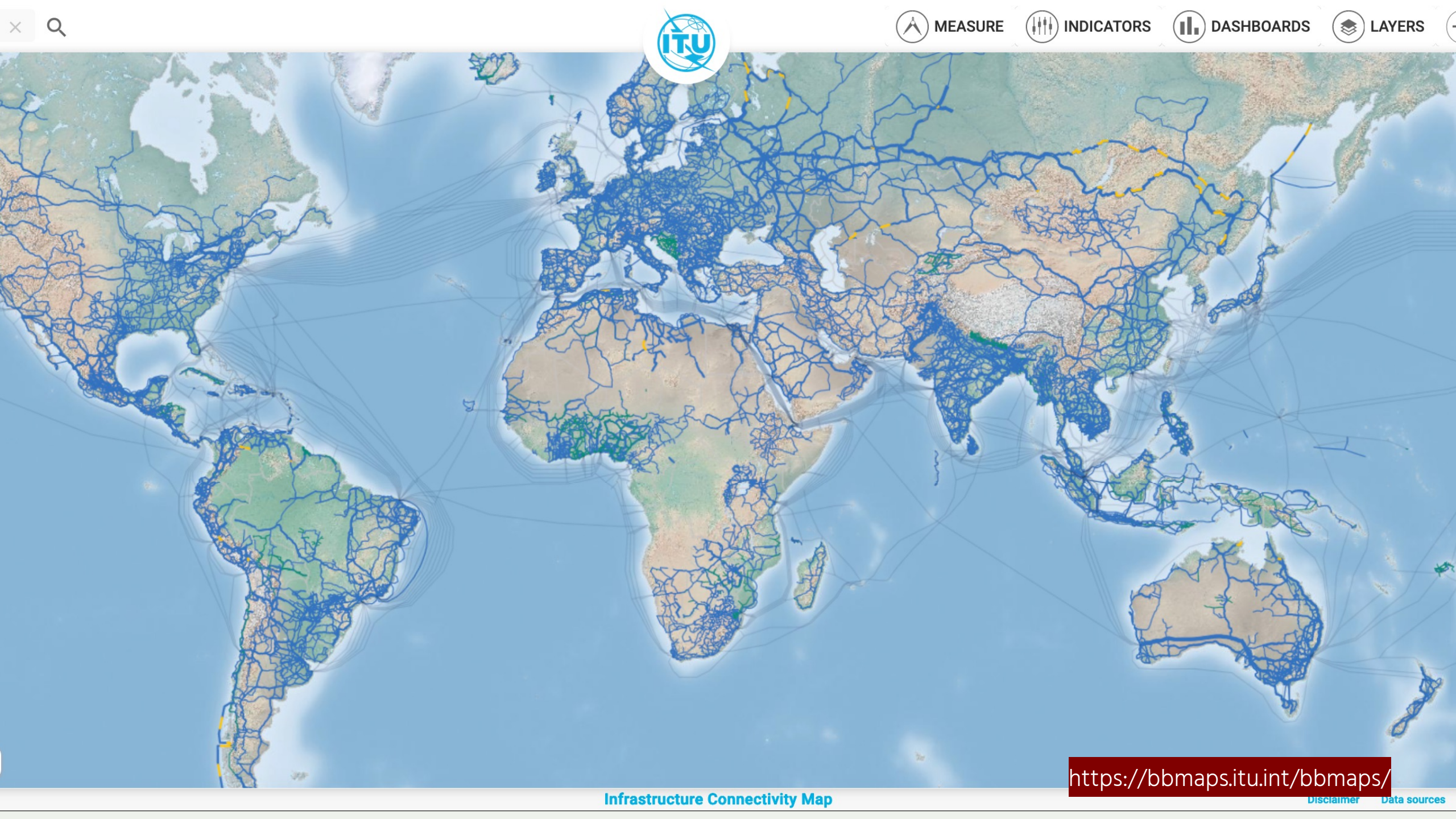
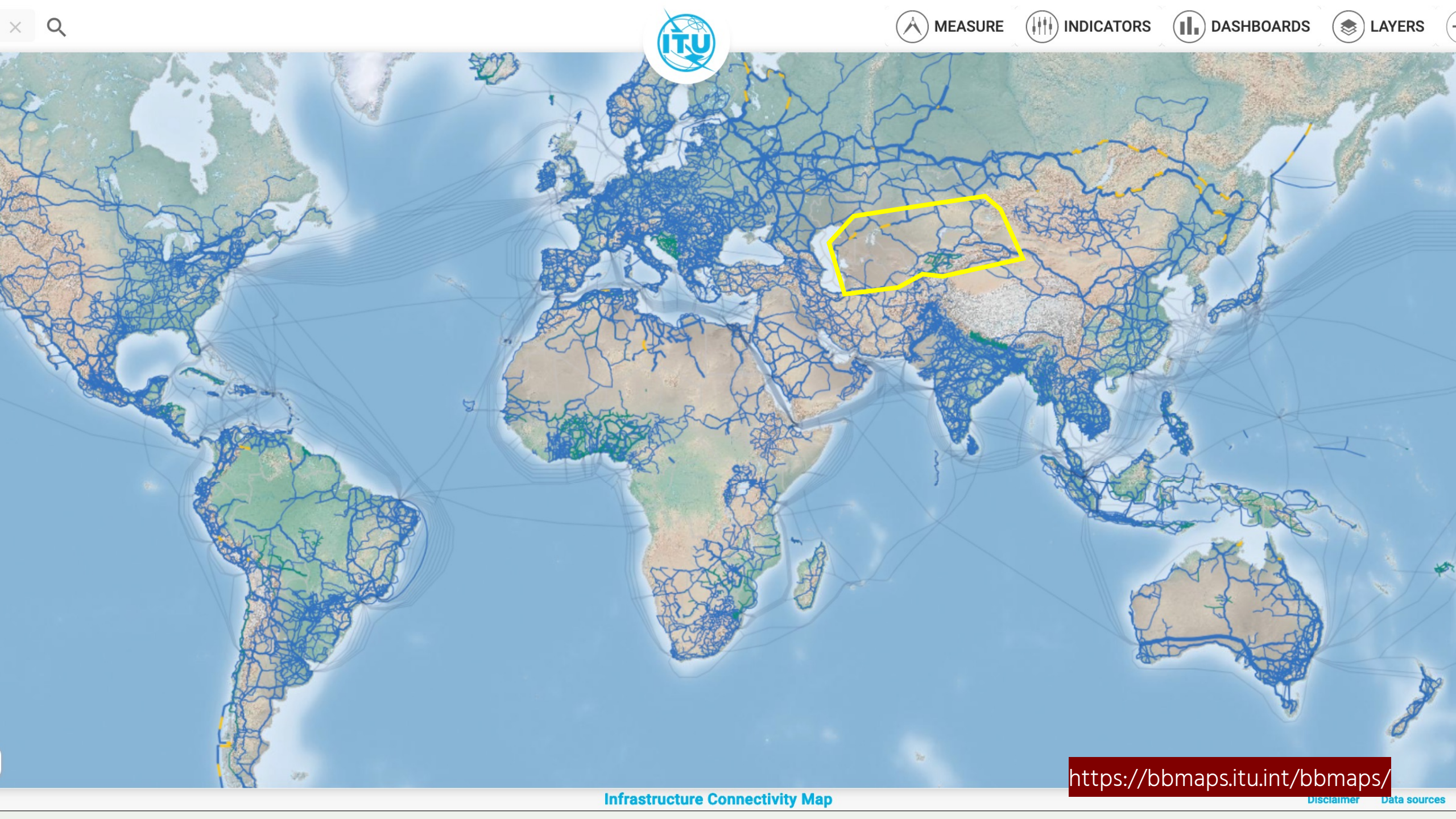
- The data is pulled from external public sources, not always up-to-date.
  - An indicator is not included if data is missing on more than 25% of countries in the Index.
  - Regional shutdown and outage data difficult to source/validate
- Without in-country measurements, it's difficult to validate the data.
  - RIPE Atlas and OONI are doing great work in this area, but more is needed.
- Some of the data undergoes processing, normalization, and weighing, we use a methodology that is reproducible.
  - You can see raw numbers via API. Email us for access pulse@isoc.org
- Ultimately, the Index benchmarks countries with one another and helps decision makers recognize gaps and weaknesses to conduct further study into validating these and work towards addressing them.

