# International A2P Traffic Monetization Challenges & Resolution

*telenor*

**Submitted to:**

Mr. Abdul Salam

**Submitted by:**

Muhammad Tanveer

EMBA

Reg #: 203506

# Table of Contents

# List of Figures:

# Project Scope:

Telenor Pakistan is the 2nd biggest Telecom operator in Pakistan which is operating since last 16 years countrywide. It comes from Telenor Group which is based in Norway and has business units across Europe and Asia. We will see further details about Telenor Pakistan, its operations, revenue, strengths, and weaknesses in report but let's first look at the scope of this project.

Digitalization being at the center stage of the technical big bang naturally brings digital connectivity of consumers with enterprises and value chains. It then brings into perspective the wide range of possible connectivity options with these digital platforms. When we talk about options we talk about devices, OS, browsers and then OTTs via which the world can connect digitally.

Being at Telenor Pakistan the mobile devices are automatically part of our interest and scope. We need to see how we can add to the value chain and contribute to connecting our consumers to a wide range of digital platforms via their mobile phones. Our responsibility is not only to give them good connectivity via mobile data but to make it safe for them. With mobile device there is a natural identification of each consumer with their unique MSISDN and their IMSI. With this advantage and spread of access, Telecom Operators have an unchallenged advantage which can still be leveraged while the voice and P2P SMS market is on a decline.

With advancement in digital outfit, enterprises started using cheap SMS channel to authenticate customer as it is a safe way to interact with customers and authenticate them on digital apps with a good customer experience.

We at Telenor group realized the fact that we have a huge consumer base which these enterprises are benefiting from with prime customer satisfaction and immaculate access to the devices for authentication and other actions but with expense of next to nothing. So, Telenor group took an initiative to channelize this traffic and then monetize it. Our project had following phases:


Phase 1: Collection of international A2P traffic via legal partners

Phase 2: Monetization of international A2P traffic via SMS Firewall

We divided the 2nd phase of project into further two phases:

Phase 1a: International terminating SMS (MT SMS) traffic routing to SMS Firewall

Phase 1b: Local A2P traffic routing to SMS Firewall

In my business project 1, I covered the collection of International A2P traffic via SMS Firewall. In this report, we will discuss about the challenges faced in the monetization of international A2P traffic. We will discuss the availability of grey routes, role of aggregators and approach taken by Telenor group to counter such leakages in A2P revenue stream.

In business project 1, we focused on how we closed an open network technically to allow Telenor Pakistan to safeguard its legal routes for international A2P traffic. In addition, we looked at business side of things on how we developed business case and what decisions were taken to support that. We also saw the collaboration model between Telenor Pakistan and Telenor Global Wholesale and interaction with Enterprises to set the market terms and pricing. Giants like Facebook, Instagram, Google, Microsoft, Amazon, And others. Our business team along with Telenor Global Wholesale team worked on plan to reach out to these enterprises and price for OTP traffic. Similarly in market communication was done to let market know that Telenor Globalwholesale is the exclusive hub to carry Telenor Pakistan's international A2P traffic.

. As we progressed on monetization and struggled to stabilize this revenue stream we faced some unprecedented challenges.  We completed the implementation in mid-2017 and first 12 months were phenomenal. But as we know that we must be ahead in the game from the potential challenges and the revenue leakage possibilities, same was the case here. We had designed the network in such a way that we could cover many aspects, but it was not utilized as it was not required on launch. After 12 months, we started to see the saturation on revenue and stagnancy in growth although Telenor base was growing and importantly internet users were adding up. It brought into limelight the change of approach from aggregators and enterprises to avoid the monetized routes.

In this project we will look at the grey routes of A2P traffic including following:

1. SIM Farms
2. Flash Calls and Robo Calls
3. Local Bypass

We will look at how we coped with these challenges and not only stabilized revenue again in fact we recovered some potential revenue which was missing due to these channels. We will see business, strategical, legal, and technical changes that were made to deal with these challenges.

As mentioned in the summary of project being part of Telecom industry for last 12 years, we observed great decline in the profit margin of GSM based business. Conventional services of call, SMS, MMS, and other VAS services saw a huge decline in uptake, contextualization, and revenue stream. There are multiple reasons for that, but the main reason is the transformation of handset industry. With a journey from legacy handsets which were capable of only SMS, Call and few other mandatory services to a handset which can almost replace a computer now and has a great exposure to internet and OTTs. Such a tremendous transformation had an inversely proportional relationship with GSM industry revenue streams. There was a great need to make a shift in business model where Telecom industry is enabling the OTT and provisioning of mobile networks subscribers on OTT platforms and other digital services. So, we identified an option which is for now an integral part of

subscriber lifecycle and can be monetized by Telco industry to reap benefits of the transformation.

I have worked on this project in my company, and I am an advocate of this business idea and would like to share my understanding and the benefits of the implementation to Pakistan's industry.

## Why A2P Monetization:

Following are major reasons of inclusion of international A2P stream in business segment of Telecom.

1.  The exposure of people towards digitization has changed massively during last few years. Pakistan is no exception where penetration of smartphones has really taken our Telecom industry by storm.
2.  A lot of leading enterprises have introduced their OTTs in market who have changed the business ecosystem of telecom industry massively. Telecom industry which was hugely benefiting from conventional calling and messaging capabilities offered by GSM were jolted by an alternate which had no cost apart from switching handset from legacy to smartphone.
3.  As per the research work done which includes the feedback from the leaders of leading telecom operators and the digital players the Telecom Industry is now losing its isolated existence of being the sole connection of an individual to the world. Now the digital applications are becoming a way of life where consumers don't only interact with the world in fact, they create their moments of life. They create their life experiences and share with their friends, families and to the rest of the world. As per latest statistics referred in **Appendices** (Figure 1: Changing opinion of CXOs of Telecom Operators)
4.  The CXOs of leading Telecom operators are now off the view that they now have competition with unknown competitors. It is unlike the conventional battle of Telecom operators to acquire more customer base, get more recharges and more minutes under belt. 52% of CXOs now believe that their competition is now replaced by the new value chains, now the competition has stretched to digital enablement and being a digital life partner of consumers.
5.  OTTs like Facebook, Instagram, WhatsApp, and many others entered the market and had a considerable footprint within few years and the features they offered on messaging and calling disrupted the conventional voice call and SMS offered by telecom operators. The dilemma is that the mobile operators were deprived of their network usage as well as they were used as a channel for authentication without any specific charging.

It meant loss in all aspects for telecom industry by acting as a service provider to OTTs for authentication and providing them with network (Data) for services and not getting anything out of it.

6.  The message sent by the OTTs to customers on their SIM is called A2P or application to person message which was seen as an opportunity by telecom industry to leverage and get it monetized. It certainly needed a new way to shape network and reaching out to enterprises to showcase traffic and agree on a business case and path of delivery.

Telenor Pakistan being part of Telenor Group who is operating in Europe had an advantage over other operators since OTT market was much mature in Europe and A2P monetization was in market. So, Telenor Pakistan benefited from the experience from group and laid foundation of A2P monetization in Pakistan's market and enjoyed first mover's advantage.

I was part of the project from conception phase till the delivery and rollout, so I saw how we benefited from this project and what are its impacts on financial booksWe will discuss in detail in this project report about the key factors, plan, execution, results and future recommendations.

## Arise of Business Need for A2P:

As mentioned before the digital journey has shrunk the conventional revenue streams and all the Telecom operators must strive for finding new avenues of revenue along with the new face of technology. After massive growth in voice and SMS in 1990s and 2000s the tide has taken a turn with customers switching to OTTs to meet the need of communication both for voice and text. With ever changing features of such OTTs, it is an absolute unfair competition to do for the Telecom operators in conventional voice and SMS streams. The customer experience, the charging, and the additional features that OTTs like WhatsApp, Facebook and other OTTs offer are unparalleled for conventional SMS and GSM based calling.

So, while operators start their own digital journey in their processes, customer experience, customer touch points, integration with digital world it is equally important that how they leverage on their infrastructure and spread to connect digital stream and convert it into some revenue stream.

