



# IPV6 STORY IN MTN-IRANCELL

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# AGENDA

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01. Who Am I?

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02. Studying Phase

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03. Planning &  
Deployment

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04. Challenges & Future  
Plans

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05. IPv6 Adoption  
In Central Asia

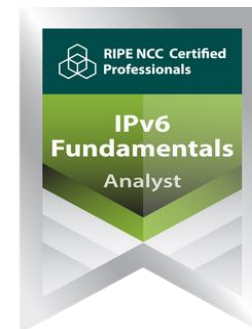


# WHO AM I?



## Abolfazl Najafi

- IPWAN Planning & Optimization Manager @ MTNlrancell (AS44244)
- More than 12 years of experience in the telecommunications industry
- IPv6 Enthusiast
- Scan the QR to reach my LinkedIn



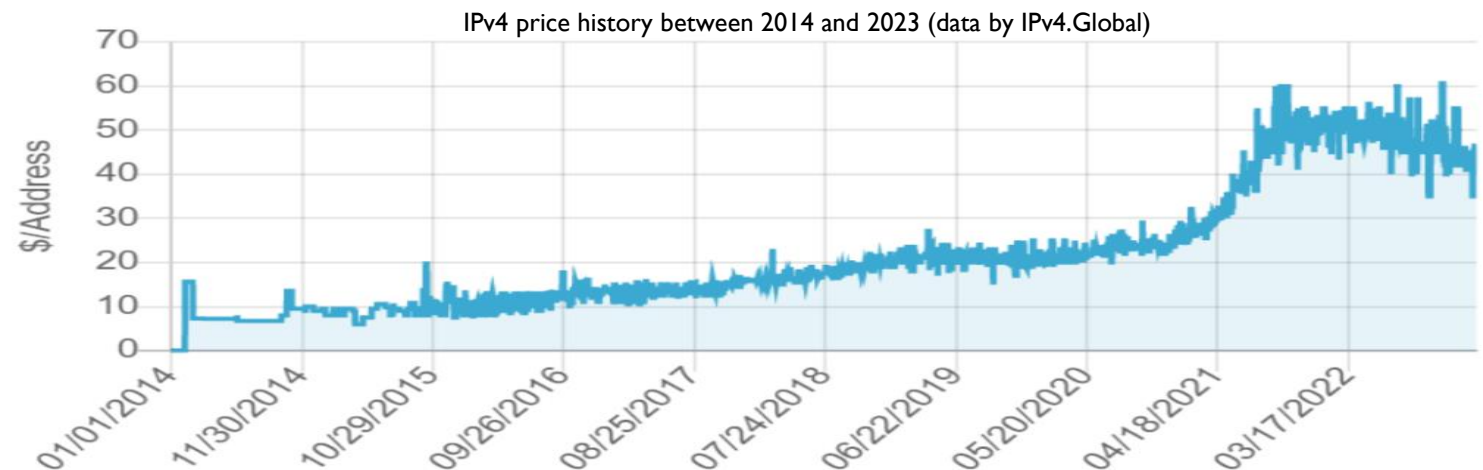
# **BEGINNING POINT**

- Starting to study: **2016**
- Mobile operator with around 30 million subscribers
- Total IPv4 address space for mobile users: **1,048,576**
- Number of regions/GWs all across the country: **7 GWs**
- Total voice subscribers: **30 Million**
- Total concurrent data (2G,3G,4G) users (PDP connection): **12 Million**
- NAT Ratio: **12:1**