Where to start


MEASURE
INDICATORS
DASHBOARDS
LAYERS
https://bbmaps.itu.int/bbmaps/
Infrastructure Connectivity Map
Disclaimer
Data sources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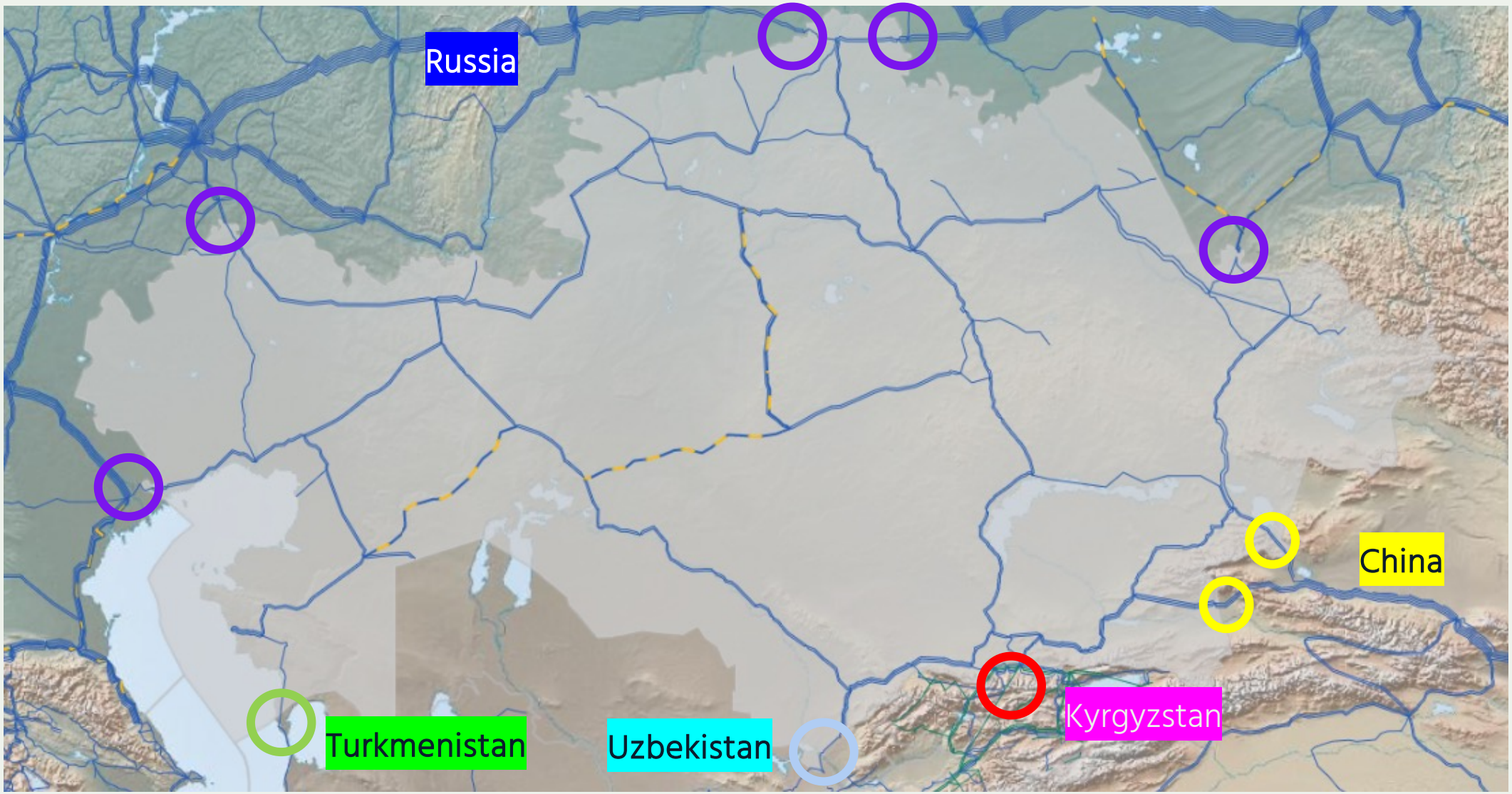
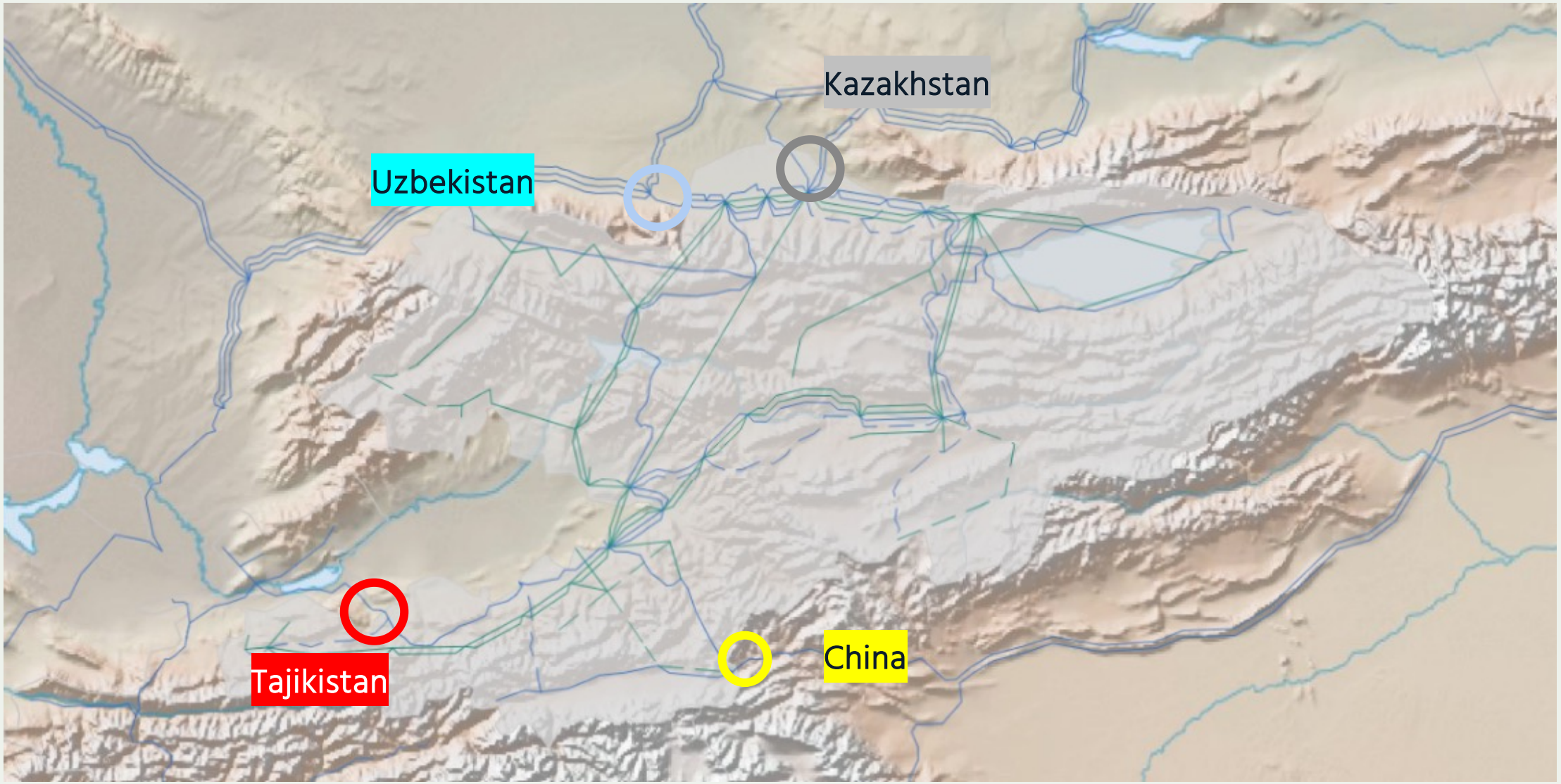
Kazakhstan – Exit Points



