

State of the Internet: Ukraine and Neighbouring Countries

Ukraine



- **Area: 603,628 km²**
 - The largest entirely European territory
 - Fourth (after Russia, Kazakhstan, France) if take into account non-European territories
- **Population: 41.99 million (1 Aug 2019)**
- **Economics (2018)**
 - GDP: 130.83 USD (59th place in the world)
 - GDP per capita: 3,104 USD (122nd place in the world)



Basic Telecom Statistics

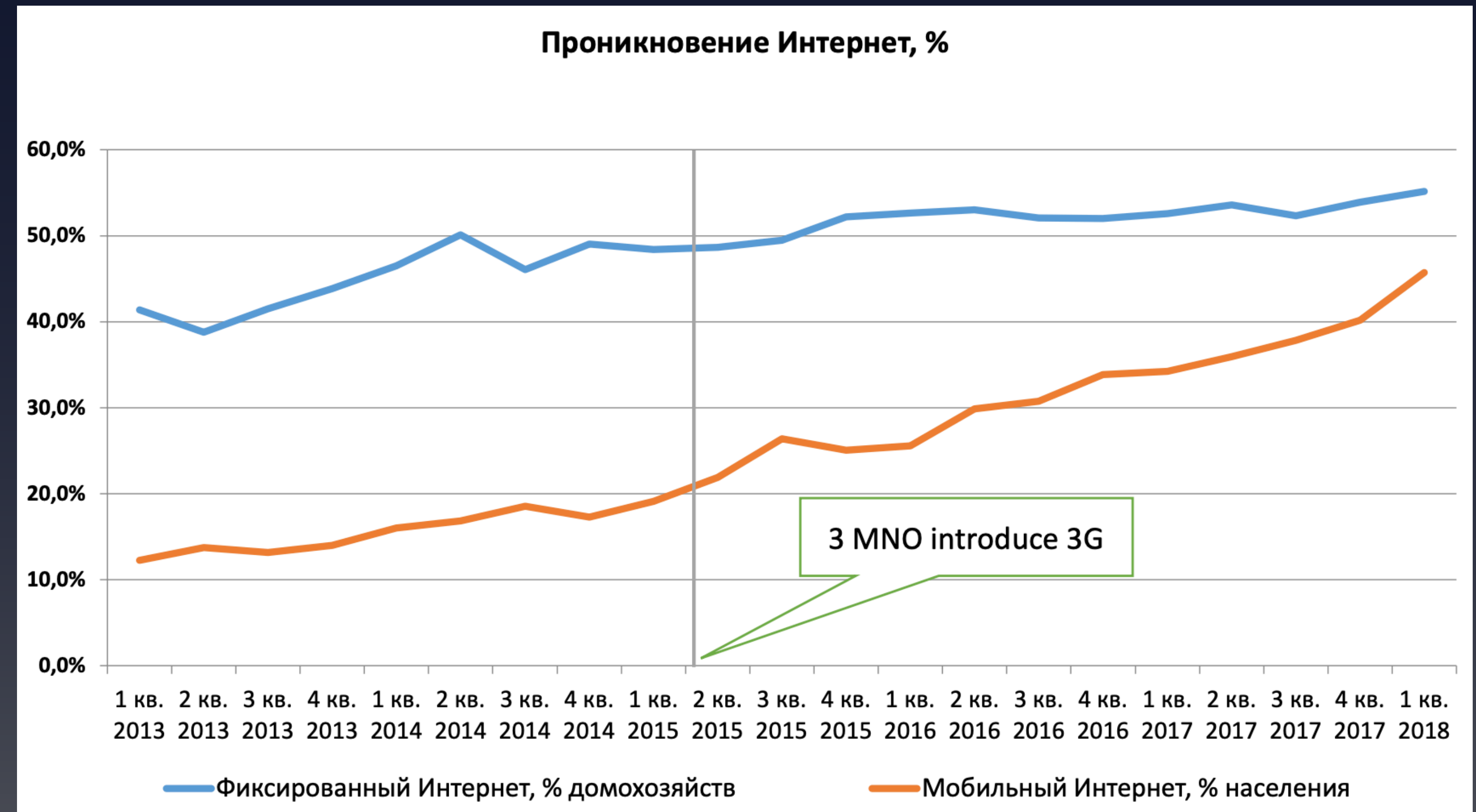
- **In the state register by NCCIR: 5888 operators**
 - Not all of them are alive
 - Not all of them really provide Internet access services
 - Still huge number!
- **FBB ARPU in 2017: 3.5 USD - one of the lowest in the world :(**
 - Russia 2017: 6.52 USD (S&P Global)
 - Moldova 2016: 9.6 USD (<https://en.anrceti.md>)
 - Brasil 2016: 16.93 USD (S&P Global)
- **Internet penetration (2017):**
 - InAU: 64% (users)
 - State Statistics Service: 48.7% (FBB, households)
- **Ukraine ranks 4th in the world in terms of stability of Internet infrastructure (Qrator Labs)**

Internet Penetration



- ITU Data:

- Based on the data of State Statistics Service of Ukraine
- Mobile Internet is growing faster
- But there is the grows of the fixed broadband as well

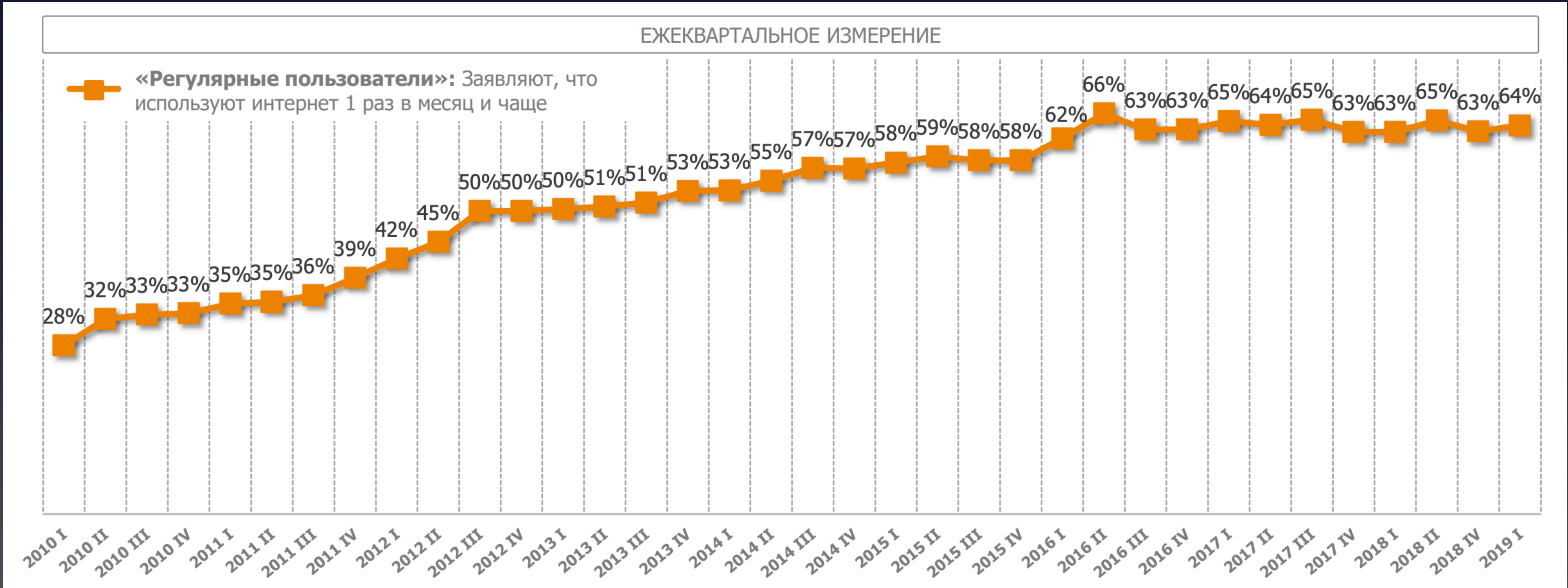


https://www.itu.int/en/ITU-D/Regional-Presence/CIS/Documents/Events/2018/05_Kiev/ITU%20Seminar%2016.05.18%20-%20Denis%20Zakharenko.pdf

Internet Penetration

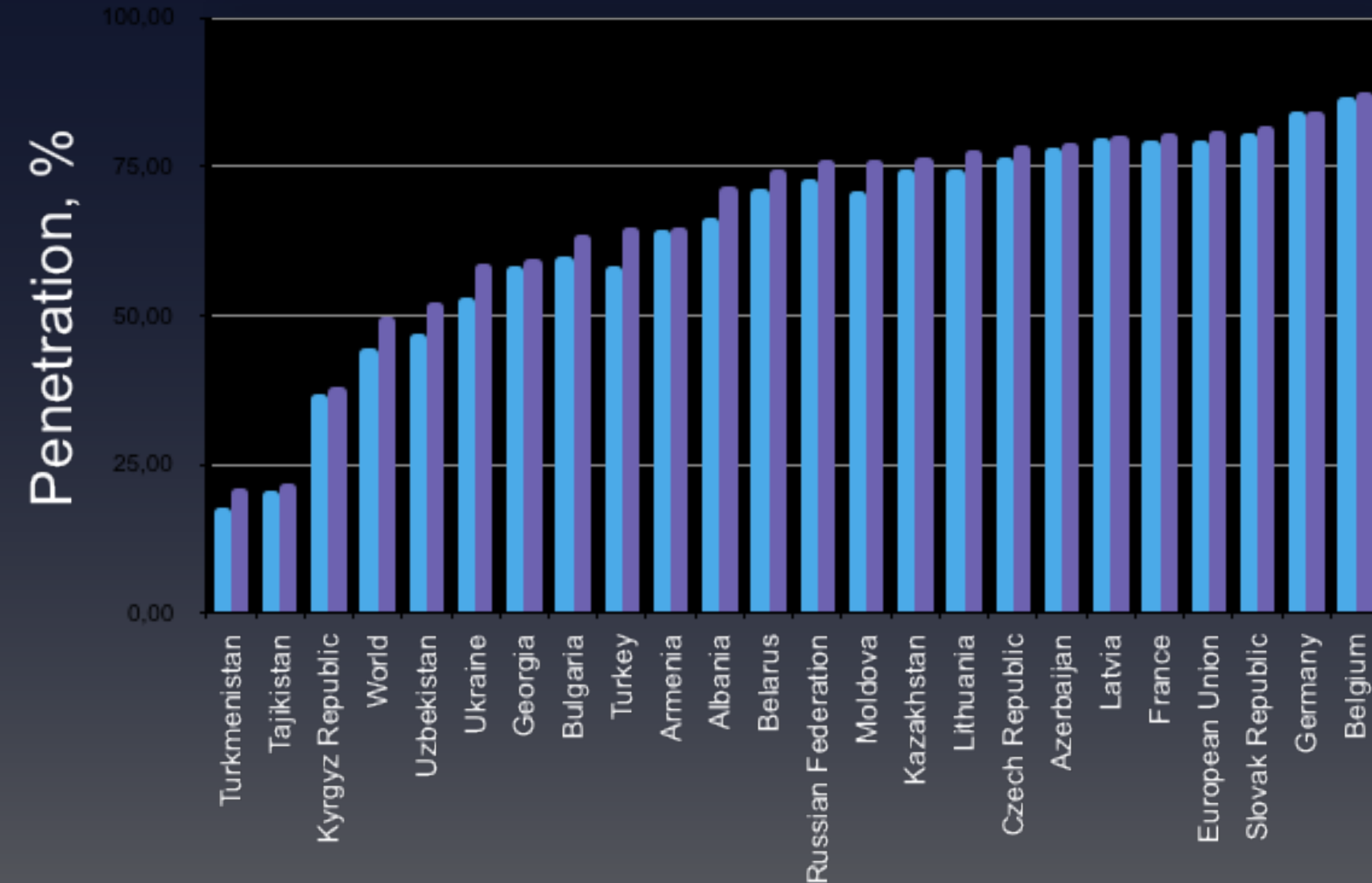


Data provided by InAU



https://inau.ua/sites/default/files/file/1903/dani_ustanovchyh_doslidzhen_zh_1-y_kvartal_2019_0.pdf

Internet penetration



- **Data by World Bank:**

- Former Soviet Union + neighbours + Albania + France + overages for the world and Europe
- 2016 is blue, 2017 is violet
- Ukraine is doing better than the world in average
- But still ranked 5th from the end in this list :-)