While we look at the trend of revenue growth in 2000s it gives us an idea about how comfortable these operators were operating in Pakistan. Referring to the following figure for further clarification: **Appendices** (Figure 2: Revenue trend in 2000s)
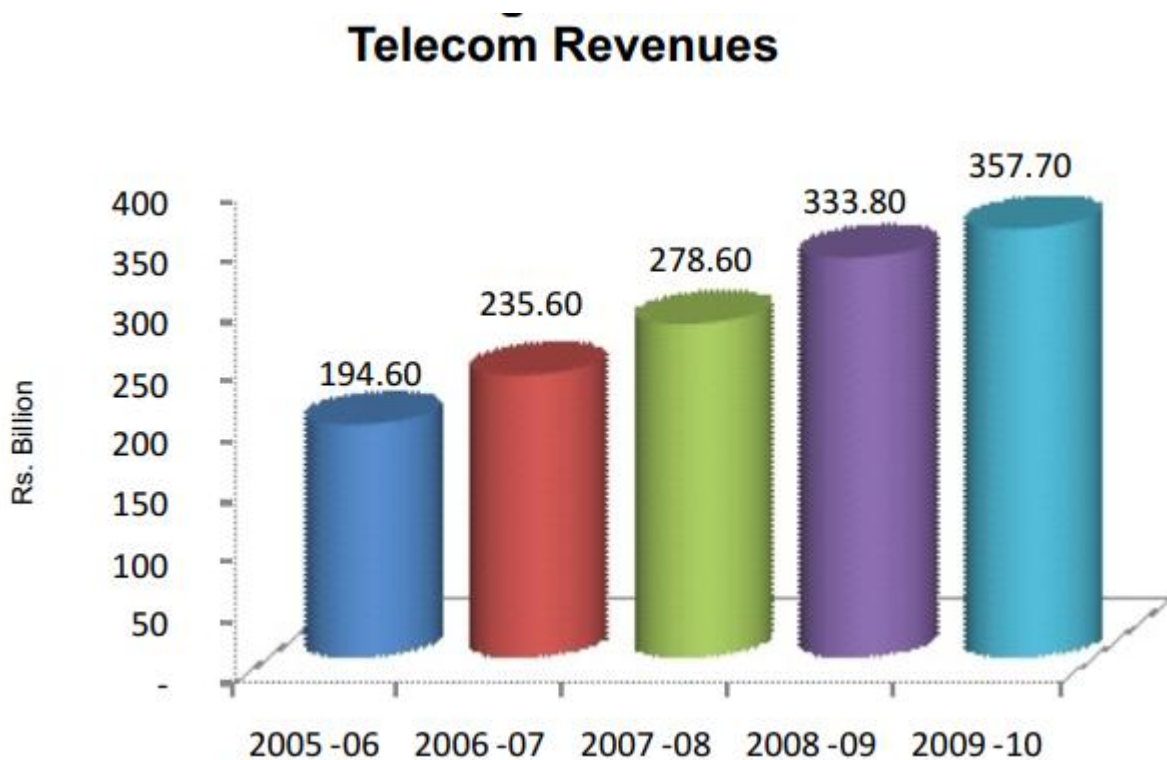


Telecom Revenues

Figure 2: Revenue trend in 2000s)

Revenue again we can see almost 15% growth in Telecom revenues in 2000s which is an amazing achievement and can easily put a business in its comfort zone. Looking at the figure at above picture it is evident that over the course of 5 years the revenues piled from a yearly of 195 billion PKR in 2006 to an astonishing figure of 357 billion PKR in 2010 which is almost doubled in 5 years.

There is around 6% growth even in 2009-10 while the patterns are much sharper in years before that. This all revenue is based on conventional offerings of GSM i.e., voice and call. The B2B or digital streams did not exist as such at that period in Pakistan market. '

Following is the breakdown of the revenue stream of telecom operators. We can see that revenues of VAS and conventional stream(s) was on a rise as the penetration of data and smartphones was relatively low. The exposure of consumers towards OTTs was still something very new for the market.

**Following figure** refers to revenue of Telecom sector broken down to the core streams in PKR Millions. It shows a huge volume of 10,000 plus Millions PKR from VAS (Value Added Services) stream which was a unique selling point for Pakistan market when rest of world had almost gone beyond the conventional VAS

| | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|---|---|---|---|---|---|
| Cellular | 89,896.3 | 133,131.9 | 182,122.2 | 212,423 | 236,047 |
| Local Loop | 71,185.9 | 68,368.2 | 63,693.1 | 62,568 | 61,464 |
| LDI | 7,199.6 | 15,567.4 | 21,982.6 | 47,969 | 47,067 |
| WLL | 12,453.5 | 2,644.9 | 2,704.0 | 2,670 | 2,880 |
| VAS (Estimated) | 13,827.0 | 15,901.1 | 8,048 | 8,179 | 10,202 |
| **Total** | **194,562.3** | **235,613.4** | **278,549.6** | **333,809** | **357,712** |

Figure 3: Revenue Breakdown in Millions (PKR)

.

Another convincing trend is ARPU (Average Revenue per User) which is the key indicator of how operators are engaged with their consumers. It was rising rapidly and with customer base penetration on a positive trend the overall revenue growth is natural. This also indicates that the consumers were using the SMS and voice avenues to a great extent since the technology shift had yet to take its effects on user behaviors.

If we compare the ARPU from 2008 till 2010 there is 6% increase in ARPU which demonstrates the potential of the Pakistan Telcom Market even in late 2000s. This is referred from **following figure:**

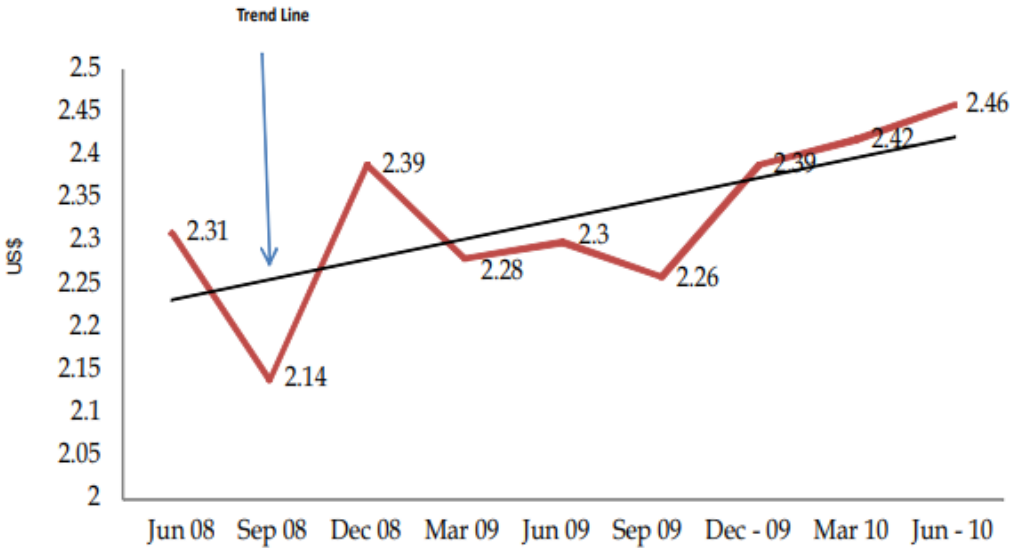**Cellular Mobile Average Revenue per User per Month**

Figure 4: ARPU increase trend in 2000s

where ARPU from 2008 till 2010 has been plotted. Due to this fact Telecom Operator still relied on further investment on basic infrastructure and expansion of footprint. The major investment was done on 3G infrastructure both on radio and core network.

Now particularly looking at Telenor Pakistan we can see the increase in subscriber base year on year. Telenor Pakistan was quickly penetrating through the rural market and a 2% YoY growth shows phenomenal increase.