https://bbmaps.itu.int/bbmaps/

Kyrgyzstan– Exit Points



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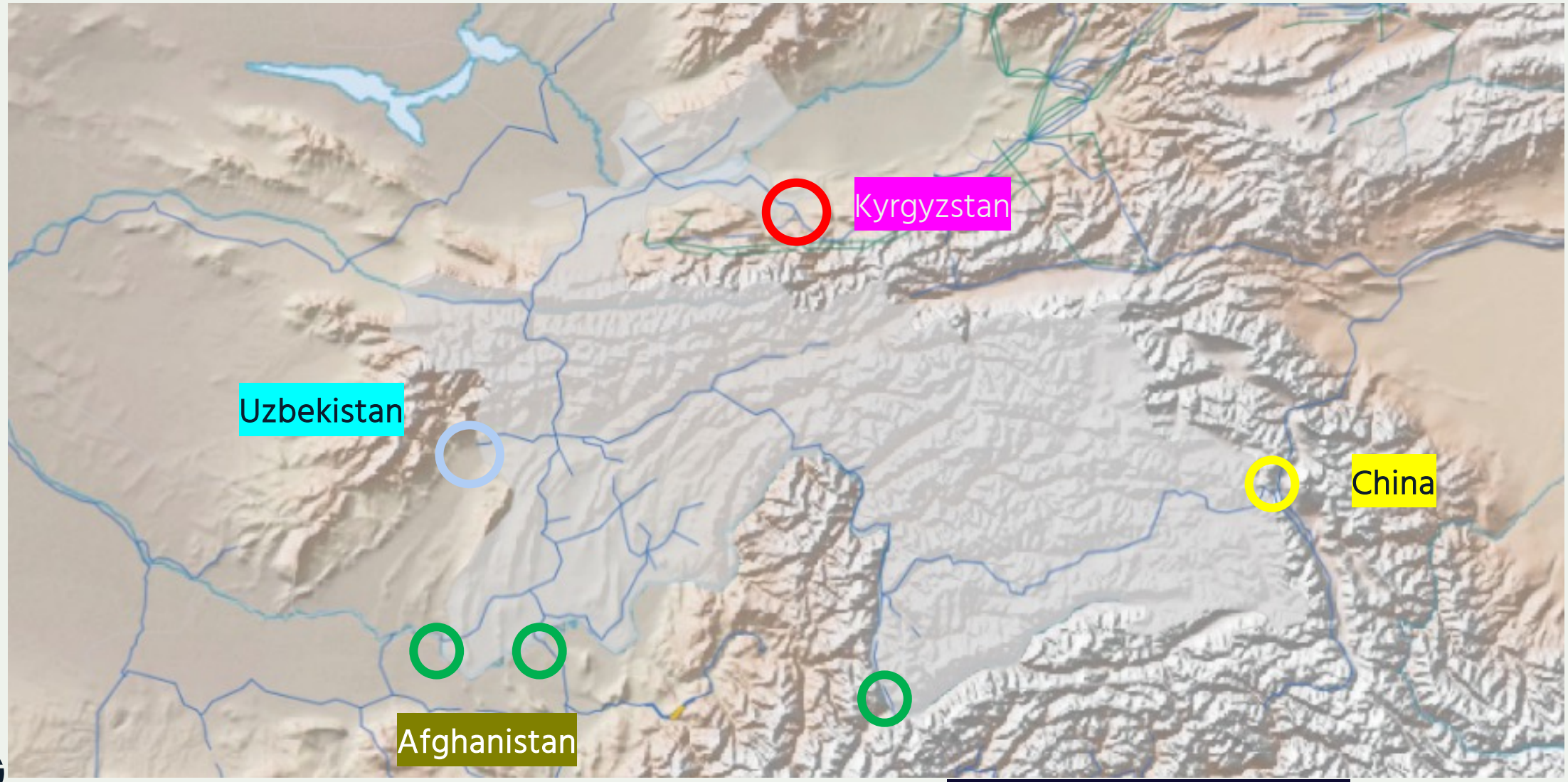
Tajikistan