Telecom Industry Concentration

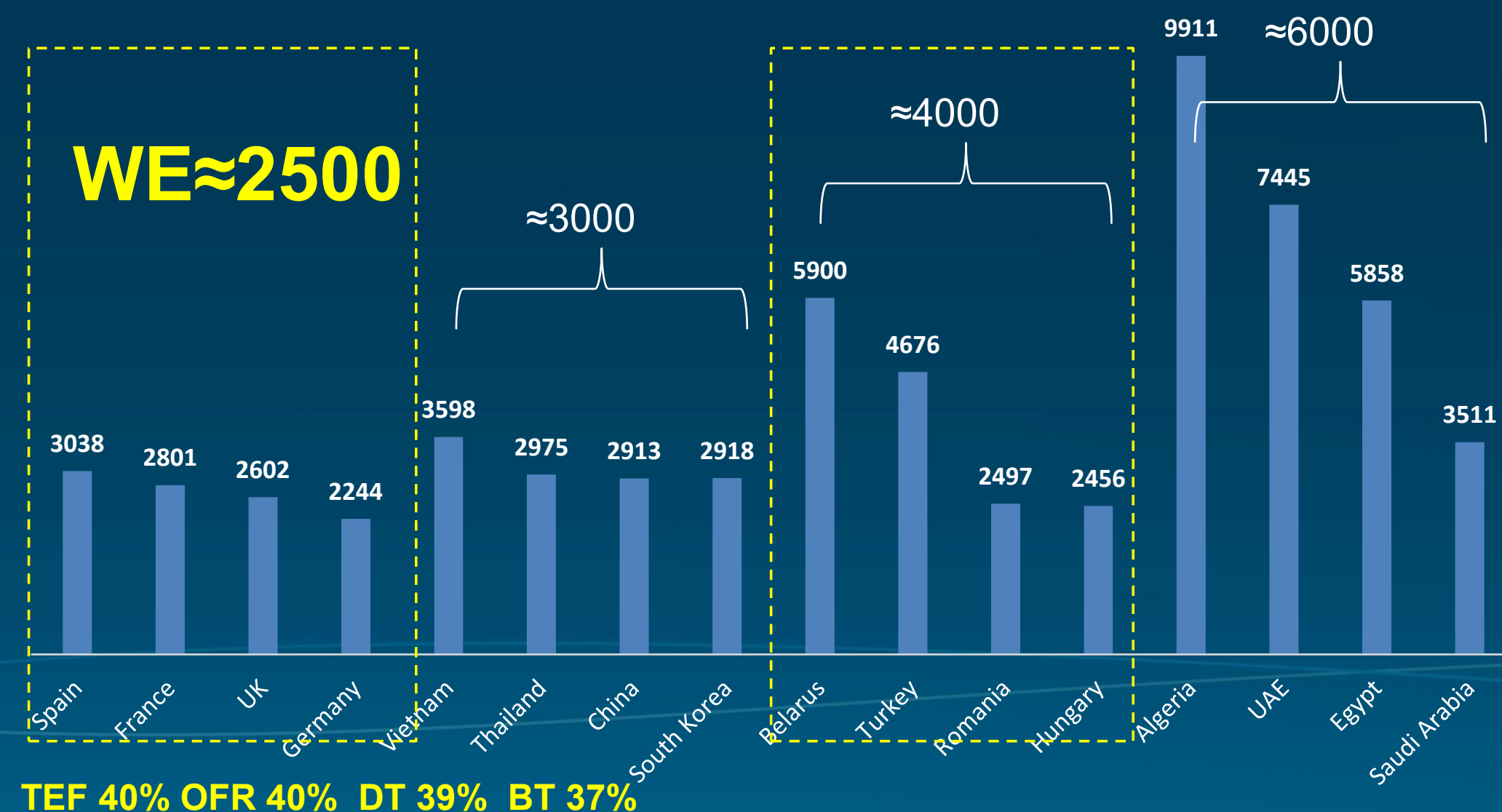
Industry Concentration : HHI (Herfindahl–Hirschman Index)

The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration that is used to determine market competitiveness.

$$HHI = ((S1)^2 + (S2)^2 + \dots + (Sn)^2) * 10000$$

*where S is the market share of the each Firm.

$$\text{Ukraine: } HHI = ((15\%)^2 + (9\%)^2 + (8\%)^2 + (3\%)^2 + (1.5\%)^2 + \dots + (0.01\%)^2) * 10000 \approx 500$$



Ukraine **3.5 USD** ARPU
Global **22 USD** ARPU

Source: ITU, Telegeography, Country Telecom
Industry report Ukraine 2017Q2

FCC of USA:

“The question that has to be asked about market concentration is how to **benchmark** the HHI number (which the **FCC puts at 2,848 out of 10,000.**)”

Department of Justice, USA:

“The agencies generally consider markets in which the HHI is in excess of 2500 points to be highly concentrated.”

Data from “Huawei CS Cloud”



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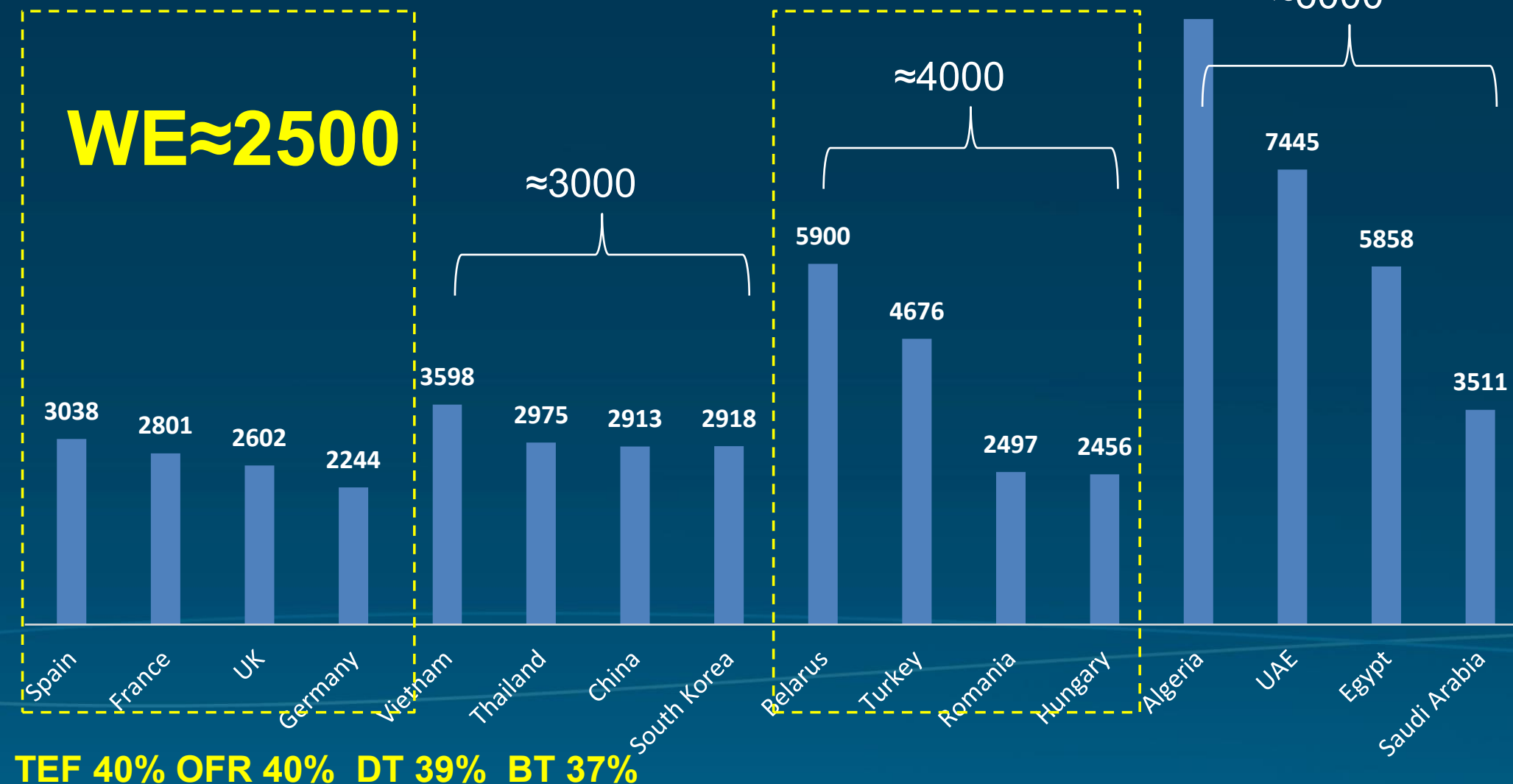
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**Highly
unconcentrated
market**

**Extremely
low ARPU**



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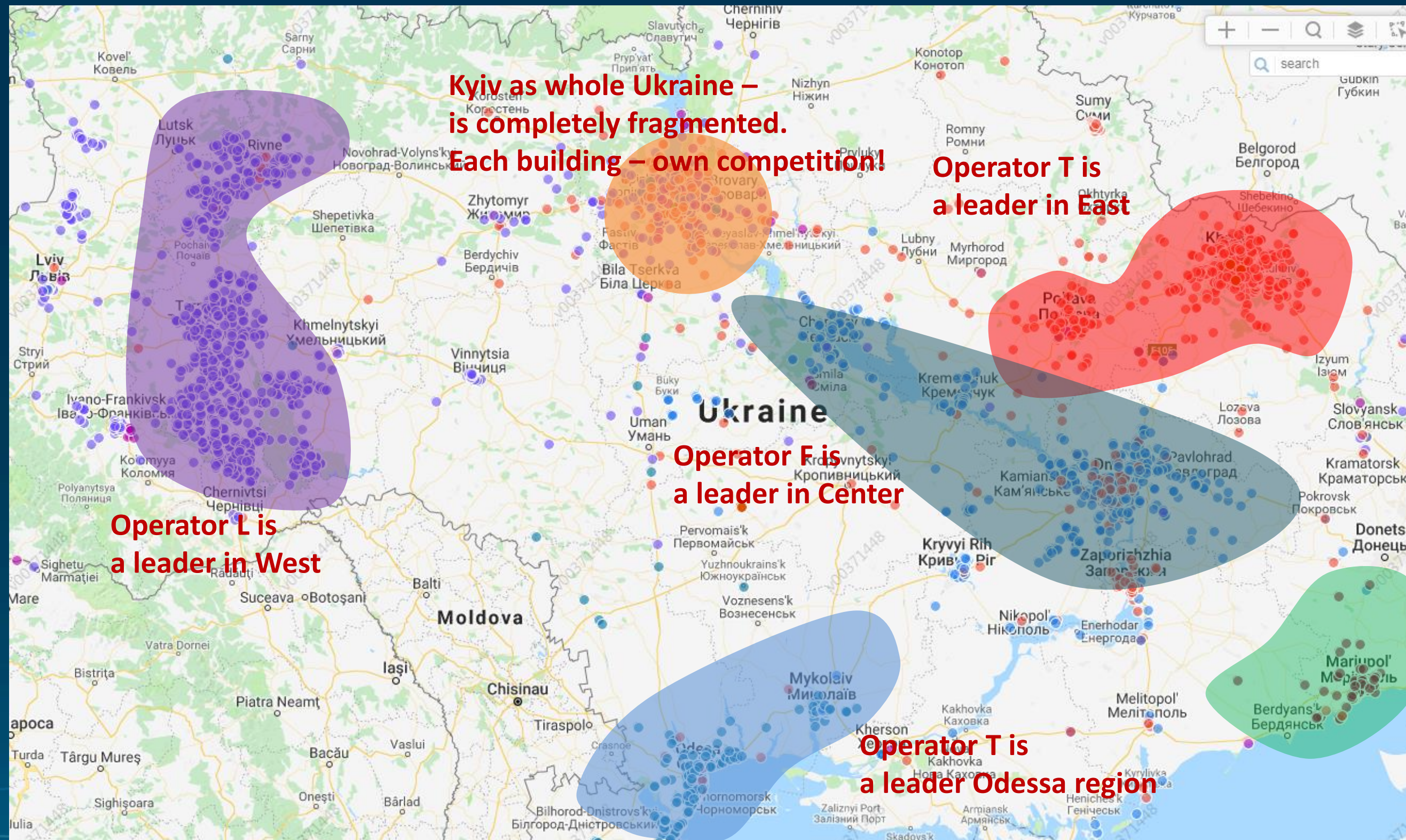
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Data from “Huawei CS Cloud”

Telecom Industry Concentration



FBB market is fragmented seriously with many players at different areas



Source: Ookla/Huawei CS Cloud

TOP 2 B2C players are national wide.
17 ISP's B2C players are strong in particular region/s
900+ – local players.

No Tier 1 Operators, a few Tier 2 Operators.