# MOTIVATIONS FOR MIGRATION TO IPV6

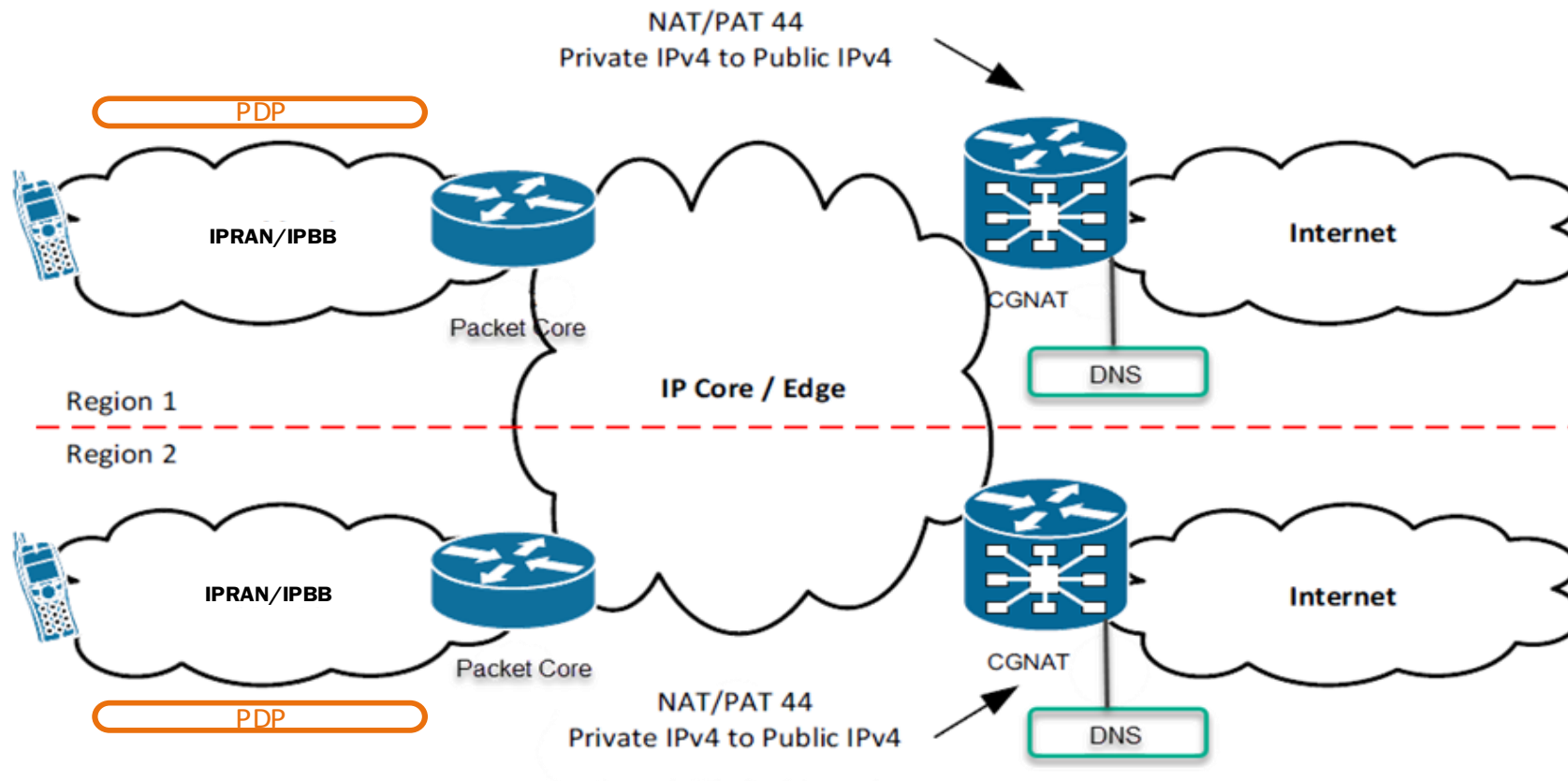
- Reducing the use of CGNAT
- Reducing NAT ratio, which was against the internal regulations(4:1)
- Network readiness for new technologies(SRv6,IOT, 5G and Network Slicing,...)
- Cost of providing new IPv4 blocks
- Lack of IPv4 addresses