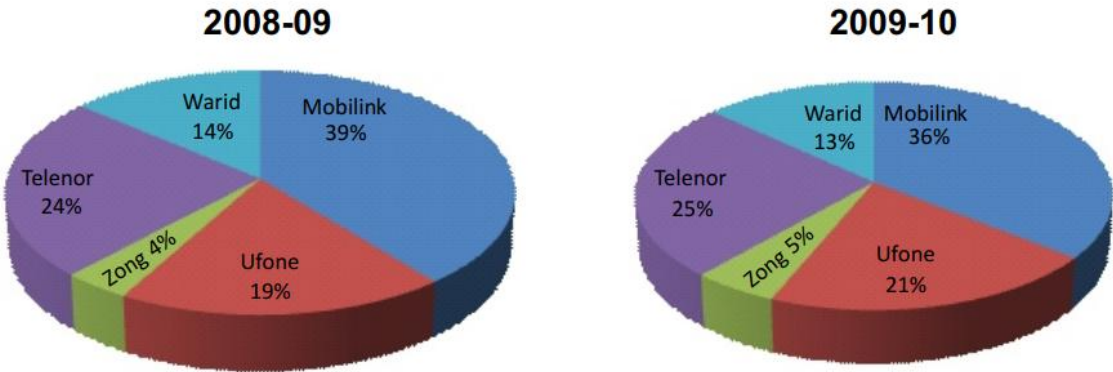**Revenue Share by Cellular Operaters**

Figure 6: Revenue Share YoY

above figure can be referred for such information where Telenor Pakistan performance has been shown in later 2000s with a 2% increase in market share and revenue share on YoY basis.

We can see the customer base and revenue increase for Telenor Pakistan as well as 1% YoY growth in revenue share in the market while 2% increase in customer base was a very healthy trend line. We can safely say that this was the growth period of Telenor Pakistan where the subscriber base was increasing, so was the average revenue per user (ARPU) and resultantly the revenue and revenue share.

Due to the same fact the investments were on same trend and the Telecom Operators didn't find it a risky ground to hit.

Trend of investment that came in as FDI and the share of Telecom sector in that. Telenor being based in Norway received a fair share of investment as we can see Norway is in top 5 of the investors in Pakistan. Trend of investment has been shared in **Appendices** Figure 7: Investment trend in Telecom sector in 2000s)

We can clearly see that there is a big chunk of investment came in 2008-09. As explained earlier this was the time when Telenor Pakistan was massively expanding and had a good business case to do so. As revenues were stretching along with customer base there was a natural indicator for Telenor to further invest and expand the footprint of network.

The import of the telecom equipment into Pakistan gives us a same trend as the telecom operators were massively expanding and improving their voice and SMS networks along with some expansion on 2G/3G data network (PS Core). There was a rise from 777 million USD in 2005 to 1600 Million USD in 2009, which is more than double. **Following figure** includes investment trend as a reference to above statement.
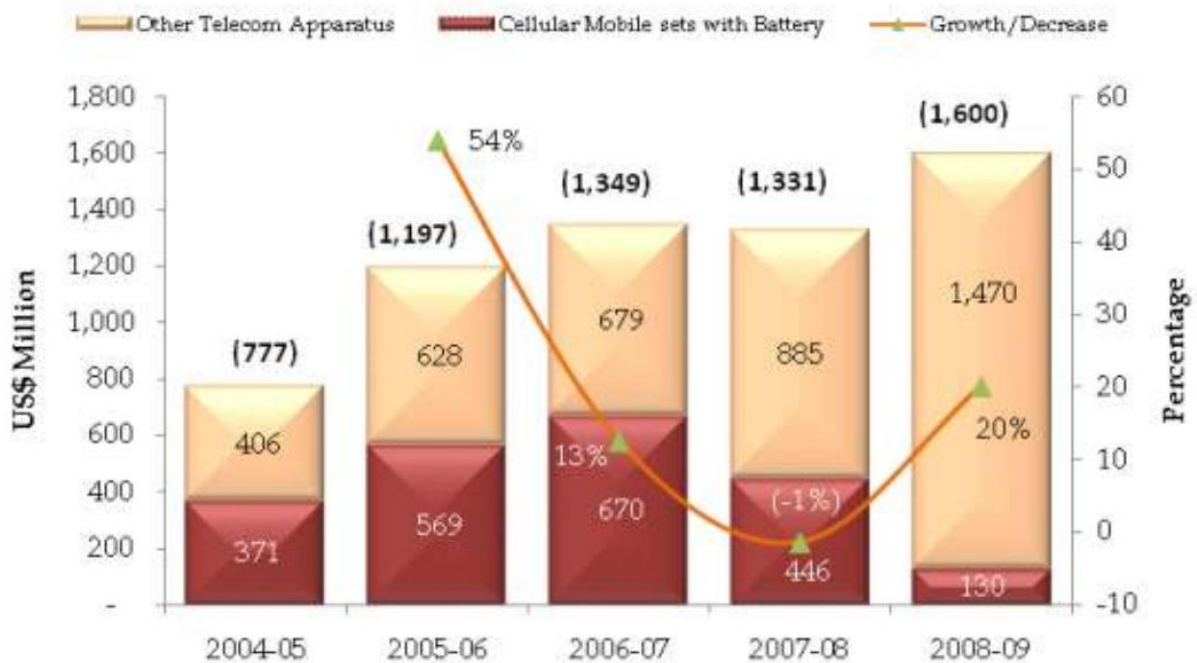
**Telecom Imports**

Figure 8: Telecom imports in 2000s

## Decision Point in Industry:

As it is rightly said that the revenue cow can't be forever the same. Market dynamics change, so does the customer needs. The profitability margins squeeze unless new avenues are explored. With a paradigm shift in technology and in customer needs the Telecom Operators struggled naturally as it is not easy to accept the change at first place and then manage the change at 2<sup>nd</sup> place. It needed mind shift, flexibility on network side both core and IT to be more open towards external integrations and more flexible towards digital and IT applications. It also needed a shift from Telecom Operator to a service provider and then to a digital service provider / enabler.

We can quickly go through telecom indicators like investment, annual revenues and average revenues per user to see how things changed in 2010s and exposed the non-readiness of Pakistan Telecom market towards such technological and behavioral shift. The figure below shows some key indicators reflective of same situation and a need for change. The revenues of VAS itself reduced to half if we compare years from 2013 till 2017. It essentially meant that one of the key revenues streams of Pakistan market which boomed in 2000s with revenues mounting to 10,000 million PKR per Anum squeezed to a mare 2500 million PKR in 2017.

| | | | | (Rs. Million) |
|---|---|---|---|---|
| | **2013-14 (R)** | **2014-15 (R)** | **2015-16 (R)** | **2016-17 (E)** |
| Cellular | 322,683 | 317,016 | 345,537 | 369,118 |
| Local Loop | 88,952 | 81,914 | 76,344 | 72,937 |
| Long Distance International | 43,901 | 40,890 | 32,554 | 23,083 |
| Class Value Added Services (E) | 4,123 | 2,468 | 2,499 | 2,503 |
| Total | **459,632** | **442,287** | **457,024** | **467,642** |

R = Revised
E = Estimated

Figure 9: Revenue drop for VAS in 2010s

We can see a major decline in value added services (VAS) revenues by mid 2010s. Value Added Services majorly cover conventional services like SMS (Short Message), MMS (Multimedia Message), IVR based services, call screening services, Colorful ring back tone (CRBT) and missed call alerts. All such services massively declined due to the features offered by applications like WhatsApp, IMO, Viber, and others.

Person to person SMS took the major blow as the digital applications like WhatsApp, IMO, WeChat, Signal came into market and exploited the Android and iOS-based devices capability to give customers a digital experience and much lesser cost as compared to SMS. Other social media-based applications like Facebook, Orkut, Instagram, Twitter, Gmail, Yahoo, and many others also made a great shift among customers from exchanging SMS and calls to sharing a huge chunk of multimedia content of news, entertainment and sports among the friends and family.

This made a huge demand of data usage which the operators could cope with by getting into 3G and 4G network rollout, which automatically needed more investment. But the shift of customer interactions and engagement from mobile operator to social media and digital applications meant difficulty of customer engagement and recharges. It also meant that it would be further tougher to contextualize or segment the customers and target their needs by introducing mobile bundles based on minutes and SMS. These were not needed anymore. The maximum that could be offered was to contextualize and make hybrid offers that included data. But the dependency on the SIM started to become much and much low. As customers could use Android features almost without a SIM by using google authentication.