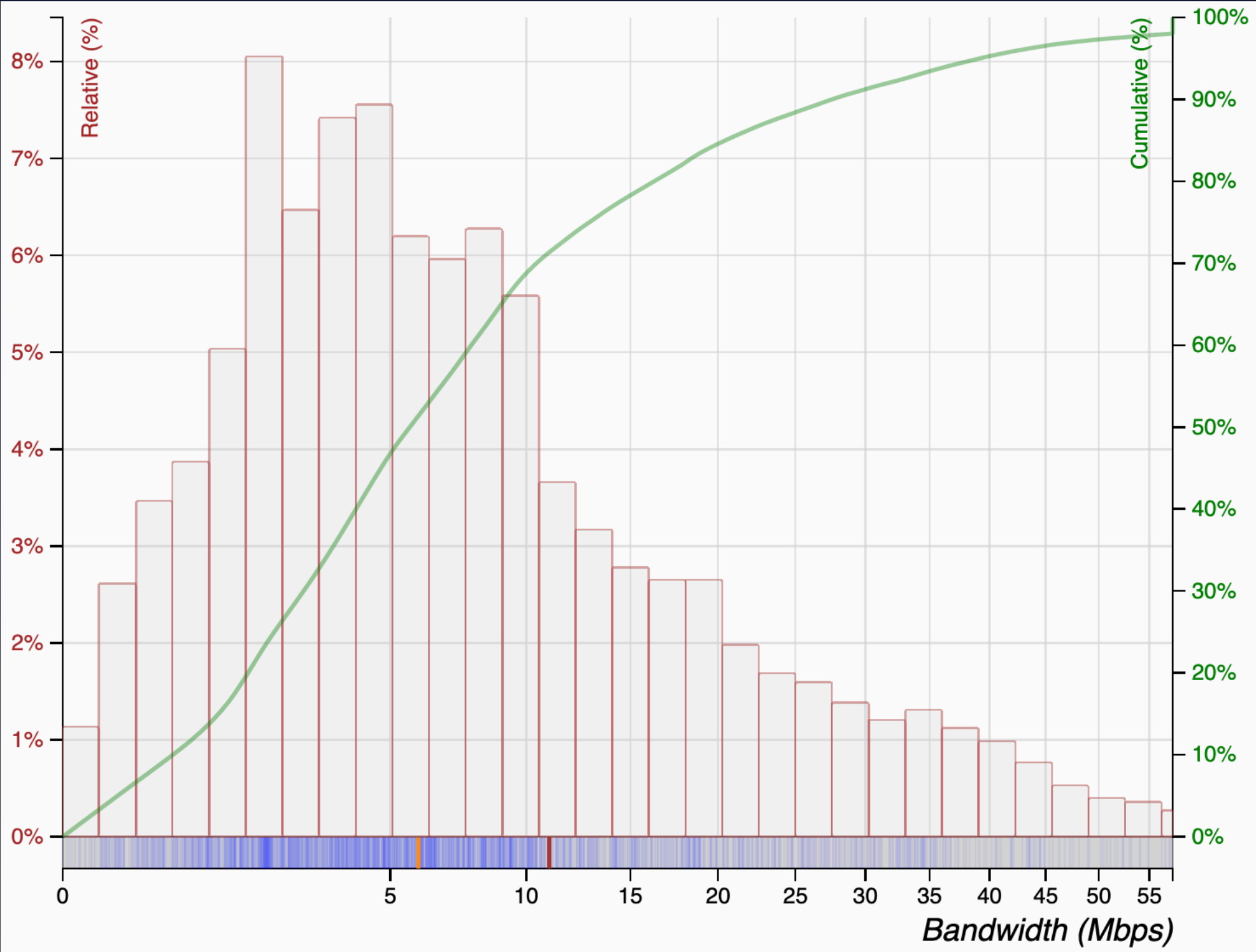
Around 20 B2O players provide global access to the Internet.

Only three national wide backbone OSP providers in Ukraine.

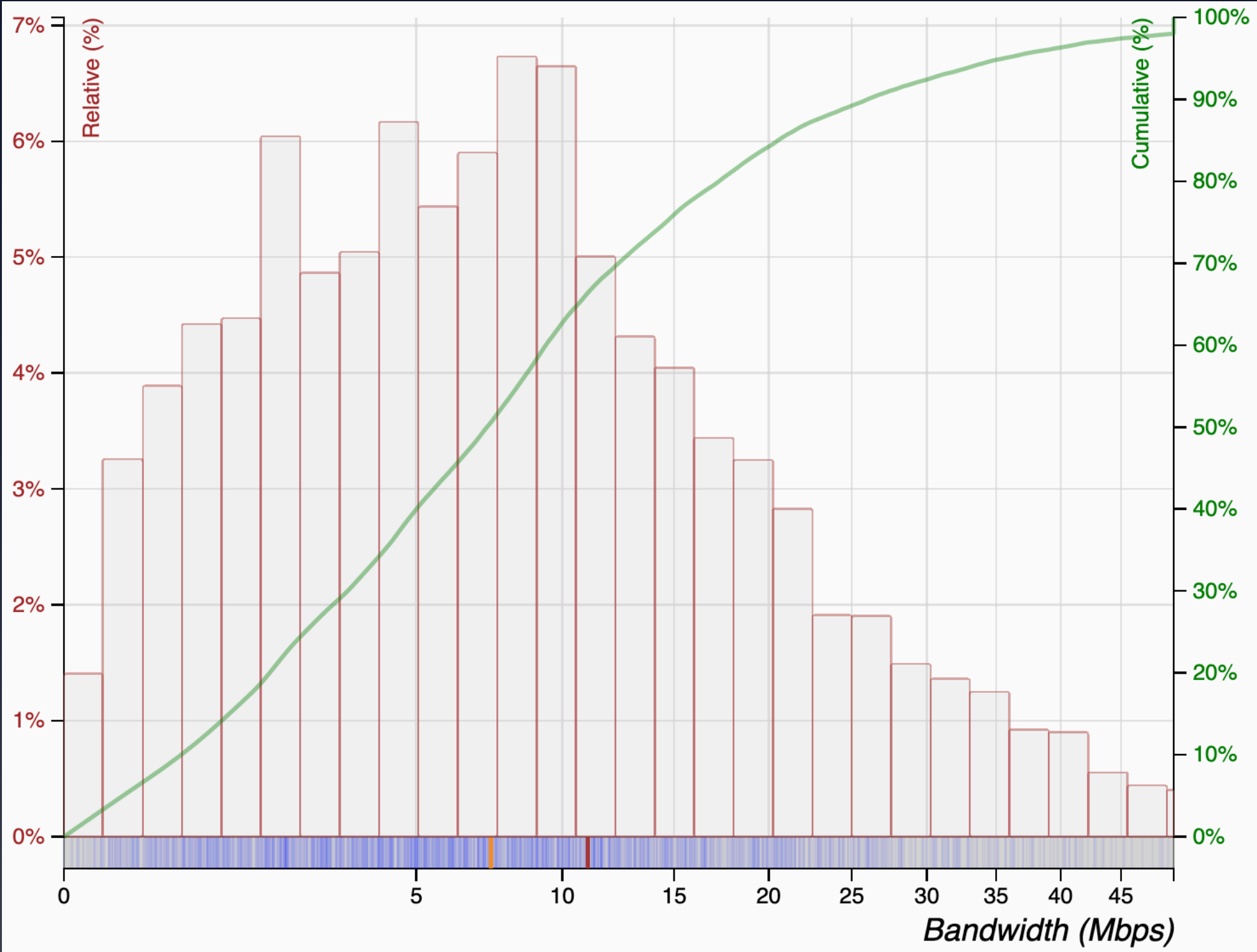
- Market is not just unconcentrated, it is scattered
- Despite of the low HHI, competition is not necessarily strong

Data from “Huawei CS Cloud”

Connection Speed (by measurementlab.net)