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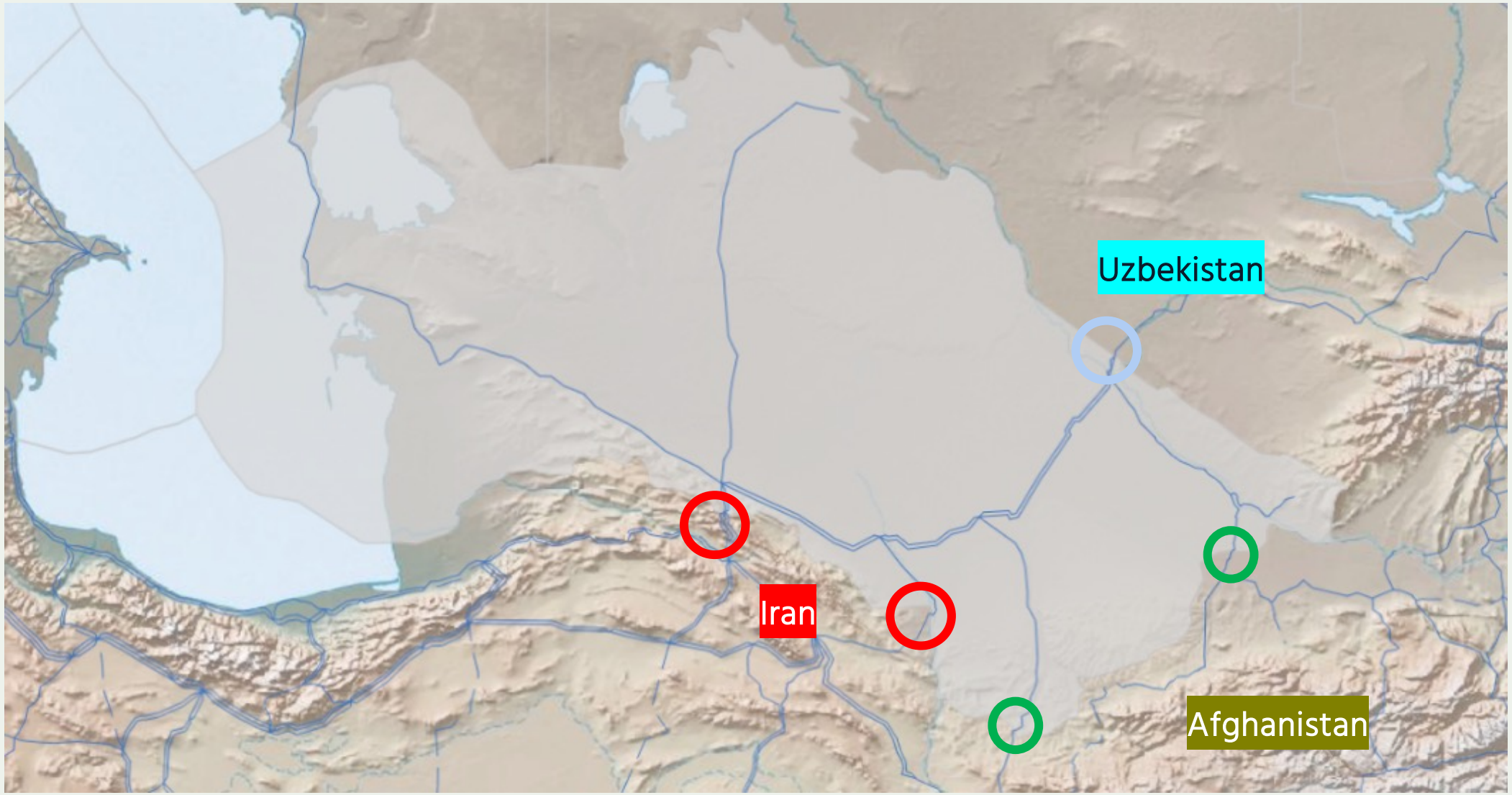
Turkmenistan– Exit Points



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Turkmenistan– Exit Points

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The Guardian

When internet shutdowns spill over borders

This is officially referred to as a “leak”. In Myanmar's case, the Singapore-headquartered telecoms provider Campana inadvertently shut off...

28 Aug 2022

"Myanmar’s Twitter block [Feb 2021] had accidentally cut Twitter access to at least half a billion internet users.

The same dynamic was repeated in March 2022, when Russia inadvertently cut access to Twitter across Europe with a block designed for its own people."

https://www.theguardian.com/technology/2022/aug/29/when-internet-shutdowns-spill-over-borders

Liveuamap @Liveuamap · Jan 5, 2022

Replying to @Liveuamap

Issues with ATM machines of "Optima Bank" in **Kyrgyzstan** due to **internet shutdown** in Kazakhstan centralasia.liveuamap.com/en/2022/5-janu...

Уважаемые клиенты,

К сожалению, ситуация с провайдером связи на территории Республики Казахстан не восстановилась и, в связи с этим на данный момент услуги Банка временно недоступны, включая мобильное приложение «Оптима24».

Также недоступно получение денежных средств посредством сервисов переводов «Золотая корона».

Безналичная оплата посредством Pos-терминалов других банков КР работает в прежнем режиме. Интернет платежи, не требующие 3D secure пароля - доступны.

Для обналичивания денежных средств мы предлагаем воспользоваться бессрочной акцией «Бесплатное обналичивание до 100 000 сом во всех банкоматах КР».