**Appendices** Figure 10: Shift of market towards internet enabled applications) shows the penetration of smartphones and increase in usage of internet by consumers. It also shows that how voice/SMS based networks had to be shifted to a 3G/4G based broadband networks. It meant a lot of investment for operators but a very low ROI (return on investment).

Figures like 1.56 GB data /user / month on mobile phones was very unusual to the Telecom market. But with Wi-Fi networks expanding if they could try to earn more margins on mobile internet it would have swept away their customers at much more rapid pace. Rise of the cellular mobile subscribers to 140M, penetration of smart phones to 18M and 19% of the subscribers were now data users. 70% of the coverage in country now had mobile data.

It naturally led to decrease of prices and much cheaper data bundles. Telecom operators also tried to compete with broadband market by introducing B2B and B2C data bundles and internet dongles. But with price competition it was not a sustained revenue stream.

Telenor Pakistan struggled further because it took a decision not to switch to 4G and LTE when Jazz and Zong did so. This created a natural lag and huge customer shift to networks which gave better internet and 4G/LTE experience. While Telenor tried to stick to their stronghold of rural base which didn't pay off. As with smartphones introduction into overall market segments even rural areas shifted from calls and SMS to data. With no 4G Telenor Pakistan couldn't catch up with Zong and Jazz and lost major revenue and growth battles.

Following section shows a decline in ARPU of Telecom market in first half of 2010s while 2nd graph shows a further decline specific to Telenor Pakistan and that is where the working fueled to find independent revenue streams which are not primarily dependent on shrinking pockets of customers. That is where the connection between digital bang and the customer base leverage had to play its part. My project revolves around the same regime of initiatives that helped Telenor Pakistan to sustain in such tough times.
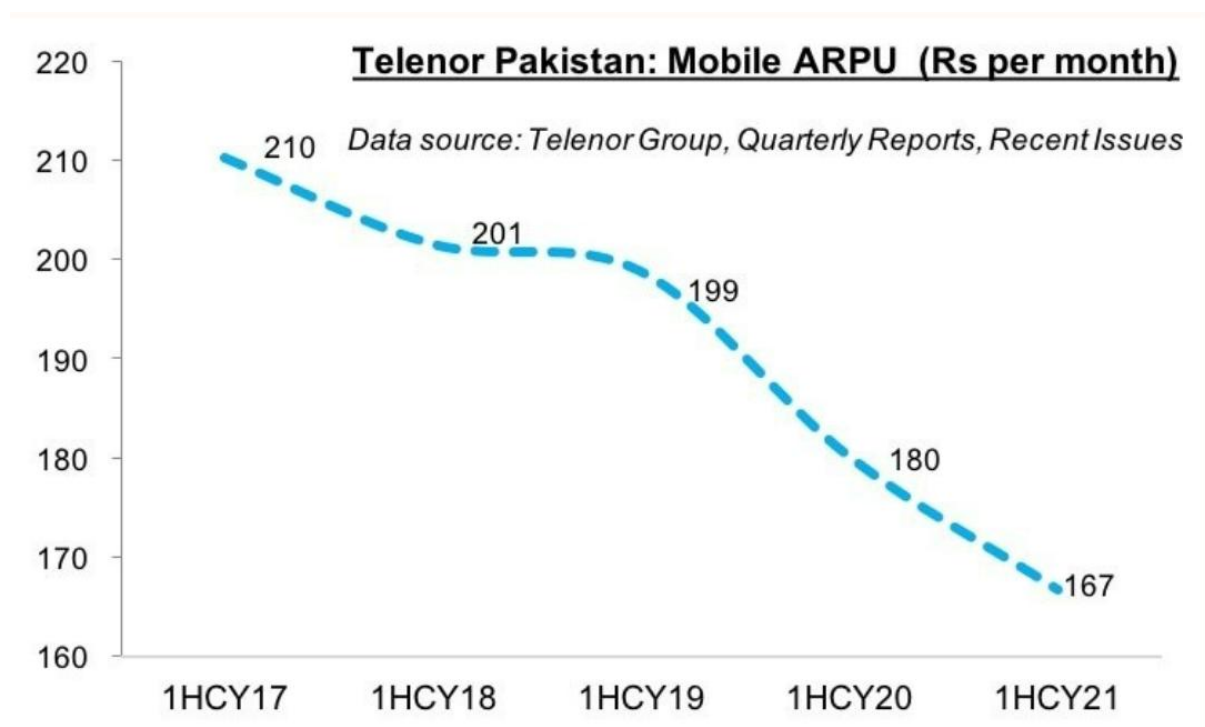


Figure 12: Telenor Pakistan drop in ARPU

**Above data** shows the decline of ARPU, if we compare 2003 with 2015 it is a staggering 4 times decrease in the ARPU. While comparing 2010 with 2015 it is still a decrease of 18% in these 5 years. A user who was spending around 950 PKR / Month was now spending only 210 PKR/Month. The investment required to manage an increasing subscriber base with a squeezing pocket was a challenge that seriously unfolded with competition coming in from unknowns.

While looking at Telenor Pakistan for later half of 2010s the curve is much steeper on decline. We can see from **Appendices** Figure 12: Telenor Pakistan drop in ARPU) that from H1 2017 to H1 of 2021 the ARPU declined by 21% which is a major dent to growth and revenue forecasts. If there are no indirect revenue streams and ARPU is declining like below it leaves hardly any chance to keep investing for nothing. That brings survival battle into the perspective rather than growth or sustainability.
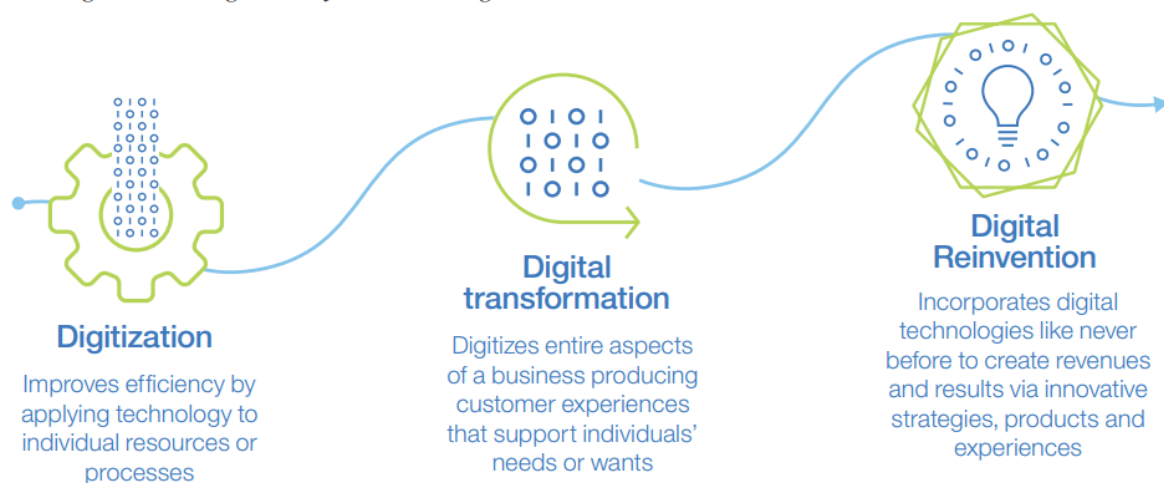
During this period 2017-2018 our initiative to monetize A2P traffic was realized, and I will show how it complimented the indirect revenue stream and added to VAS revenues to cover for decline on conventional services.

The overall journey for Telenor Pakistan was not to compete with huge enterprises like Facebook group, google, amazon or others. The idea was how we can convert from a company which helps to provide data to consumers to use applications to a service provider who has integrations with these companies. Where we are the sole option to onboard and authenticate their consumers. Along with that the other flip of the coin was on how we ourselves digitize our company and integrate it in value chains of digital partners to help our consumers authenticate, pay, and use these applications at better deals as compared to normal internet browsing.