Average for last year



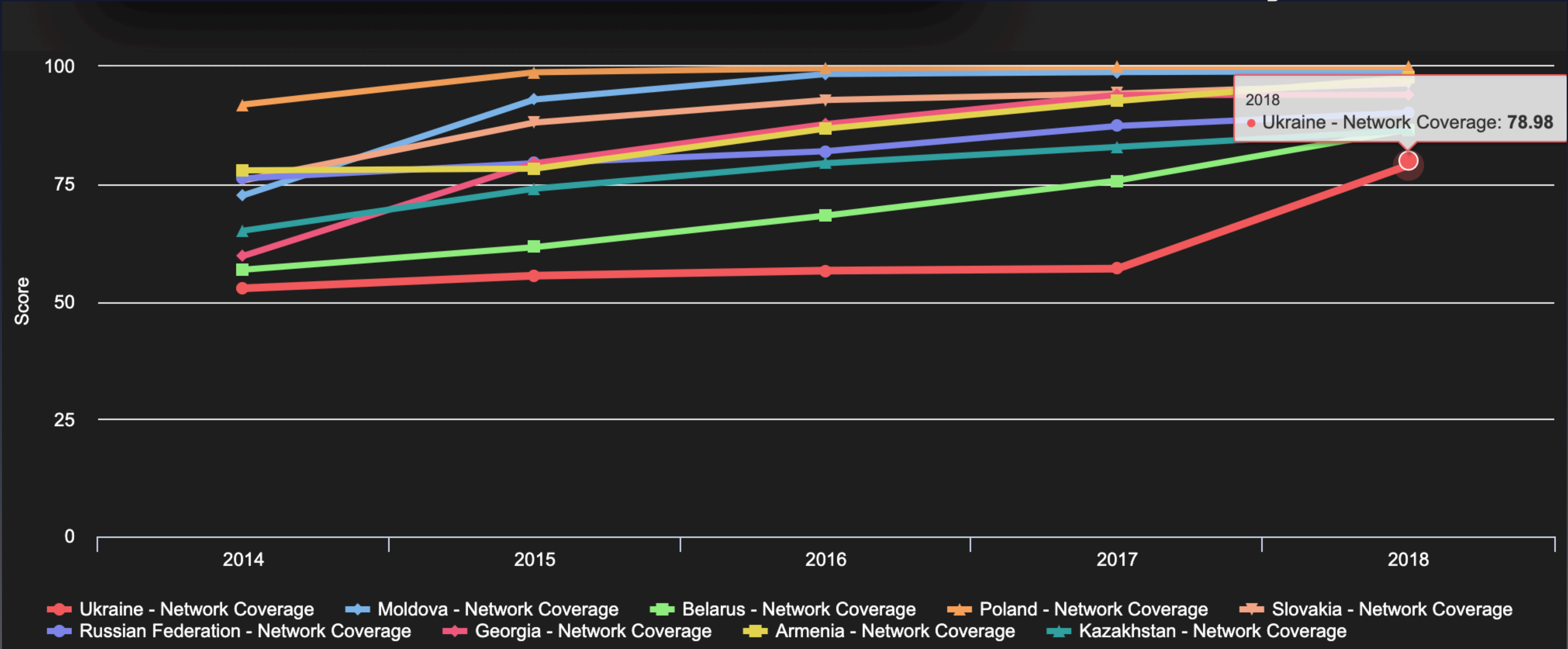
Average for last month

Speed of Internet access is growing fast

Network Coverage



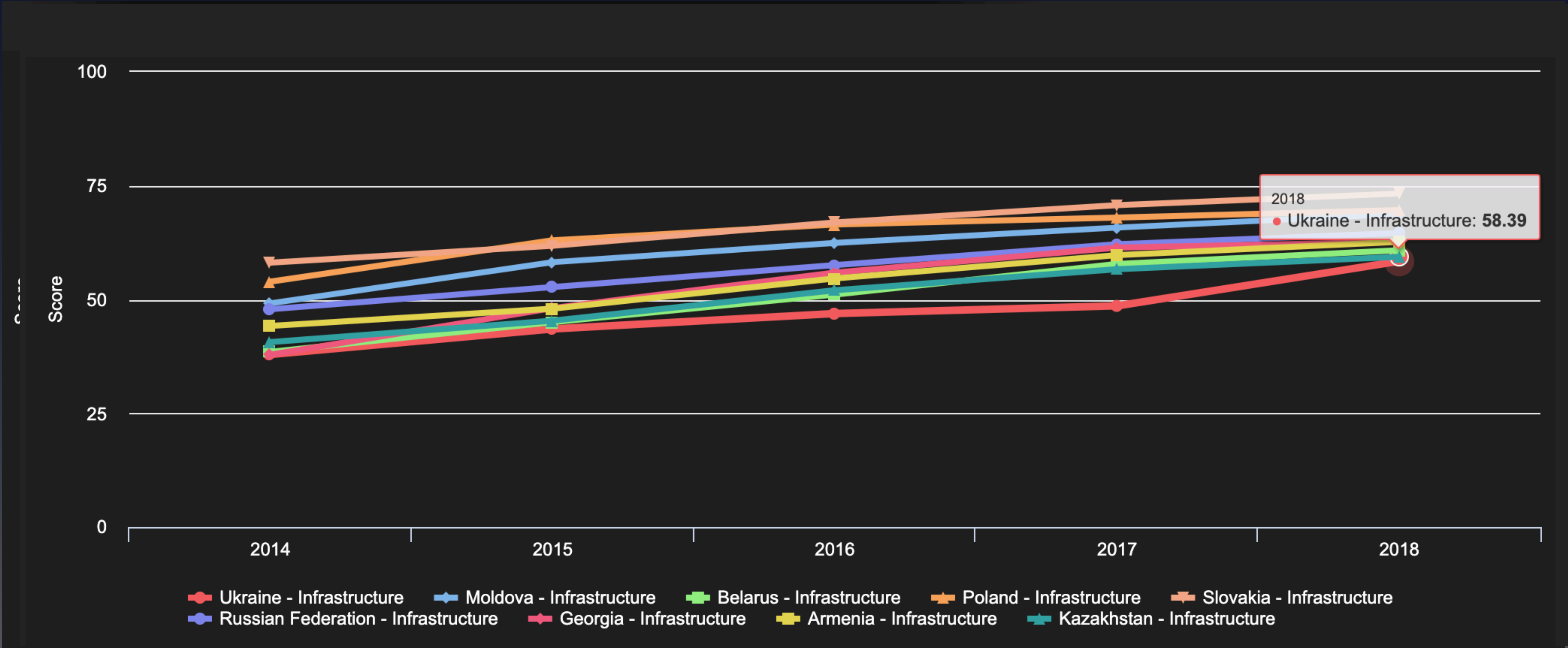
Data by GSMA



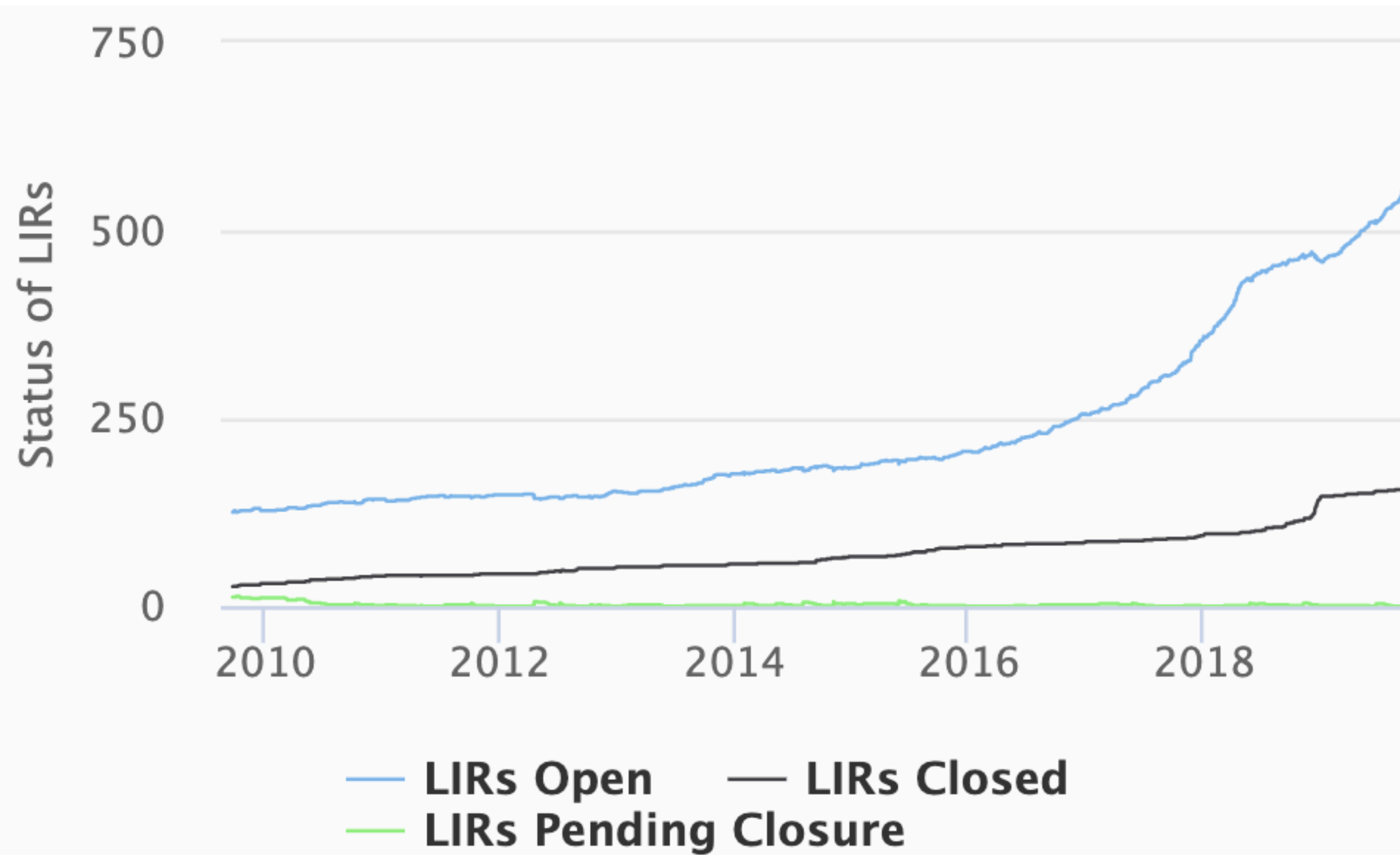
Index of Infrastructure



Data by GSMA



LIRs in Ukraine

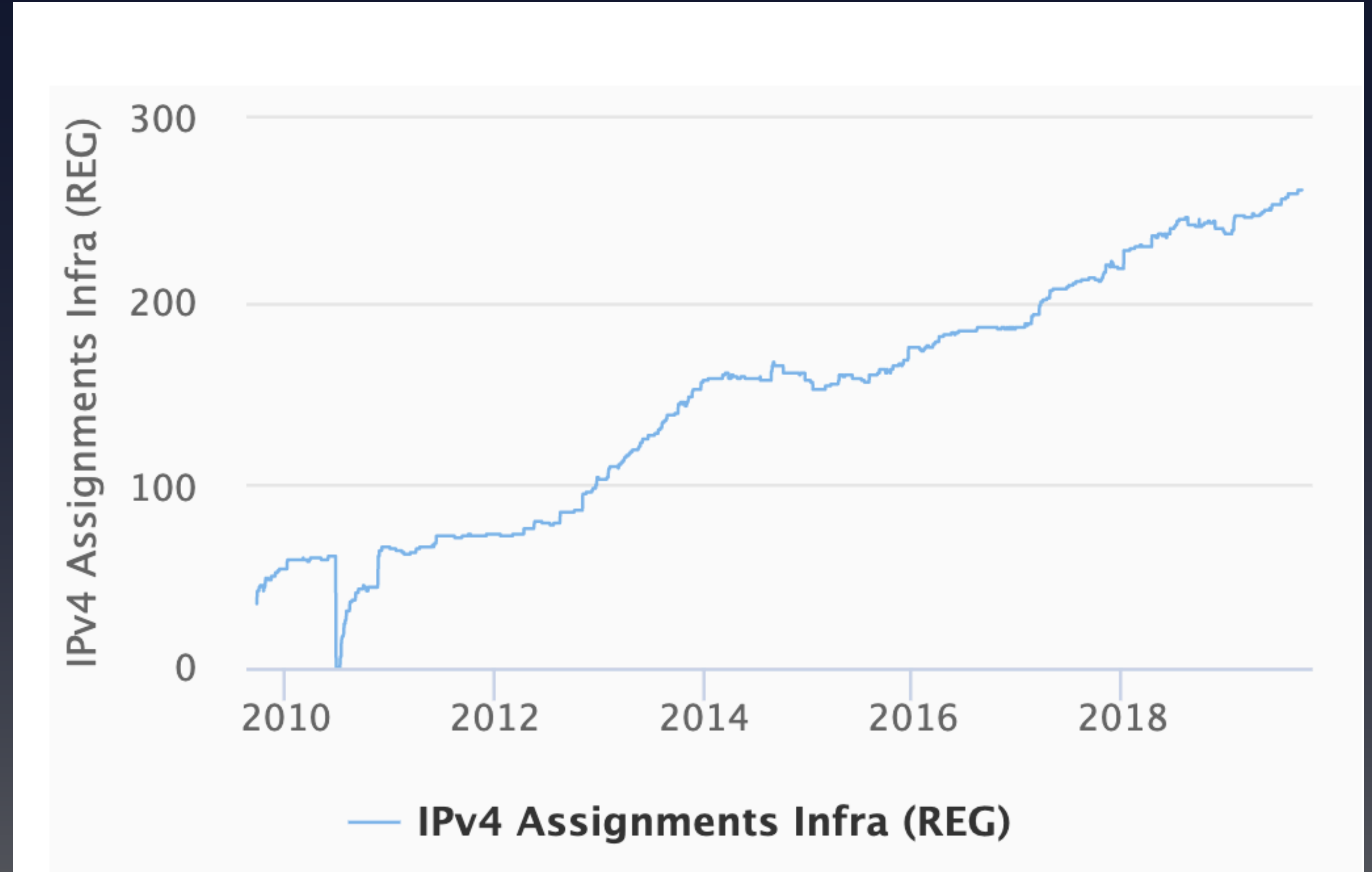


- Growth partially caused by IPv4 run out
- However, there is alignment with GSMA stats