# WHAT IS THE COMPANY'S ROLE IN THE INDUSTRY?

★ Mobile Operators ★	Content Providers	Data Centers
Handset and Device Compatibility	Content and Services Compatibility	Virtualization and Cloud Infrastructure
Network Infrastructure	Website and DNS Configuration	Network Segmentation
Core Network Infrastructure	Load Balancing	DNS and DHCP Services
IPv6 Addressing Plans	Content Caching	Server and Application Compatibility

# NETWORK HIGH-LEVEL TOPOLOGY



# MAIN CHOICES FOR THE MIGRATION

## IPV6-ONLY MODE

- Huge changes on all the network segments(Packet Core, IPBB, IPRAN,...)
- Complicated in deployment
- Time-consuming

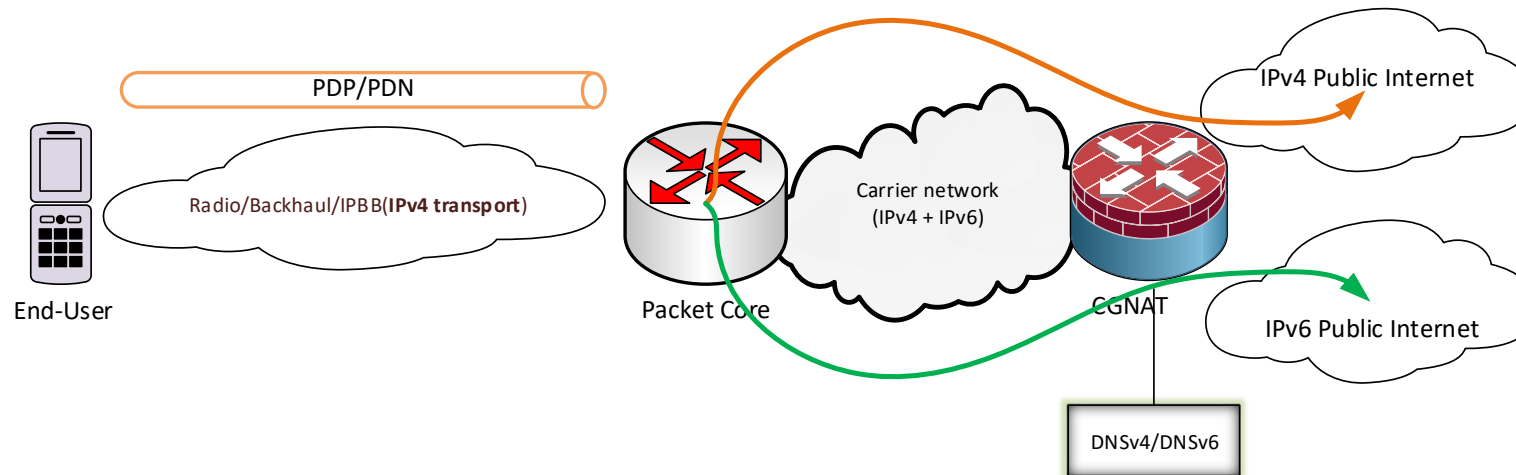


## DUAL-STACK MODE

- Huge changes on all the network segments (Core, IPBB, DCN, IPRAN, etc.) **BUT** it can be deployed without affecting live services
- Variety of deployment solutions for underlay and overlay networks
- It can be started immediately
- **It does not solve the lack of IPv4 problem completely**



# NETWORK HIGH-LEVEL TOPOLOGY




- EU's connection to the Packet Core is established over an IPv4 transport layer
- The Packet Core network has the capability to assign both IPv4 and IPv6 addresses, even if the PDP is established over an IPv4-only network
- From the Packet Core to the Edge and Internet, Dual-Stack mode is enabled
- DNSv6 has been enabled on the local servers and added to user profiles
- Most handsets have the built-in feature to prefer the IPv6 path

# IPV6 ADDRESSING PLAN

## □ GLOBAL BLOCK

- 2a01:5ec0::/32 Allocated by RIPE NCC in 2012
- /36 prefixes assigned for each region and used in IPv6 pool
- Advertised to the upstream provider with /36 and /37 prefixes