A2P monetization was to be established as a parallel stream to digitization of our own company and processes where we interact with partners, channelize traffic, define price methodologies, and streamline the payment processes.

**Appendices** Figure 13: Digital Ecosystem in modern market dynamics) shows the digitization journey towards digital re-invention and a need for the Telcos to become a digital service provider to compete in these rejuvenated market dynamics.



*From digitization to digital transformation to Digital Reinvention*

**Digitization**
Improves efficiency by applying technology to individual resources or processes

**Digital transformation**
Digitizes entire aspects of a business producing customer experiences that support individuals' needs or wants

**Digital Reinvention**
Incorporates digital technologies like never before to create revenues and results via innovative strategies, products and experiences

"Thinking digital" is deeply embedded in telcos' business models. They not only provide their own digital products and services, but also the essential connectivity infrastructure that allows other sectors to function and grow in the digital economy.
The digitization trend is currently challenging every sector in industry and society. In almost all cases it is having dramatic, if not disruptive, effects on existing traditional industry dynamics and business models.

OTT players are offering core telco services like voice or messaging, and the media space is becoming their domain. Tech and Internet companies are also increasingly active in growth areas, like cloud space and services, competing with telcos for clients and revenue. They are tying customers to their own ecosystems, while making reliance on traditional operators a thing of the past. With carrier-neutral connectivity (e.g., e-SIM), many tech and Internet companies are enabling seamless changes between operators and eliminating the hassle of changing telecom providers. Hence, digital players are systematically attacking existing telco profit pools and will continue to do so – eating up telcos' revenues and margins. This makes differentiation purely on B2C products for traditional telcos a highly questionable proposition in the future.

## Monetization Status:

In my business project -1 I explained how Telenor Pakistan together with Telenor Group monetized International A2P traffic and built it as a parallel revenue stream for our business. While we also discussed the business case and the revenue projections from the A2P market it was important to constantly monitor and monetize using the capabilities of SMS Firewall solution in place.

International and local incoming SMS traffic was passing through SMS Firewall and it was being monitored on volumes, content patterns, Sender IDs etc. to ensure that there is no leakage of international A2P SMS traffic on any illegal channel and each SMS is monetized via legal route.
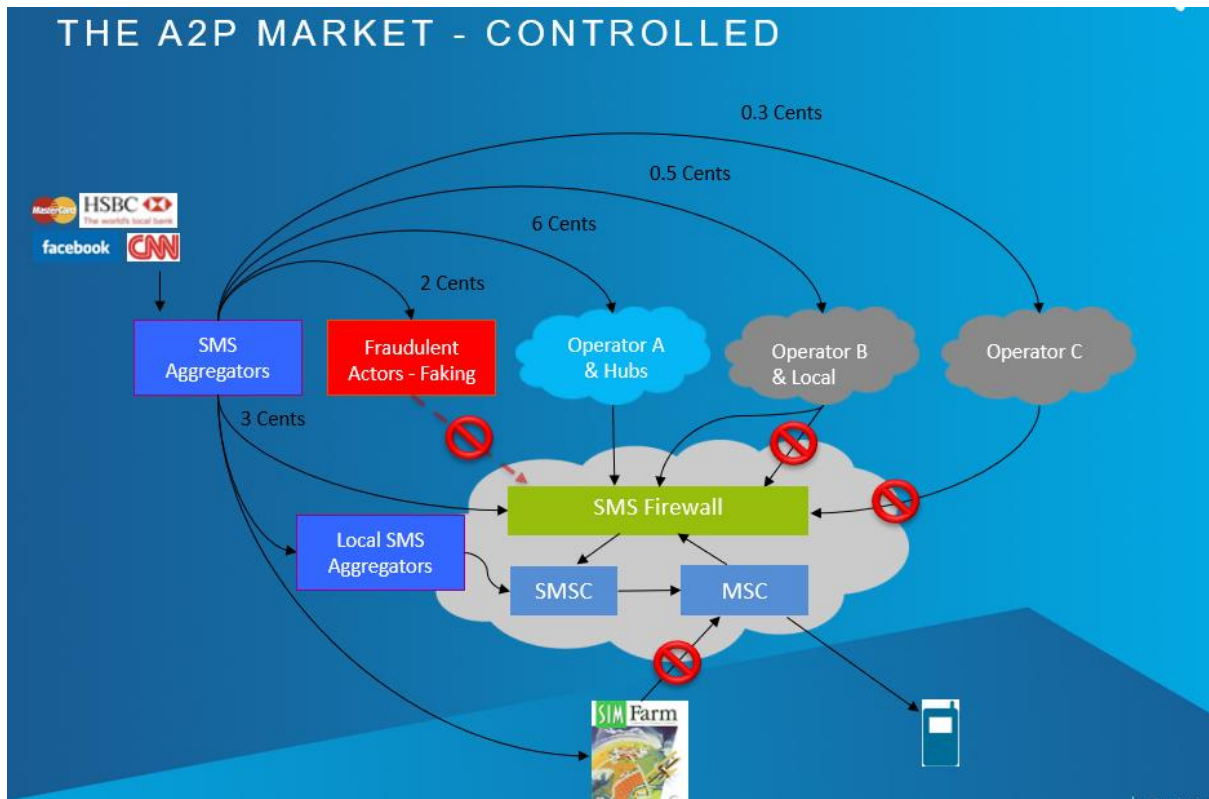
Figure 16: Monetized Route for International A2P Traffic

Above diagram shows the logical and technical architecture of how Telenor blocked illegal channels and ensured that each SMS is invoiced and paid via enterprises and partners.

## Problem Statement:

First year was a great success, revenue was increasing as per forecasted figures, infect more then that. Since the penetration of new applications was on rise so it directly implied more traffic. Following factors added up to the revenue margins for international A2P traffic:

1. Increasing smartphone penetration in our market
2. 4G launch and SIMs conversion by operators for better data uptake of customers
3. Launch of digital platforms like TikTok, Snap Chat, Snack Video, Daraz and many others

As we discussed in our business project 1, international A2P SMS monetization is never ending job. Operators just cannot rely on a static strategy and there is no zero grey point in traffic where operator can expect to be all protected and can simply reap the benefits of investment on firewall solutions. Although SMS Firewalls are state of the art products which rely on their own artificial intelligence and machine learning to identify grey channels automatically and block as well. But then there is always a scenario which can bypass the SMS Firewall. We faced similar situation and came across such channels which we could not block on SMS Firewall. Due to this invisible traffic leakage, we faced tremendous decline on our legal channel's traffic and revenue.

# The Decline in Traffic:

As we progressed into 2$^{nd}$ year of monetization i.e., 2018 we initially stopped seeing the organic growth pattern that was constant in first year. Although the factors mentioned earlier were still there and the conditions were ideal for the A2P SMS traffic to further increase on organic trend. Initial assumption on business side was that since Telenor Pakistan's customer base has started to gradually saturate and the new additions are declining. Also, the merger of Jazz with Warid and their superior data services was accounted for as a reason of our loss of pace in market.

Things became more severely serious once we started seeing decline in YoY volume as compared to the very first year of inception of A2P monetization at Telenor Pakistan. Worrying point for the team and management was that only into 2$^{nd}$ year of the monetization how could we face such a situation where we are in danger of having less traffic as compared to previous year while all the forecasting, earlier statistics and market factors pointed in other direction. Yes, the struggle on capturing new customers was a challenge but the current base, expansion of 4G network, inclusion of new enterprises was still a key to have organic growth instead of a cease or decline of traffic.