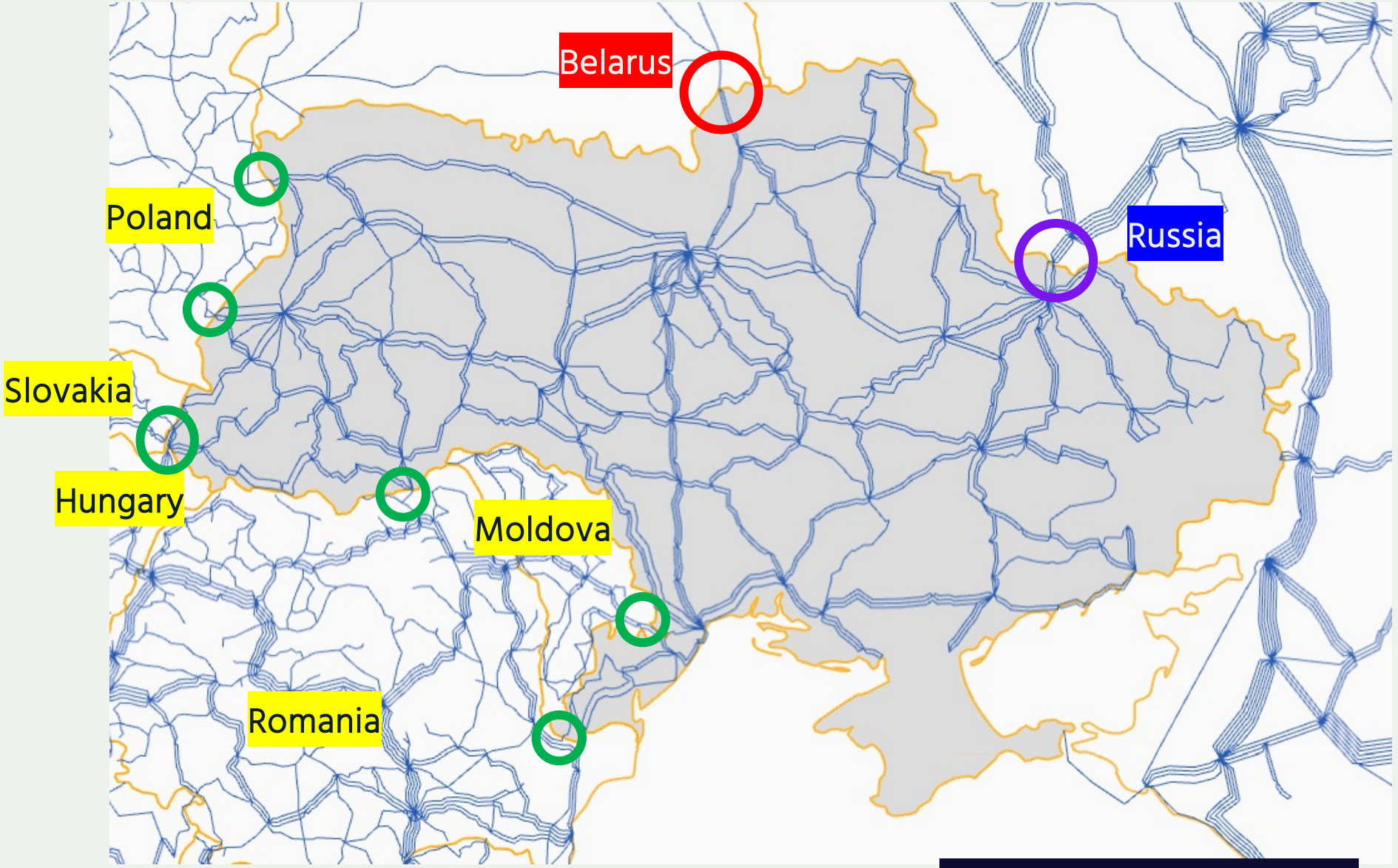
По мере устранения неполадок и восстановления сервисов будем информировать в режиме реального времени.

Мы приносим свои извинения за доставленные неудобства и работаем над устранением непол

Надеемся на ваше понимание!

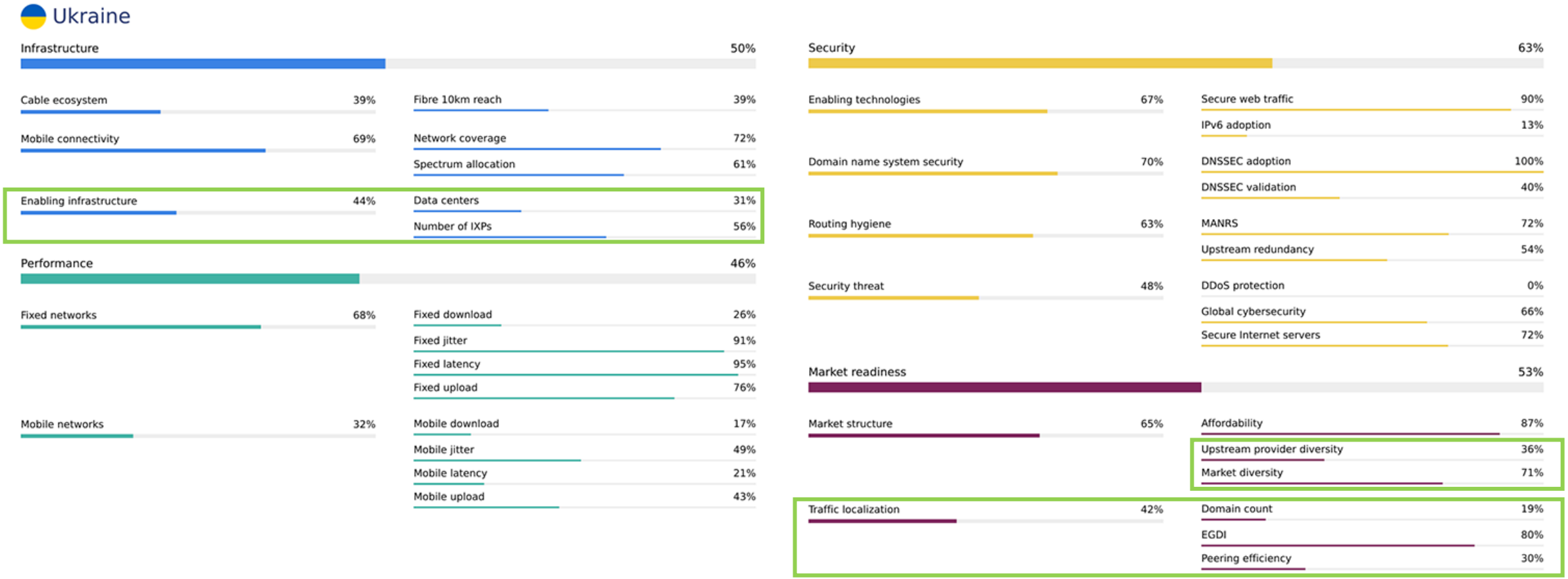
https://twitter.com/Liveuamap/status/1478709807569850372