Growth of IPv4 Infrastructure



- Steady growth
- Linear trend

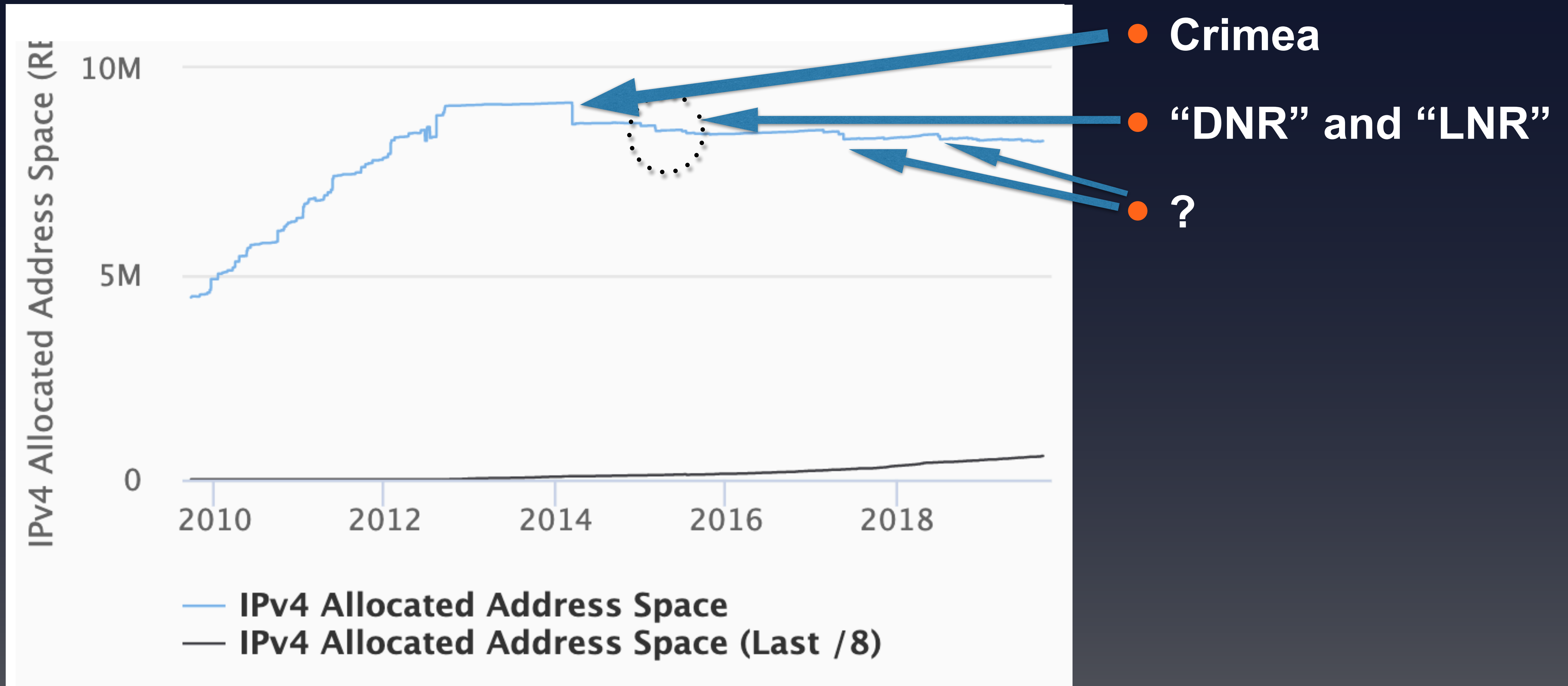


Number of IPv4: Total per Country

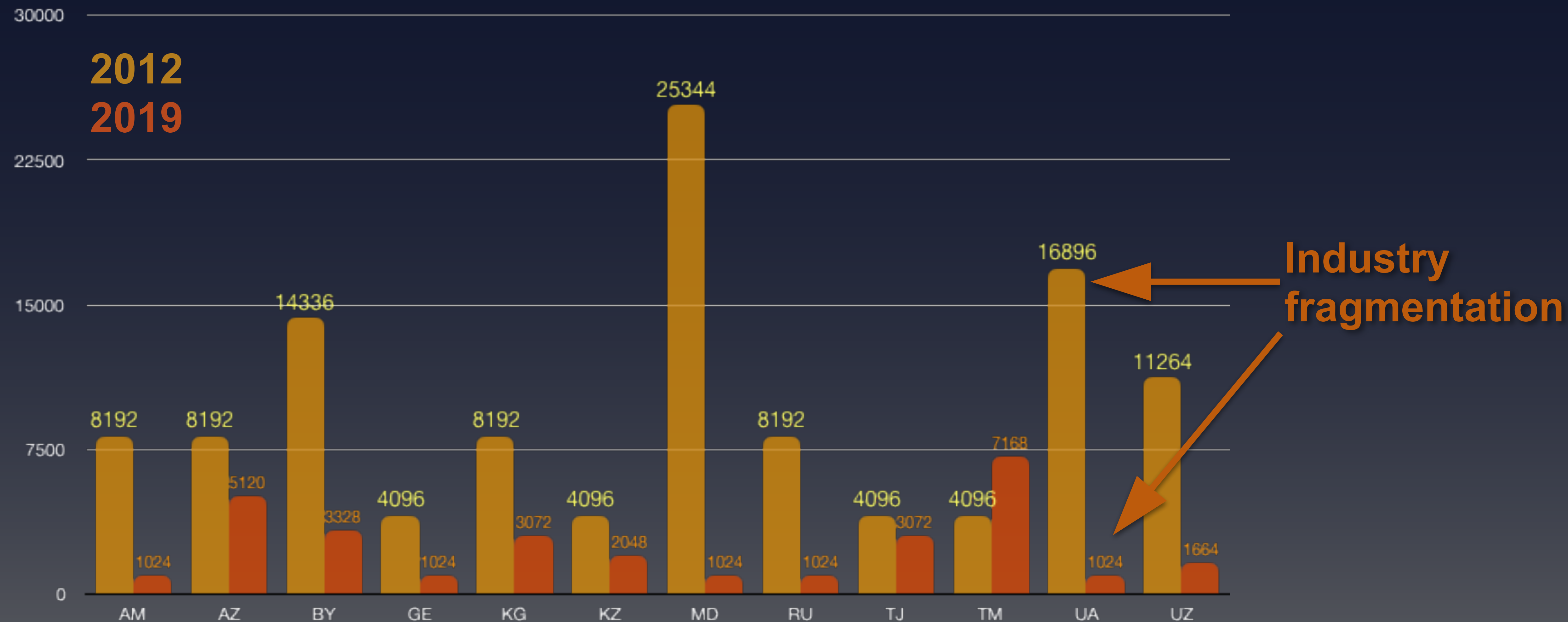


- **Ukraine is #2 in the region**
 - Both in 2012 and 2019
- **The total IPv4 space slightly decreased from 2012 to 2019**
 - Ukraine is the only country which decreased its address space

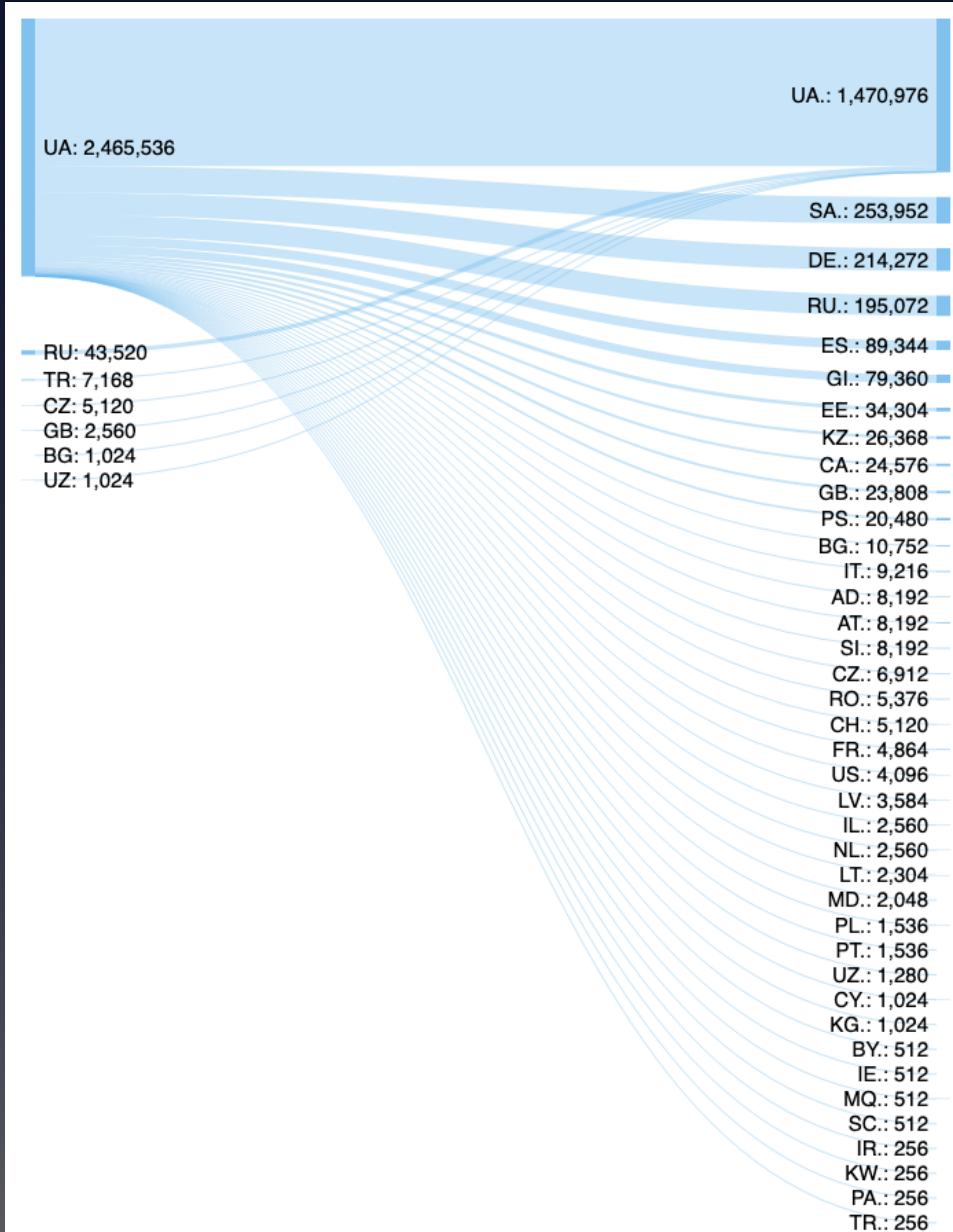
Ukraine's IPv4 Space Over Time



IPv4: Median Average per LIR



IPv4 Transfers



- **Most of transfers (58.2%) are inside Ukraine**
- **Also no transfers from abroad to Ukraine**
 - Russia is #1 (by 1.7%)
- **Top five destinations of transfers from Ukraine to abroad:**
 - South Africa (10.0%)
 - Germany (8.5%)
 - Russia (7.7%)
 - Spain (3.4%)
 - Gibraltar (3.0%)



Neighbour: Russian Federation

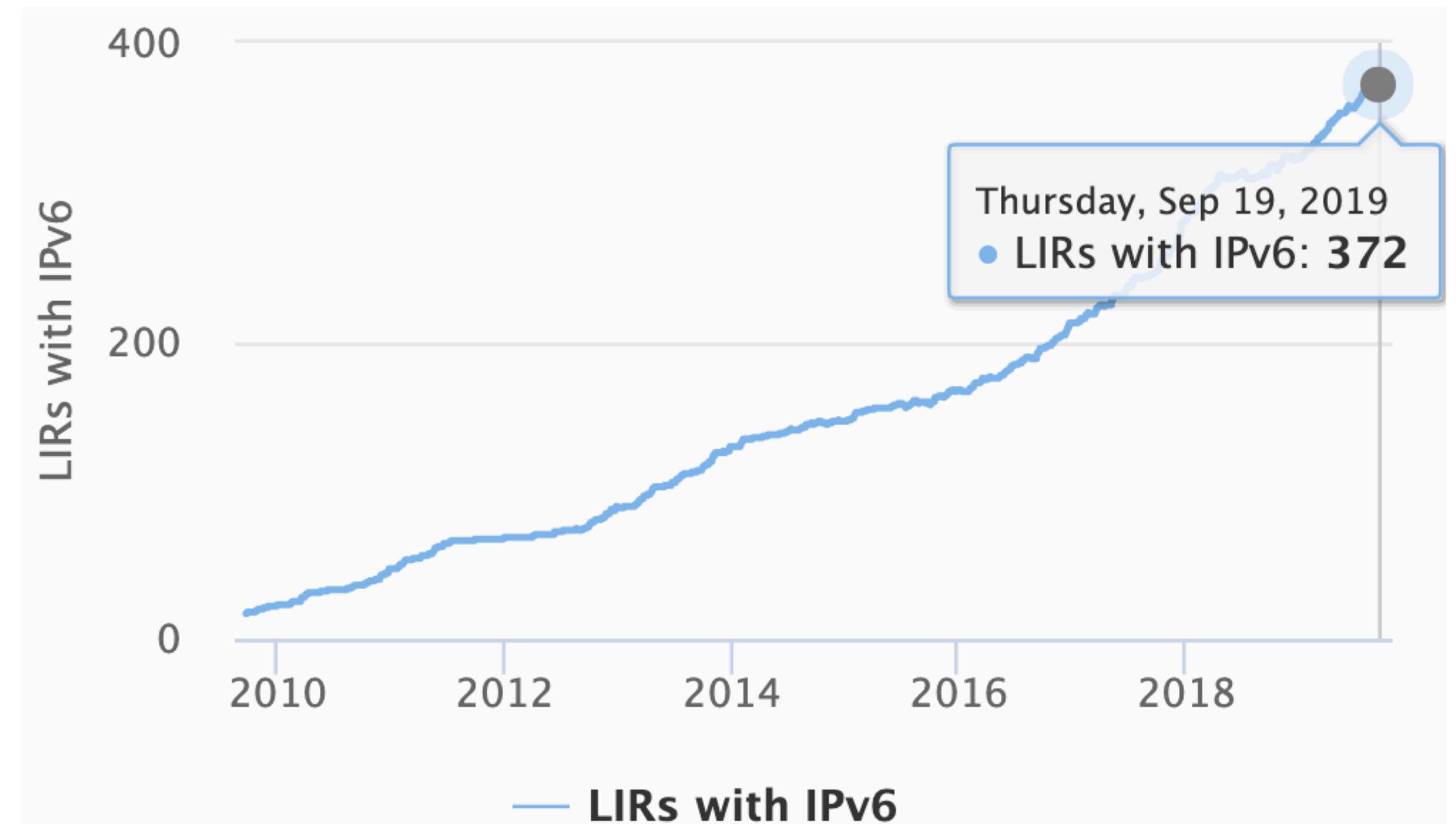
- At the same time, Ukraine is the main donor of IPv4 addresses for Russia
 - 2.9% of the incoming addresses
 - Russia is more impermeable, 68% of transfers are internal.



IPv6 LIRs

- **LIRs keep receiving IPv6 resources**
 - Rate is steady
 - 2/3 LIRs have an IPv6 allocation
- **But do LIRs use them?**