Reference: https://datareportal.com/reports/digital-2022-global-overview-report
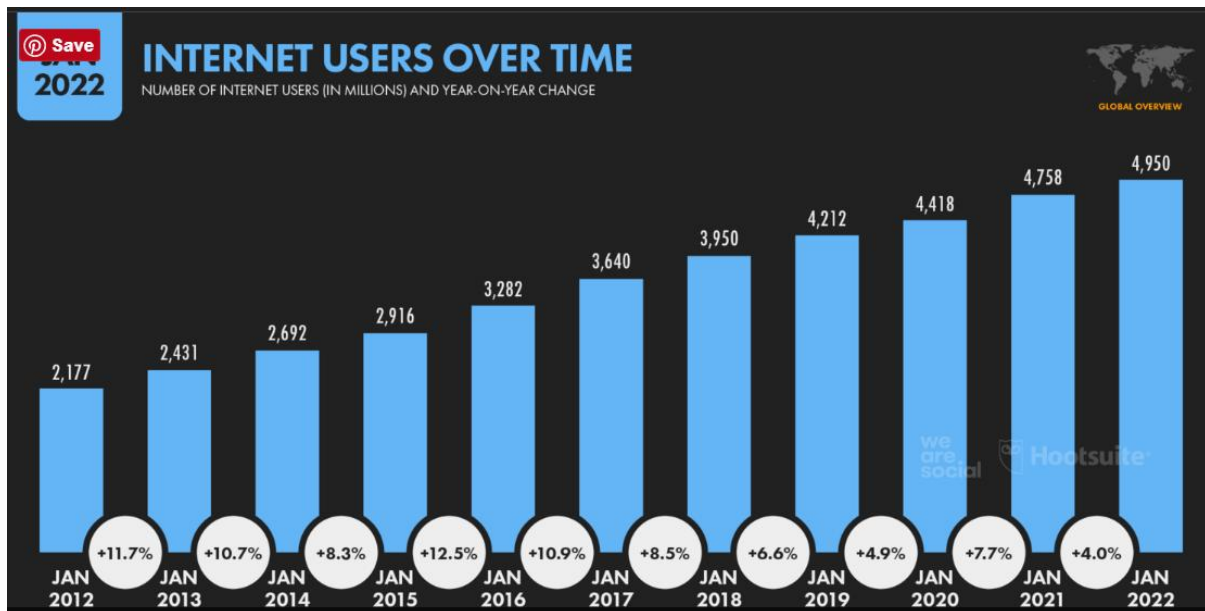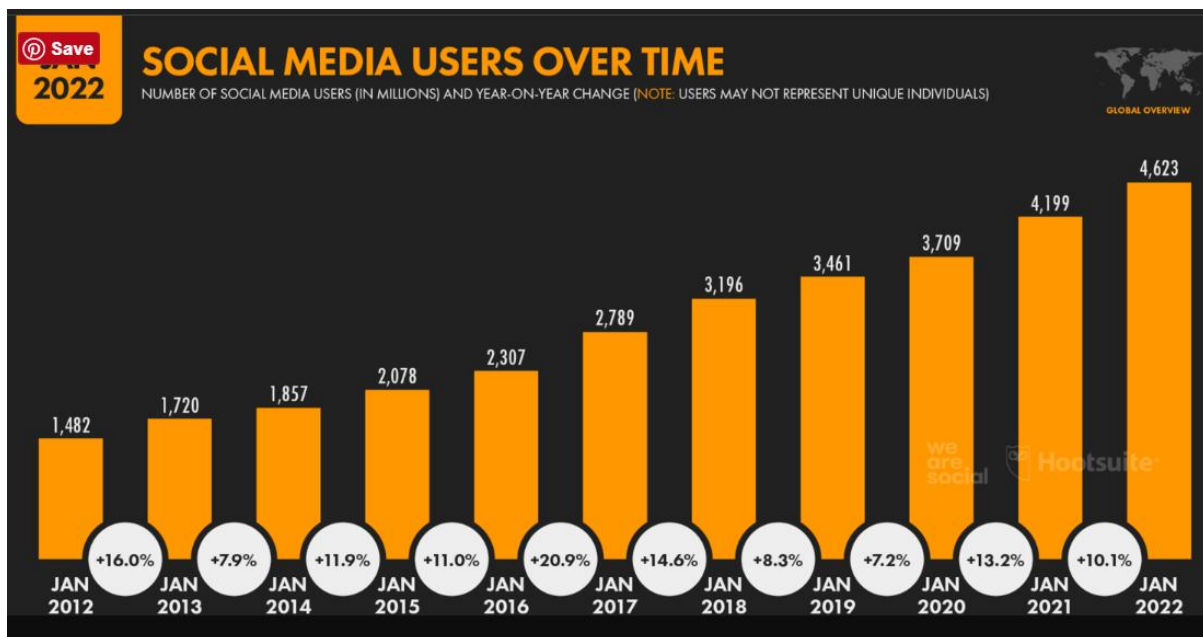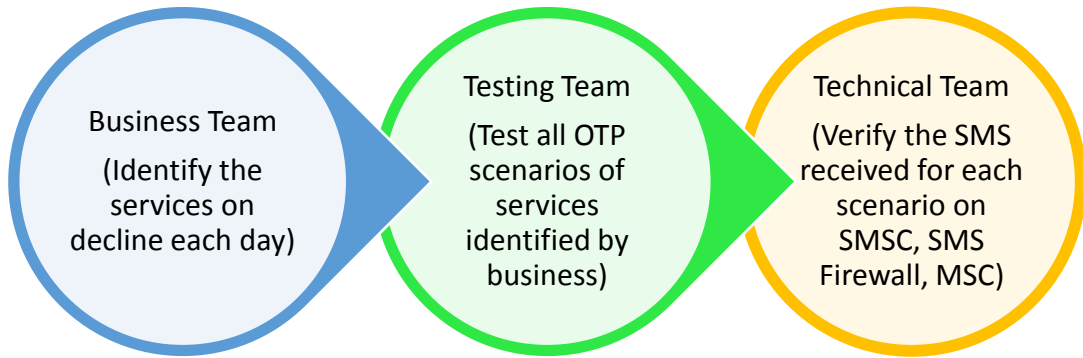
As we can see during period of 2018, 2019 there is considerable growth in internet usage and social media engagement of users worldwide and Pakistan is no different. Our market may be catching up always but on internet trends we are at par with rest of market. Yes we can question the usage trends and engagement quality but as far as usage of new applications is concerned we are not behind. One of deficiencies is availability and usage of the digital payment channels. But apart from that our market is highly engaged in exposure to other digital platforms related to social media, entertainment, informatics, technology, and education.

But why did it not reflect in traffic stats, that was the question we all had to answer collectively and find our way into resolution of this unknown issue.

## Identification of the Unknown Threat:

As described in previous section the decline in traffic was pivotal to push us into research mode and see where we are leaking the traffic again. Since protection on SMS Firewall was consistent and constantly updated but the traffic was missing.

To address this situation, we made a technical working group to find out what is happening on ground. A cross functional team was constructed to see the problematic services, test their OTP scenarios and verify the traffic received from enterprises and respective channels.

Business Team (Identify the services on decline each day)

Testing Team (Test all OTP scenarios of services identified by business)

Technical Team (Verify the SMS received for each scenario on SMSC, SMS Firewall, MSC)

We onboarded a managed service partner GMS (Global Message Services) who have a broad range of testing capabilities and their own services database, also they have a big amount of handsets available with them. They helped us to perform testing of services and international hubs which they are connected with. This helped us to identify how traffic is being terminated on our network and what are channels which are bypassing the SMS Firewall:
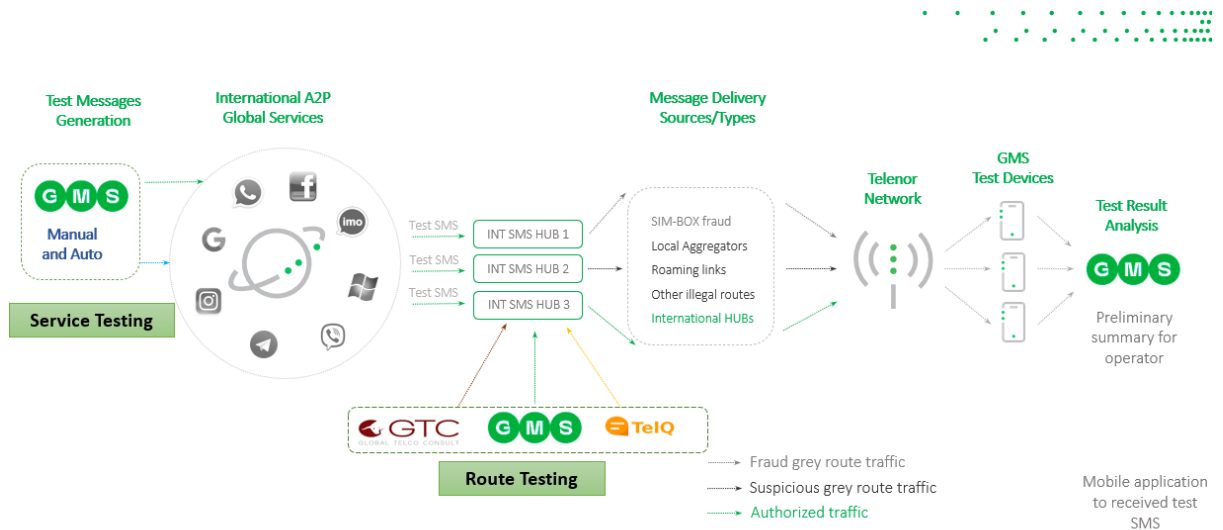