## □ INSIDE THE NETWORK

- ULAs used for the interconnections in Core, WAN, and Peering with Upstream provider :
- FD00::/7 + 2a01  FD00:2a01::/32
- /36 prefixes assigned for each region to be used for the interconnections
- /64 is reserved for the interconnections, although /127 used for security reasons

## □ DNSv6

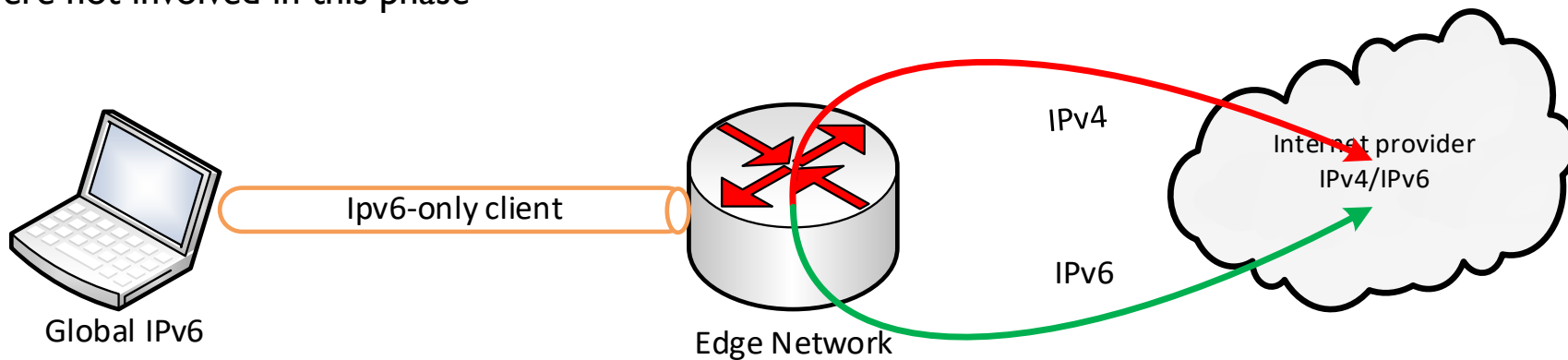
- IPv6 has been enabled on the local DNS
- It is also Local and added to user profiles under APN configuration on the Core level