Ukraine – Exit Points



https://bbmaps.itu.int/bbmaps/

Ukraine– Internet Resilience Index



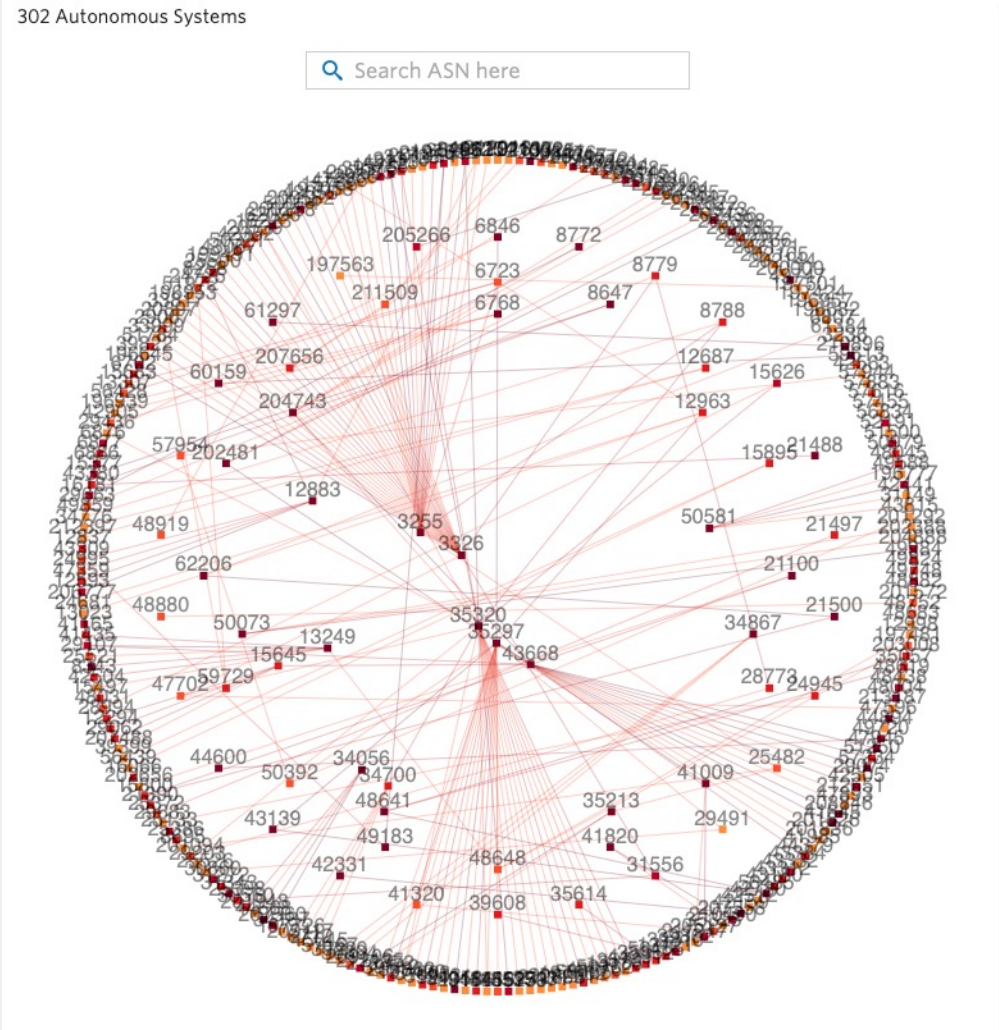
Internet Society Pulse

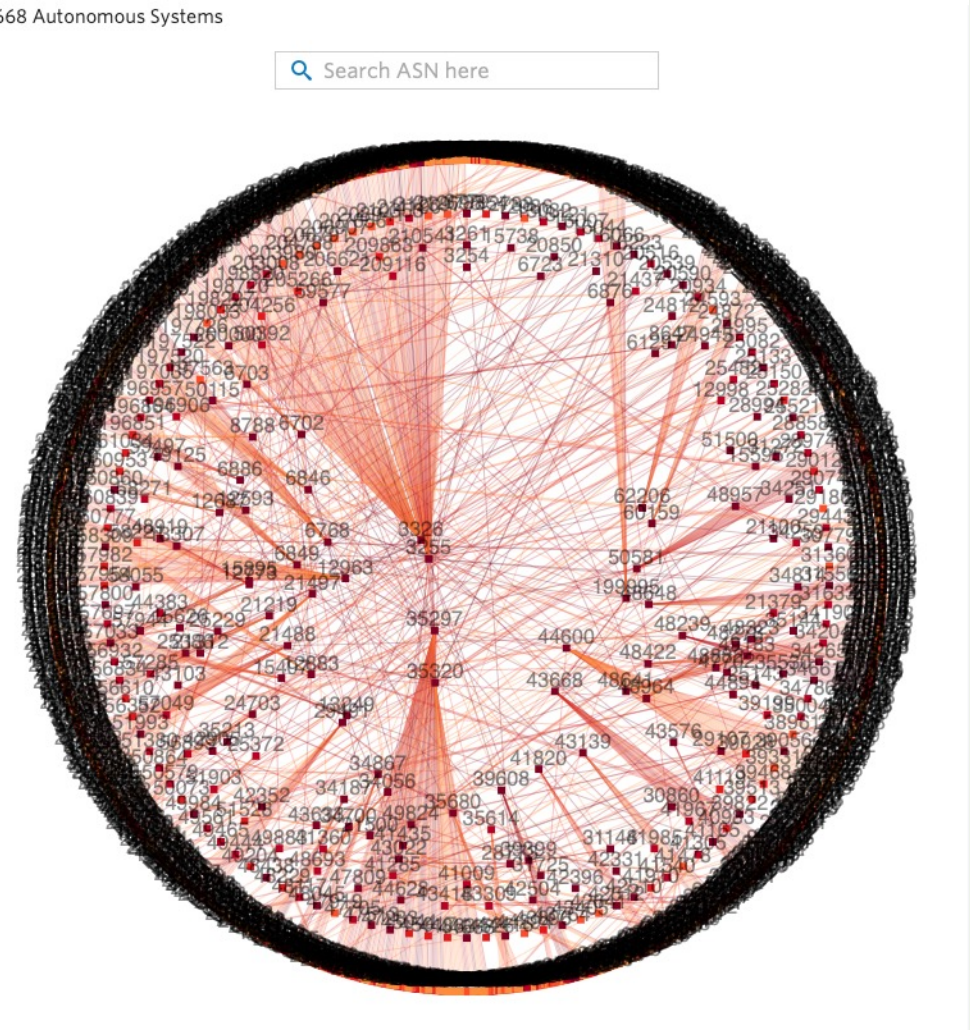
Internet Resilience

pulse.internetsociety.org

data source: Pulse Internet Resilience Index

Ukraine – IPv4 and v6 Interconnection (APNIC REx)





https://rex.apnic.net/as-interconnections?allocationType=ipv4,ipv6&economy=UA

Ukraine – ASN Dependency (IIJ Internet Health Report)

	Autonomous System	Population coverage			AS coverage
	Search	Total	Direct ↓	Indirect	Total
AS15895	KSNET-AS "Kyivstar" PJSC, UA	23.5%	22.5%	0.7%	1.5%
AS21497	UMC-AS PrJSC "VF UKRAINE", UA	10.0%	9.7%	0.2%	1.5%
AS34058	LIFECELL-AS Limited Liability Company "lifecell", UA	5.7%	5.6%	0.0%	0.1%
AS6849	UKRTELNET JSC "Ukrtelecom", UA	3.5%	3.3%	0.2%	1.5%
AS25229	VOLIA-AS Kyivski Telekomunikatsiyni Merezhi LLC, UA	3.2%	3.1%	0.1%	1.0%
AS13188	TRIOLAN CONTENT DELIVERY NETWORK LTD, UA	2.5%	2.5%	0.0%	0.1%
AS3255	UARNET-AS State Enterprise Scientific and Telecommunication Centre "Ukrainian Academic and Research Network" of the Institute for Condensed Matter Physics of the National Academy of Science of Ukraine (UARNet), UA	9.9%	2.1%	7.8%	11.6%
AS15377	FREGAT "Fregat TV" Ltd., UA	1.2%	1.2%	0.0%	0.1%
AS3326	Datagroup PRIVATE JOINT STOCK COMPANY "DATAGROUP", UA	6.9%	1.1%	5.8%	11.4%
AS31148	FREENET_LLC Freenet LTD, UA	1.2%	1.1%	0.1%	0.3%

https://ihr.iijlab.net/ihr/en-us/countries/UA?af=4&last=3&date=2023-08-24&rov_tb=routes

We all have a role to play

Advocating for a healthy Internet

- What data are you collecting and sharing?
- What data can help you in your research/advocacy/decision making efforts?
- How can we collaborate to improve the health of the Internet in your countries and as a region?

Subscribe, Review, Contribute

Subscribe to the Pulse newsletter

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Contribute to Pulse

pulse@isoc.org

Thank you

Robbie Mitchell
mitchell@isoc.org