Above picture mentions the flow of testing done by GMS on Telenor network to identify grey channels and route quality to help in engaging right partners and also to see service wise split of partners. OTP is requested from top enterprises by impersonating to be a normal subscriber and the results are gathered on devices / virtual numbers to verify the source and route of traffic.

## Testing Approach and Results:

Testing was carried out in manual and automated way where we tested the top applications in Telenor Pakistan network which were being used and results were verified from the handsets and the core platforms in Telenor Pakistan including SMS Firewall, Core network and charging platform.

Once we performed multiple rounds of testing, we got to know that these services are currently terminating a good percentage of their traffic via illegal routes. That is why the traffic on monetized route has decreased instead of increasing organically or at least sustaining their current volume.
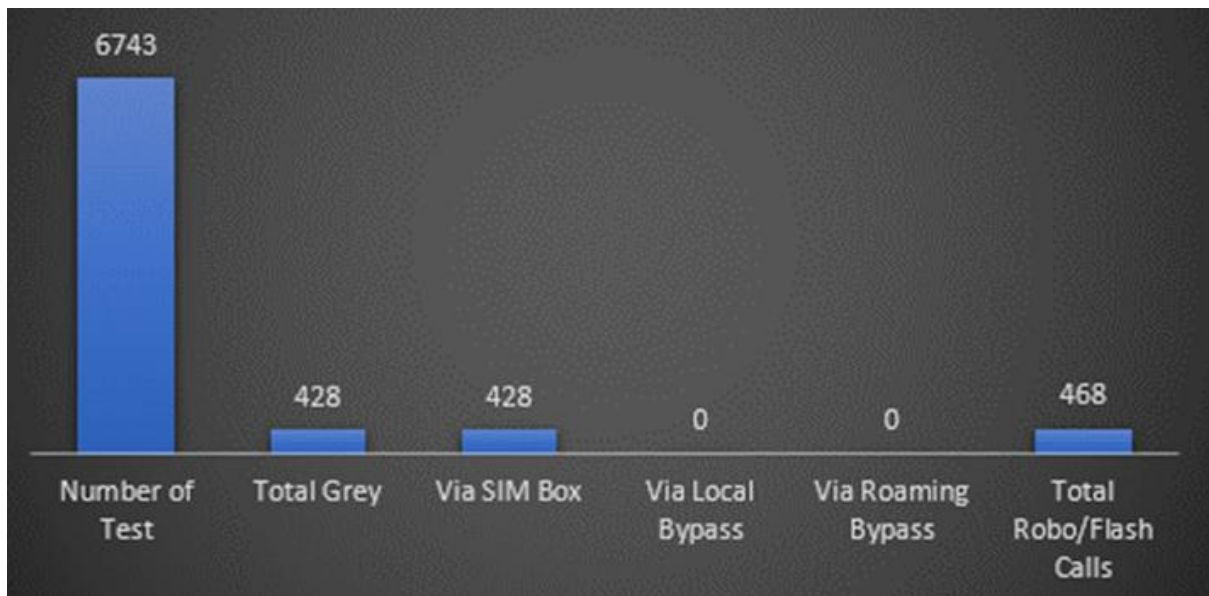


Figure 17: Testing Summary for Telenor Pakistan

Reference: Telenor Network Testing GMS

Above graph shows summary of a stress test performed on Telenor Pakistan network where we can see that almost 13% of the traffic is terminated via illegal channels.
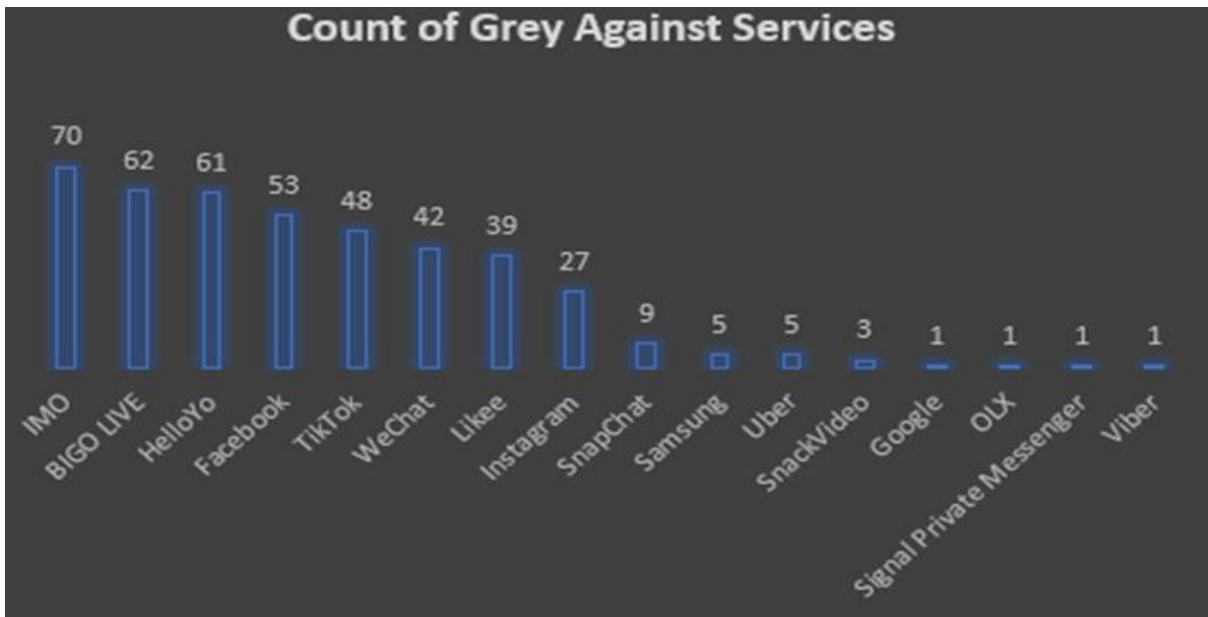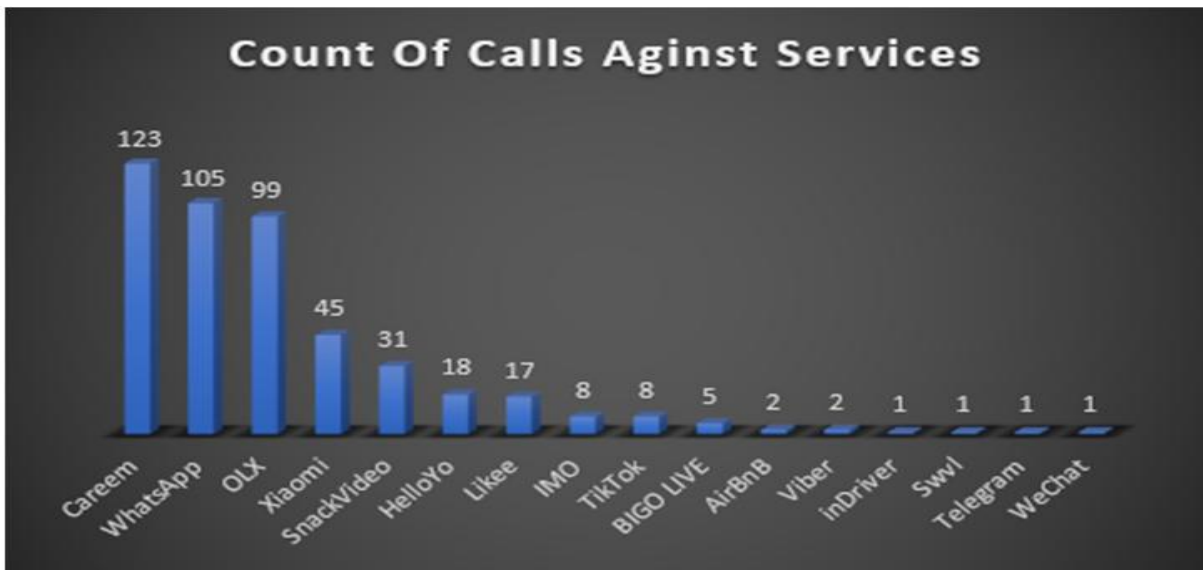
Figure 19: Service wise grey routes