## □ END USERS

- /64 assigned for the mobile users

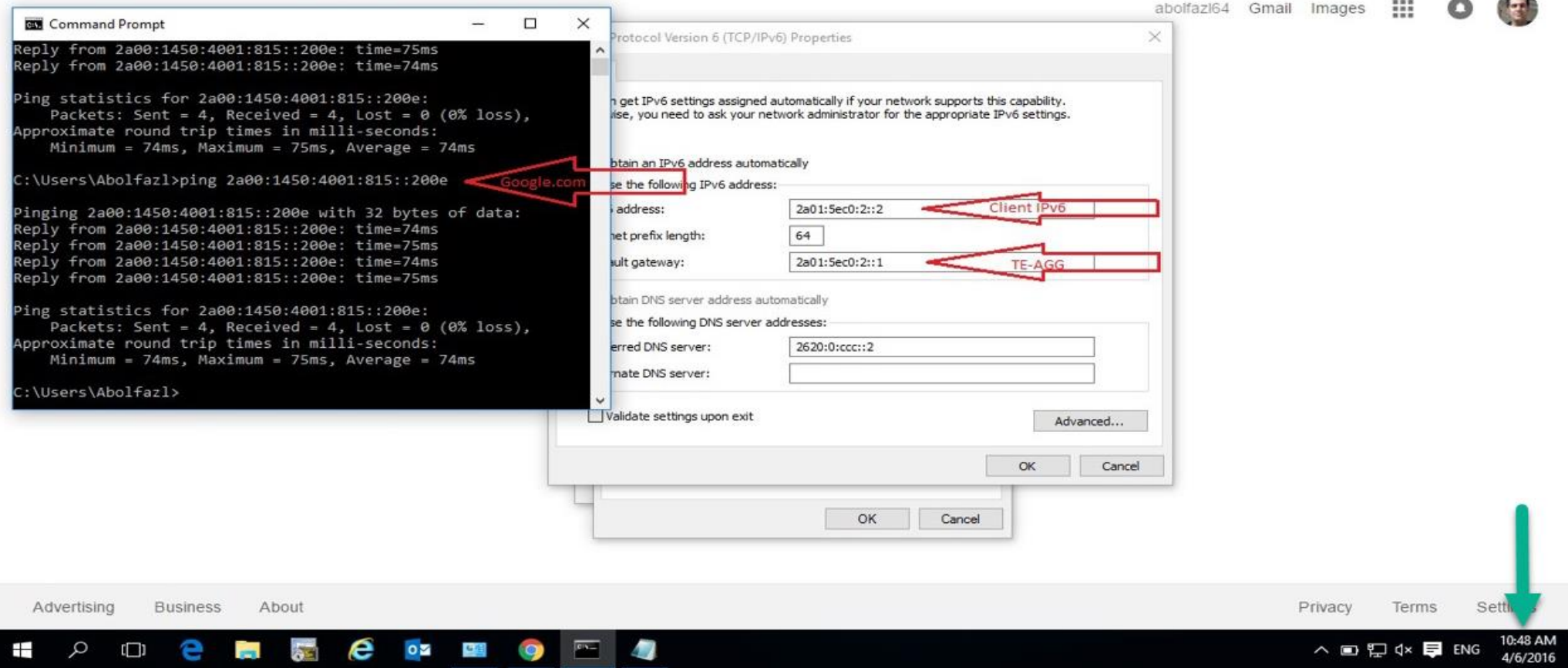
# STEPS FOR THE PILOT PHASE

- Enabling IPv6 address-family in EBGp configuration with the Internet provider
- Configuring IPv6 interconnections in the internal network for both IGP and iBGP
- Testing end-to-end connectivity in the WAN layer
- Clients were not involved in this phase



# PILOT PHASE

- **Date: 06-Apr-2016**
- **This is the first screenshot showing IPv6 reachability on my personal laptop during the test**



# DEPLOYMENT PHASE

➤ **Duration:** One year

➤ **Affected segments of networks:**

## A) IP Core:

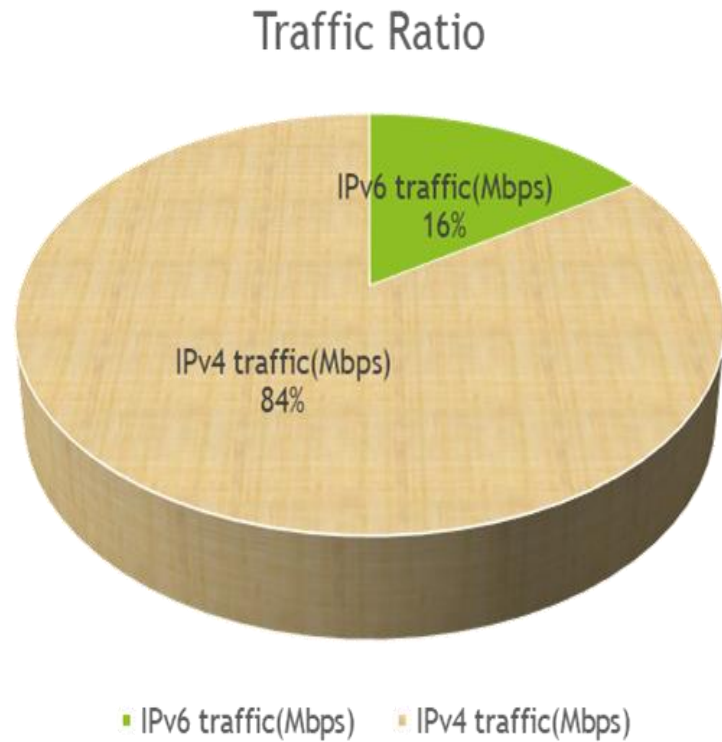
- EBGp with upstream GWs and prefix advertisements in all regions
- IPv6 configuration inside the network
- Changing IGP(OSPFv3) and BGP configuration
- Local DNSv6 end-to-end configuration and testing