LIRs With IPv6

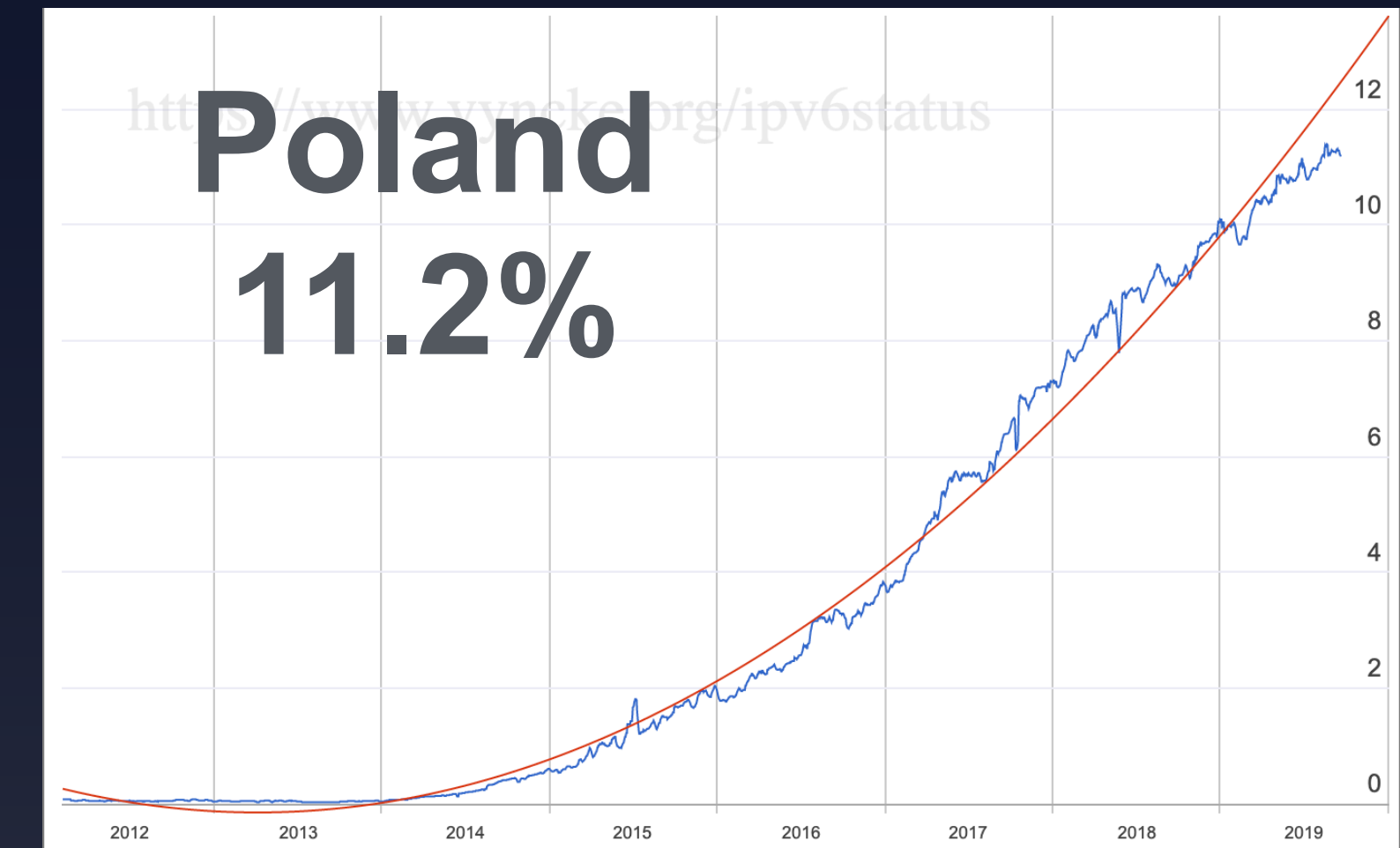
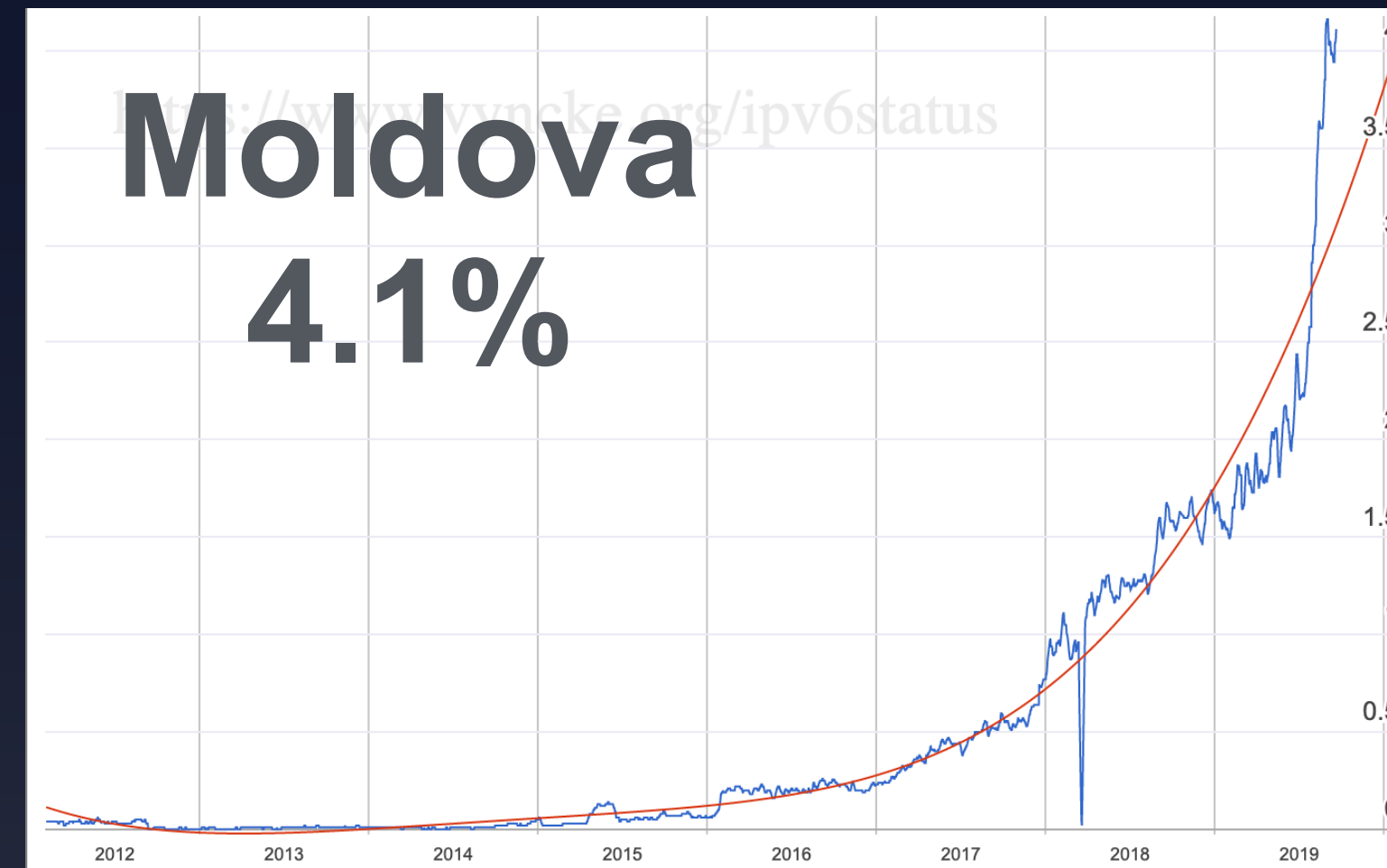
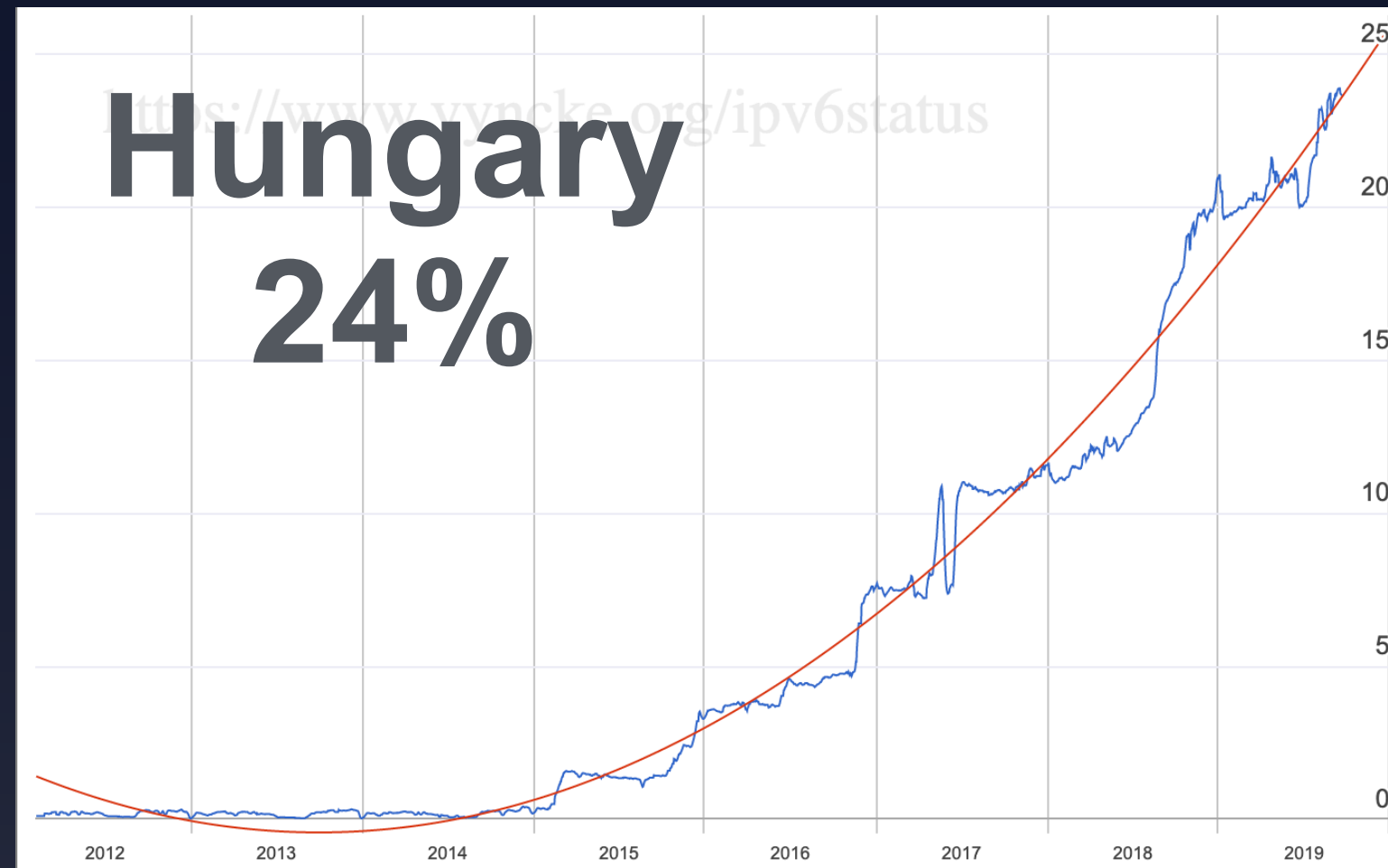


IPv6 Penetration (by E.Vyncke)



- **The growth just started**
 - Current level is sufficiently lower than the world average: 27% (according to Google)
- **IPv6 operators:**
 - Netassist
 - ITL.ua
 - Triolan
 - ?

IPv6 penetration (by E.Vyncke)



**Almost all neighbours
(except Belarus) have
higher IPv6 penetration
rate than Ukraine.**



IPv6 Resources, Popular in Ukraine

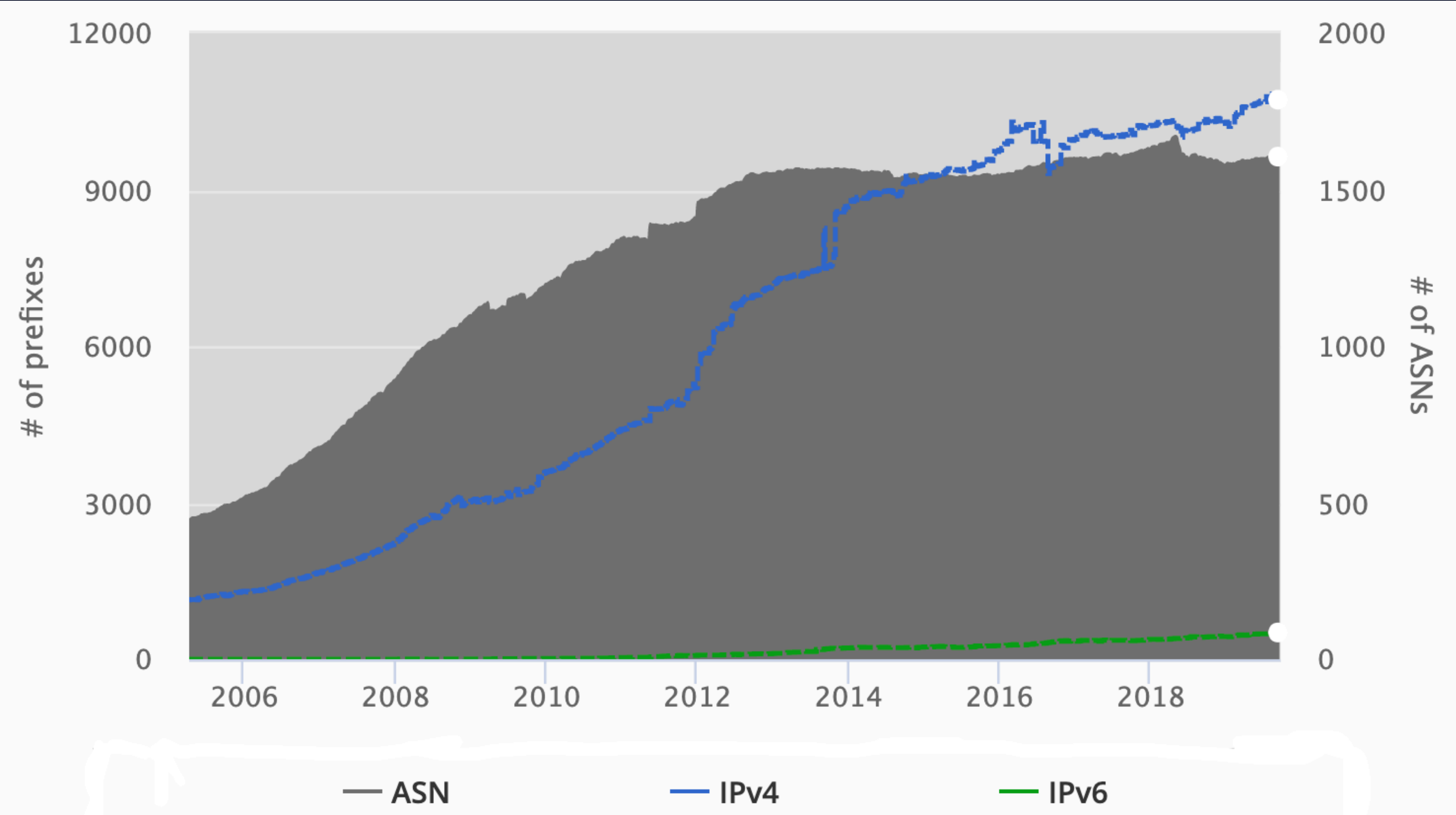
- It makes perfect sense for operators to implement IPv6
 - The most popular resources are IPv6-enabled (Google, YouTube, Facebook)
- Cloudflare helps
- Most of local resources do not see the reason to turn IPv6 on