## B) Packet Core Network:

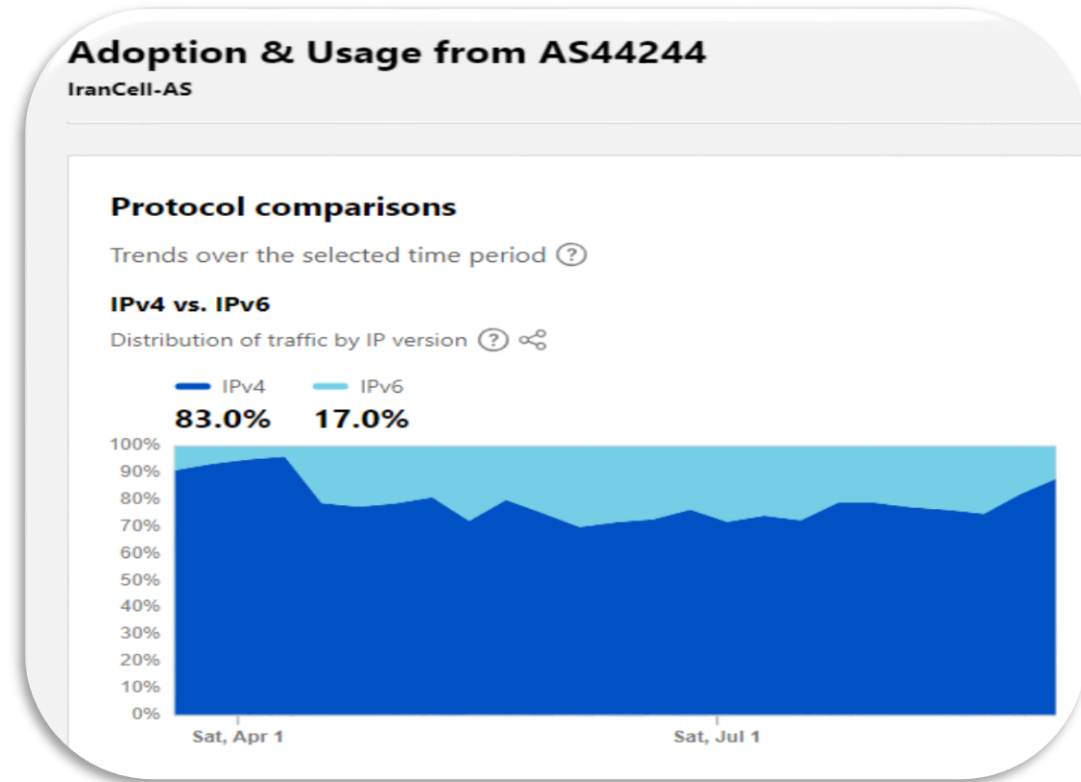
- Adding IPv6 pool on the core appliances (GGSN, PGW)
- Enabling dual-stack mode on the user's APN to assign both IPv4 and IPv6 to EUs
- Adding DNSv6 to users' APN

**NAT solution has not been used, and users receive global IPv6 addresses from the pool directly**

# DISTRIBUTION OF TRAFFIC BY IP VERSION

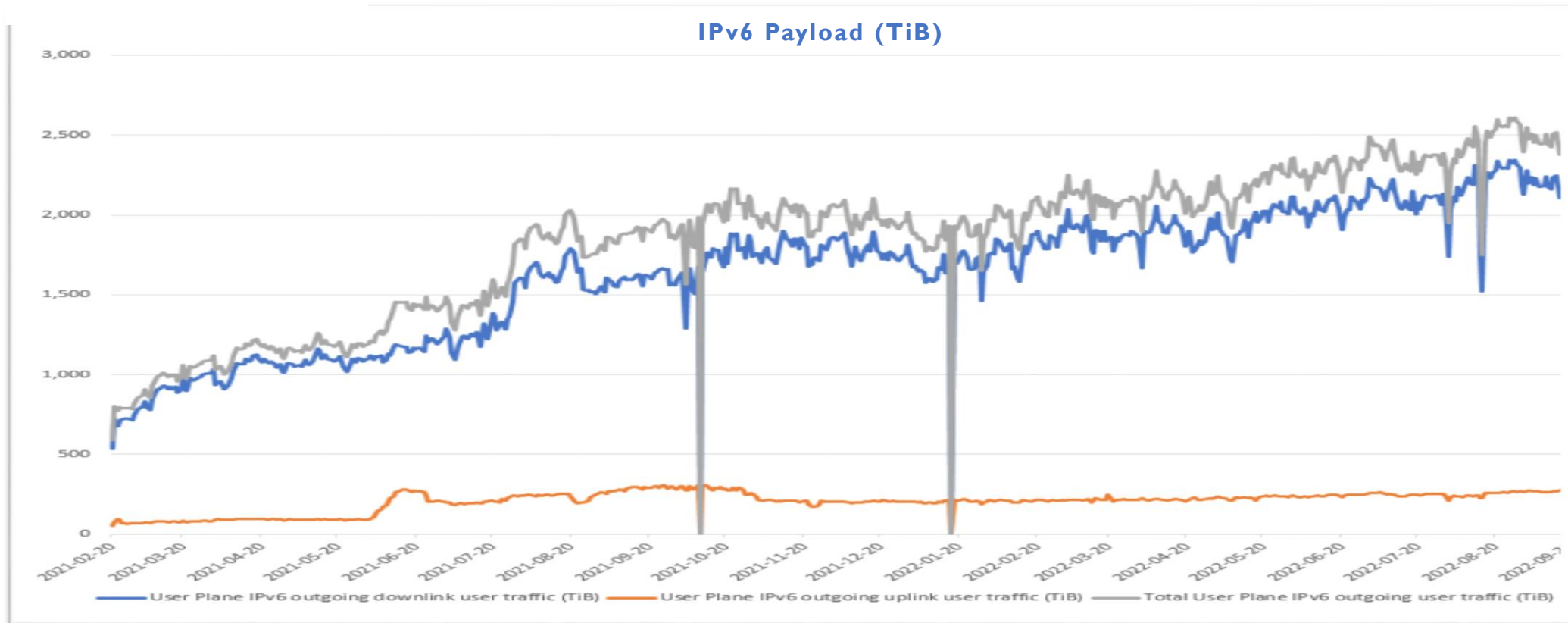


Analyzed by MTNI



Exported from Cloudflare radar(Last 6 months)

# IPV6 TRAFFIC GROWTH



# MAIN CHALLENGES

## ❑ SANCTIONS

Due to the sanctions, iPhone handsets in Iran do not currently support IPv6

## ❑ DATACENTER SERVICES

It was not a significant issue since there was no critical content stored in the data center

## ❑ Regulatory and Compliance Issues

## ❑ IOS UPGRADING

Some nodes' iOS had to be upgraded to support IPv6, resulting in service-affecting CRs, complex arrangements, and other related challenges

## ❑ Training and Skillset

Staff need to be trained to understand and manage IPv6 effectively



# FUTURE PLANS

## ❑ DEPLOYING IPV6 PREFIX DELEGATION FOR CPEs

This feature will prepare us to implement new smart homes, IoT-based services, etc.