Source of data	BigMir	Liveinternet		InAU	Similar Web	TNS
Number of resources	300	300	3000	25	50	25
IPv6-enabled, %	30,0%	30,7%	25,9%	36,0%	32,0%	24,0%
Protected by Cloudflare, %	27,3%	24,7%	11,9%	4,0%	10,0%	0,0%
Native IPv6 support, %	2,7%	6,0%	14,0%	32,0%	22,0%	24,0%

Count only local resources

Include global resources (Google, Facebook etc)

Internet Routing



Traffic Locality in Ukraine

- “IXP Country Jedi” by Emile Aben

- <http://sg-pub.ripe.net/emile/ixp-country-jedi/history/2019-07-01/UA/ixpcountry/index.html>

- IPv4
- July 2019

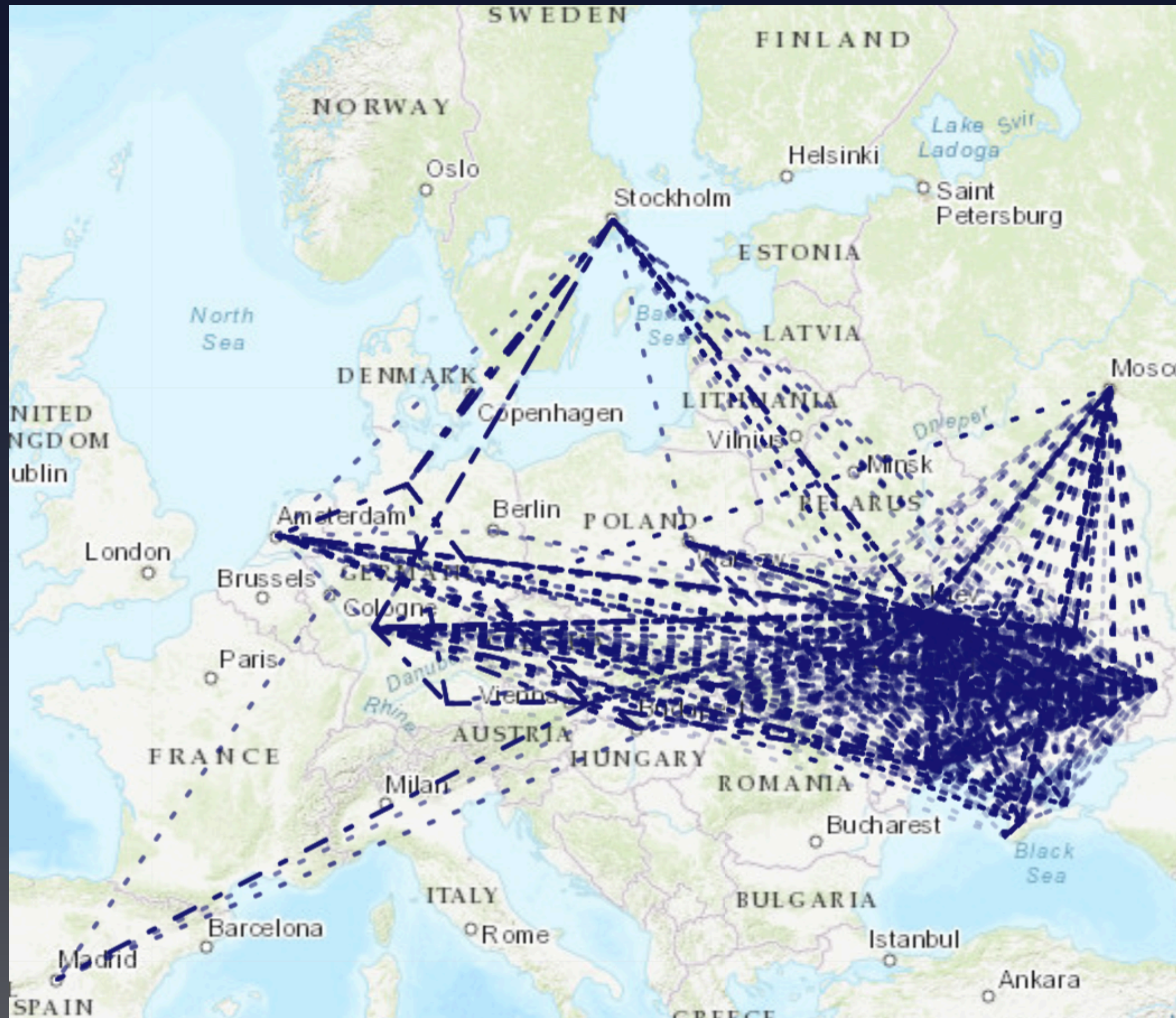
- Traffic between Ukrainian Autonomous System is mostly local

- Problematic ASes:
 - AS1820, AS3326, AS21390 - WNet
 - AS3326 - Datagroup
 - ASes from Crimea, Donetsk and Luhansk

- The proportion of IXPs is large

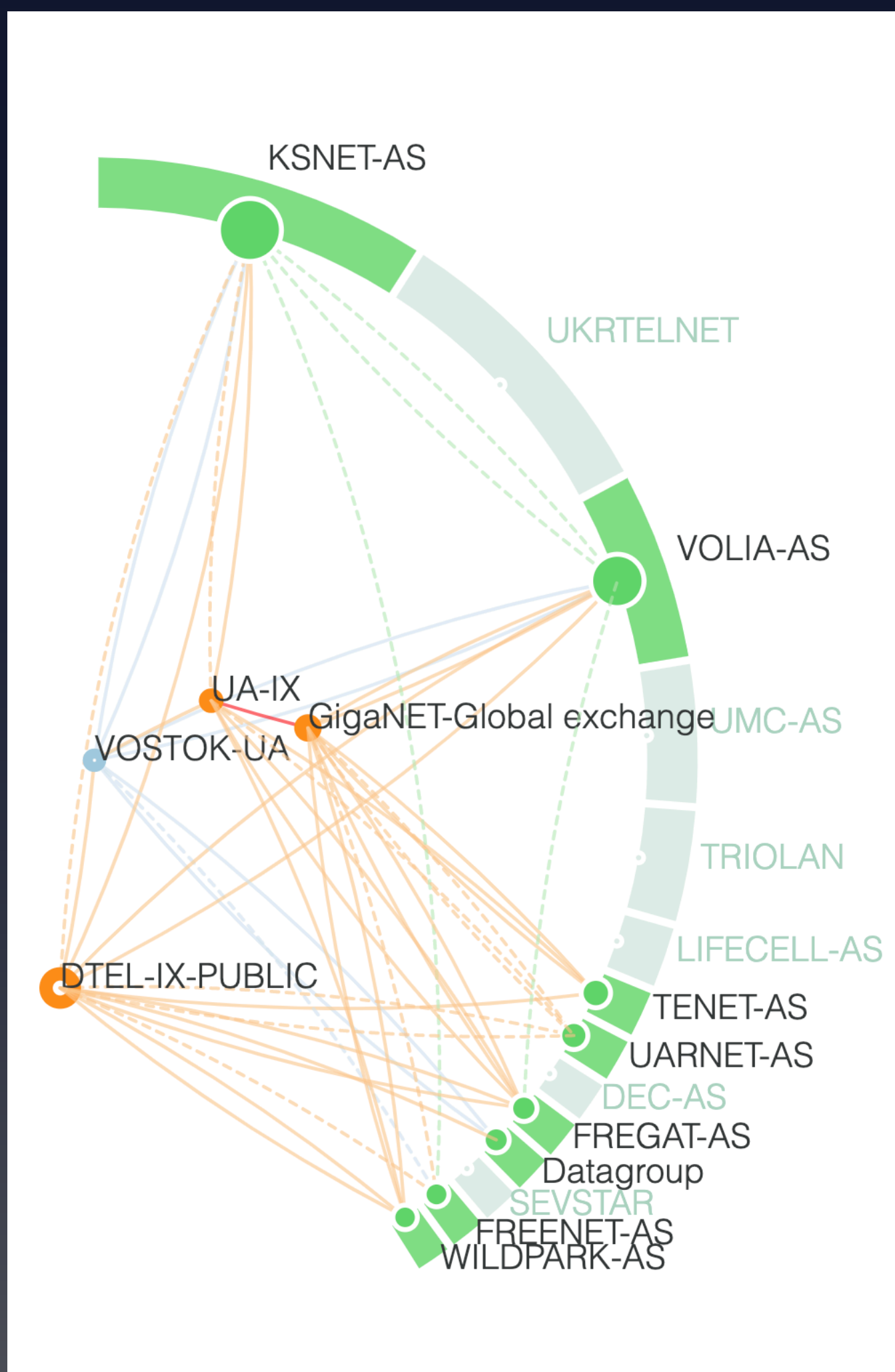


Traffic Locality in Ukraine

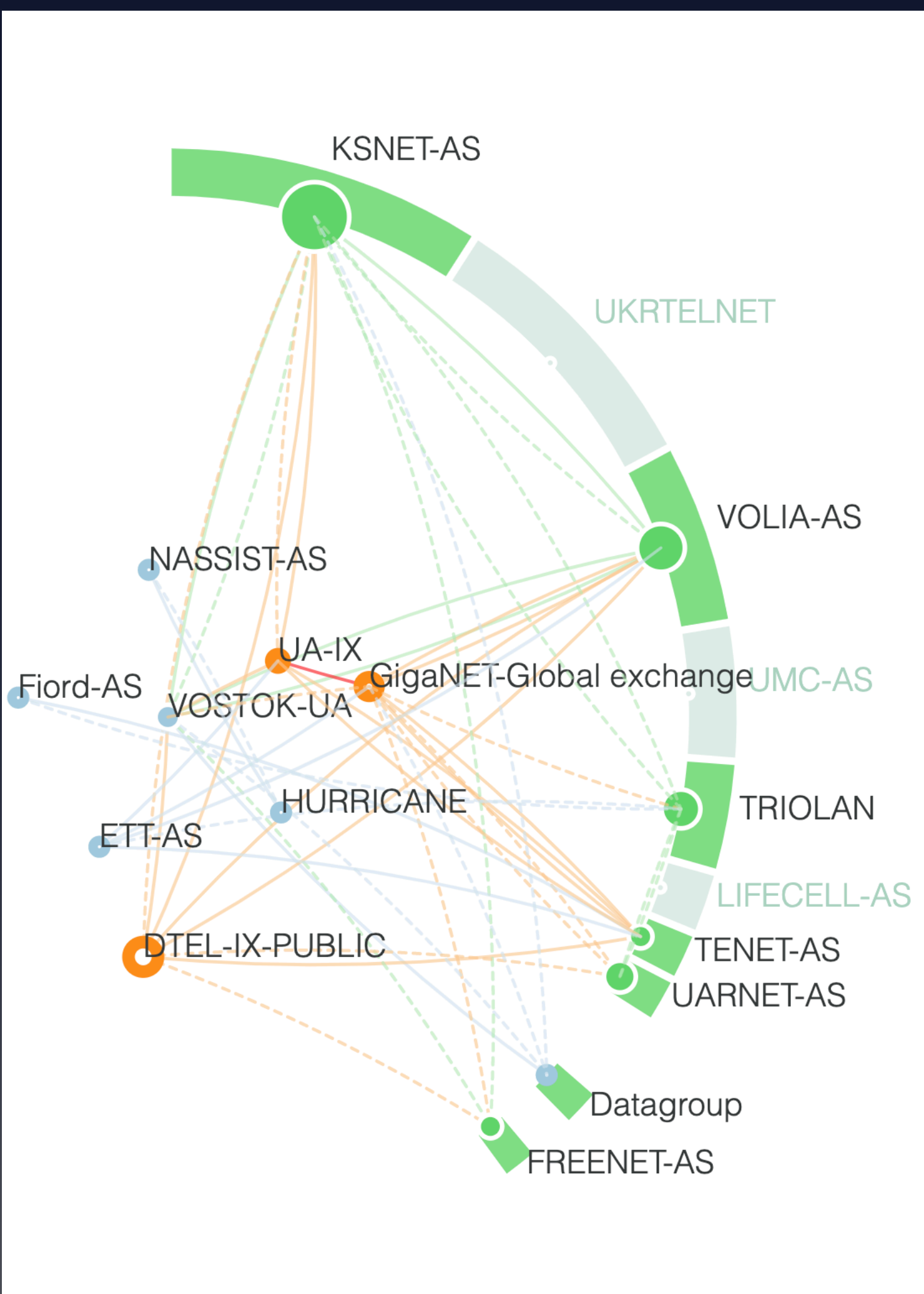


- Most of routes are local
- Geography of non-local routes looks illogical, if not chaotic
 - However, it is not a big surprise considering that ASes based in Crimea, Donetsk and Luhansk are participating

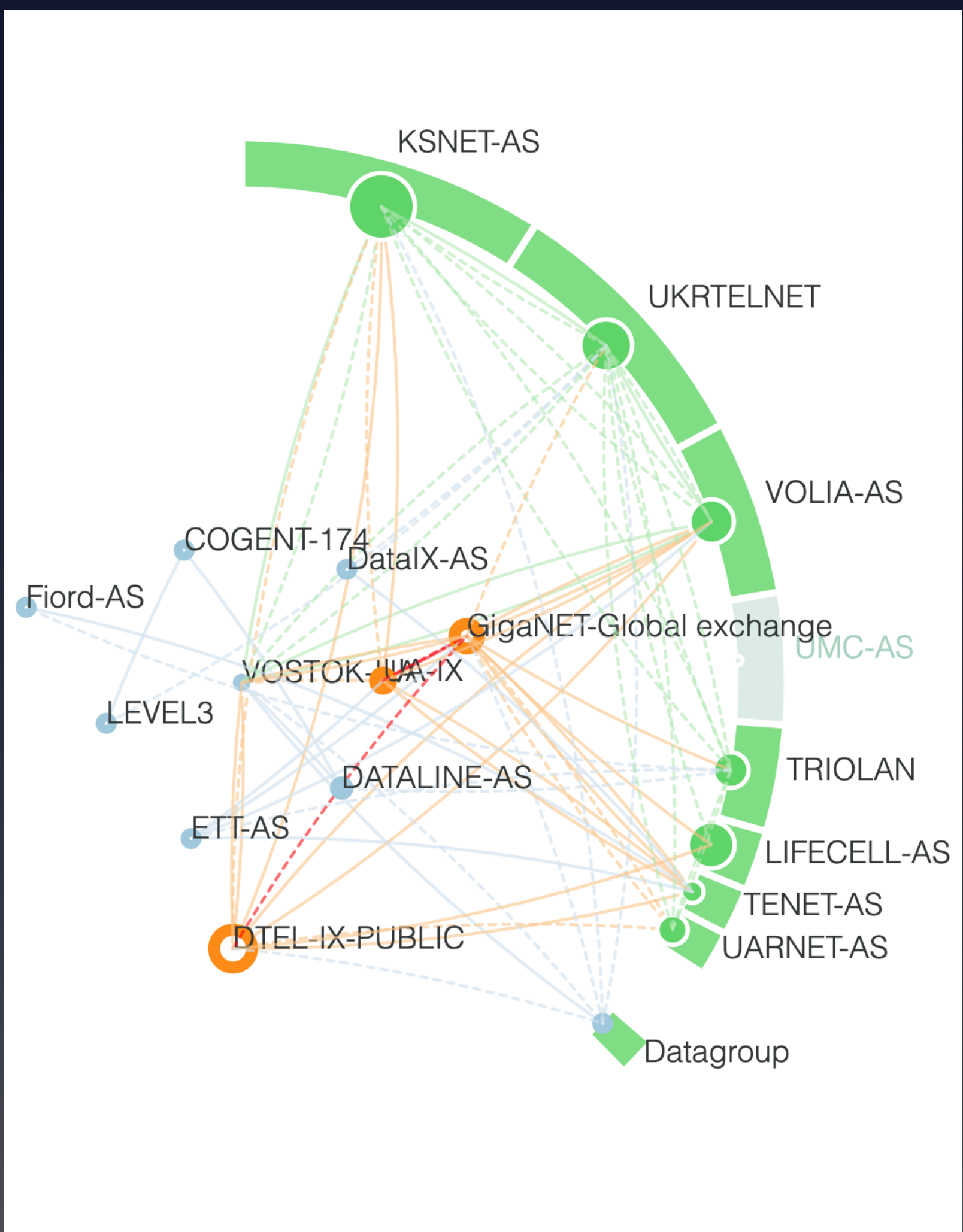
Ukrainian Interconnectivity



2019-06



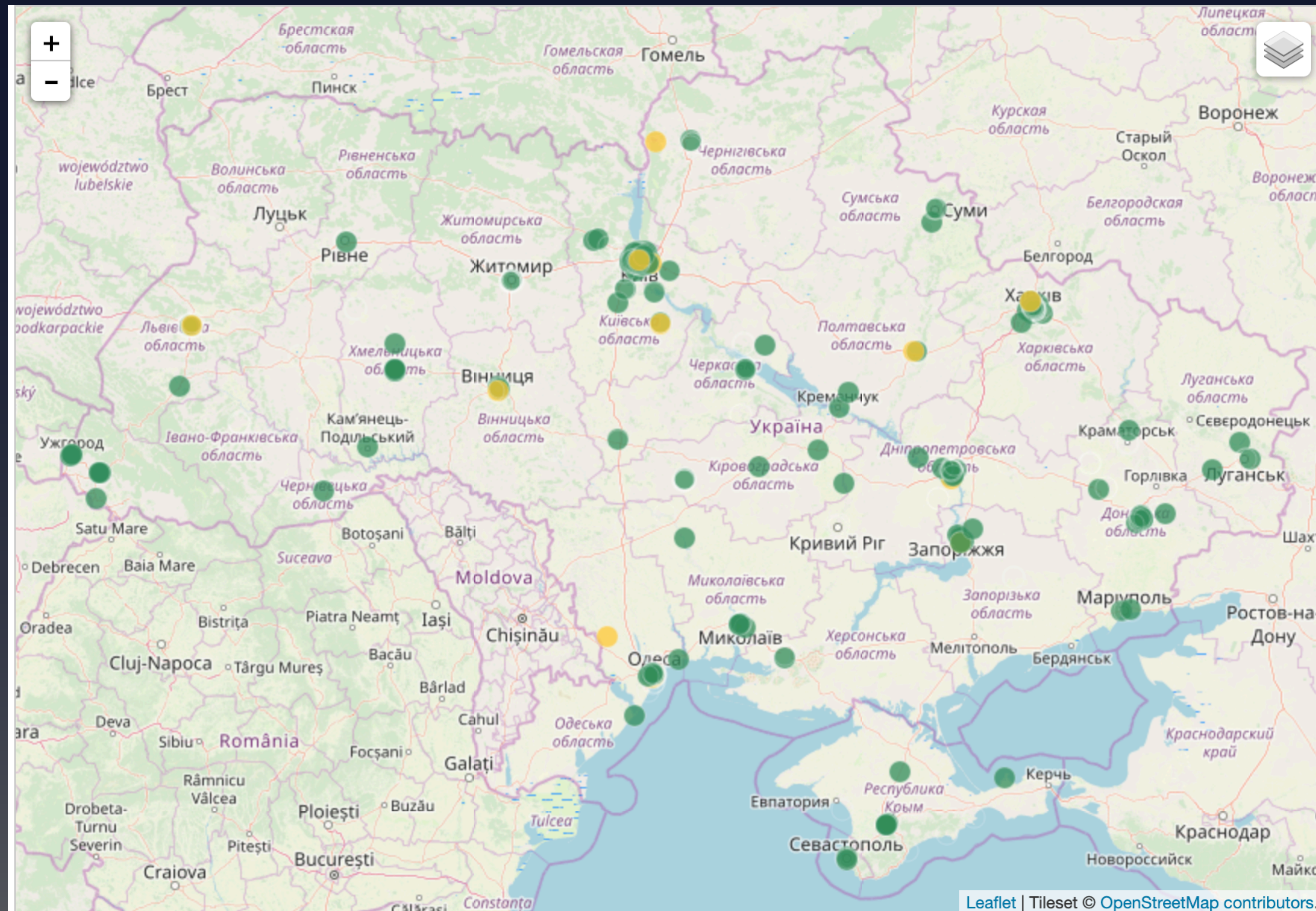
2019-07



2019-09

Changes are fast!

RIPE Atlas Probe Distribution

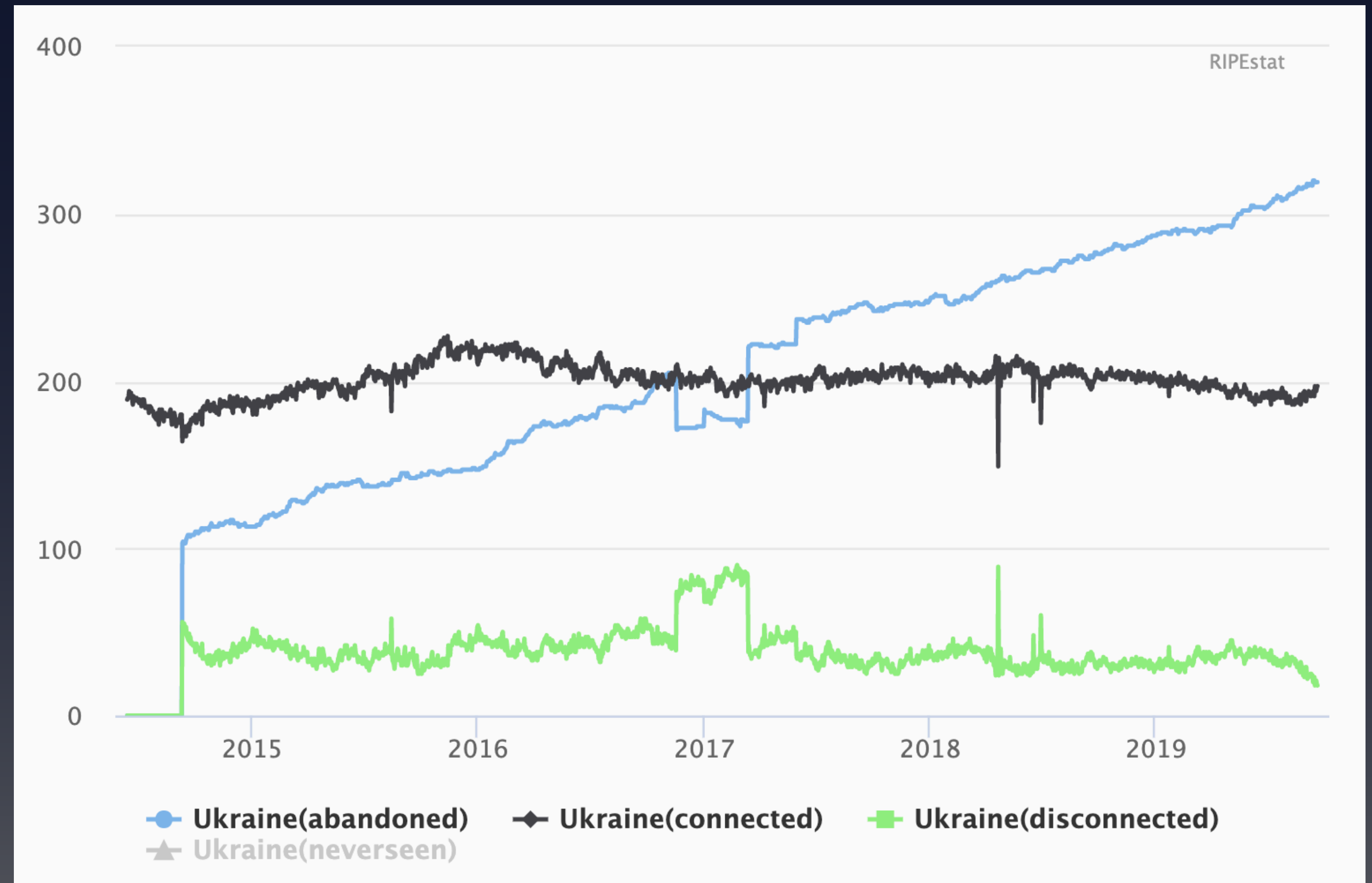


- All over the country
- Relatively uniform distribution
- Total number: 195
 - Czech Republic: 247
 - Switzerland: 287
- Need more for researche

RIPE Atlas Dynamics



- Obviously, the system in Ukraine is underutilised





Some Conclusions

- **The industry is not stagnating; the processes are healthy but there is a noticeable delay compared to other countries**
- **Huge reserves for industry growth**
 - Both for ARPU
 - ...and for number of users (penetration)
- **Implementation of the available opportunities is complicated by low ARPU (catch 22) and high fragmentation of the market**
 - This applies to both technical and commercial development
 - Perhaps the consolidation of the market will change everything
 - ▶ This may happen with the arrival of global players



Questions



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