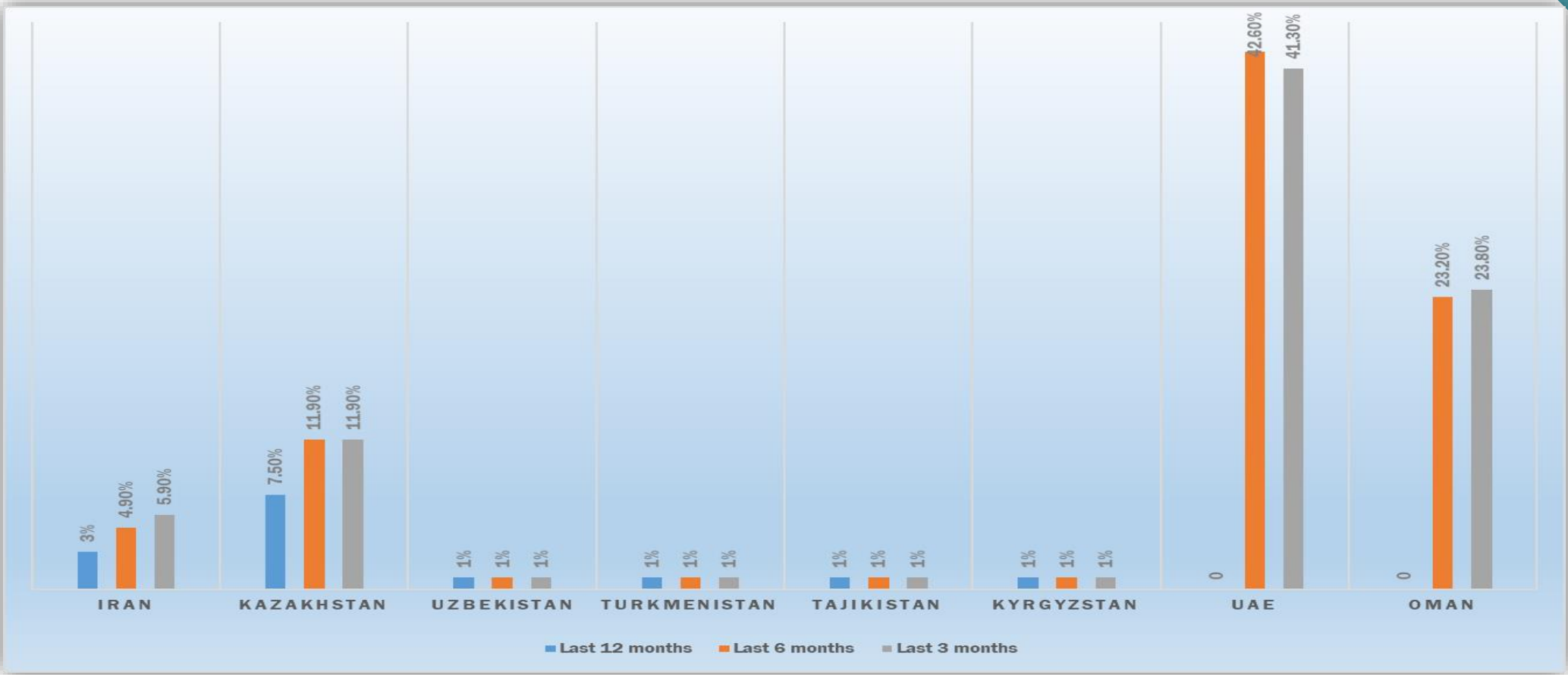
## ❑ OPTIMIZING IPV6 SUBNETS FOR THE REGIONS

Currently, some gateways have /37 prefixes; however, it is recommended to use 4-bit subnets ( /36, /40, ...).

## ❑ IPV6 PEERING WITH INTERNAL CONTENT PROVIDERS

Providing IPv6 peering prerequisites in the Iran IXP network.

# IPV6 ADOPTION IN CENTRAL ASIA BASED ON CLOUDFLARE RADAR



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# Q&A?

"It always seems impossible until it's done."  
Nelson Mandela