Figure 20: Flash Call Service wise

Above diagrams show the contribution of each service in overall illegal routes and we can see leading international brands in the list. These are top of the list brands in Telenor's traffic as following list shows the volume wise penetration of traffic in Telenor Pakistan:
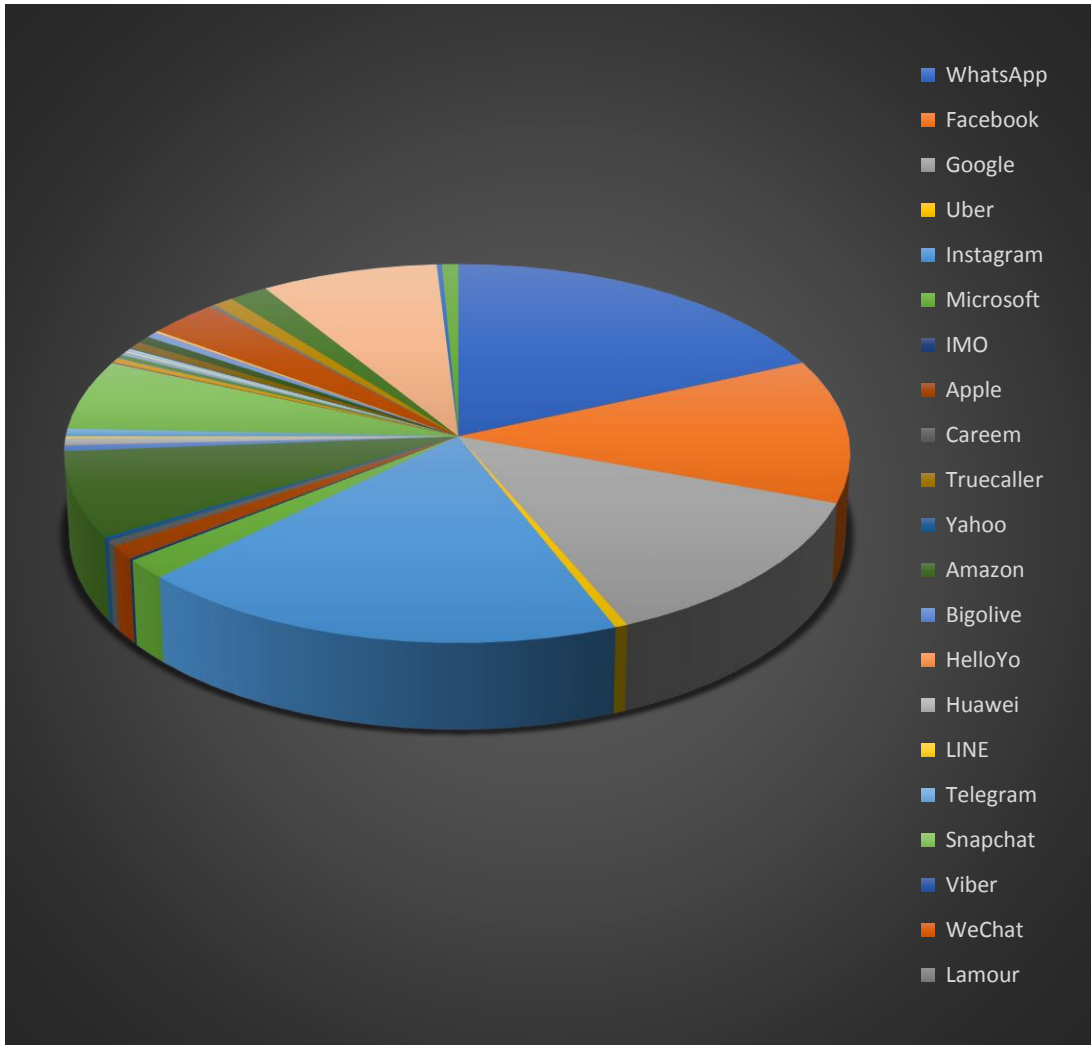
Figure 21: Traffic Split service wise

Following is the top 10 services list from volume perspective:

| Service | Contribution |
|---|---|
| WhatsApp | 18% |
| Instagram | 19% |
| Google | 13% |
| Facebook | 12% |
| TikTok | 8% |
| Amazon | 7% |
| Snapchat | 6% |
| Binance | 3% |
| Daraz | 2% |
| Microsoft | 2% |

We can see that almost all the top services were having the grey routes and it directly implies that the traffic decline was due to the leakage in traffic on the legal route.

Now looking at the grey routes we can see following as the main channels:

1. SIM Box / SIM Farms
2. Flash / Robo Calls
3. Roaming GT Bypass
4. Local Bypass

Well on **SIM Boxes** it would be rather On-Net SIM Boxes as off-net incoming SMS was already passing via SMS Firewall and we were blocking the SIM Farms and fraudulent GTs already. Main problem arose on trusted channel of On-Net SIM Farms which were Telenor Pakistan SIMs being used to generate OTP traffic for international A2P services.

The international A2P enterprises originate an OTP SMS which is then received by the SMS hub which collect traffic from the enterprise, once collected these hubs find out the best route by quality and by price as per agreement to terminate this traffic to respective operator's network and eventually to end user. On this termination of SMS, the hub invoices enterprise and gets paid. Now these hubs steal extra margin by using cheap routes like SIM Farm so they can maximize their share in payment made by enterprise.
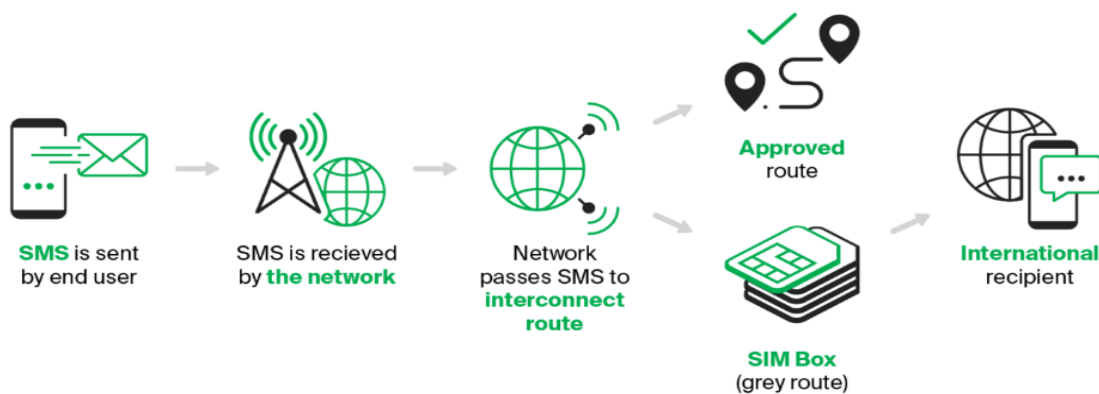


Though Sim Box is a cheap route used by hub but from customer experience perspective it is not the best one. Since sim farm manipulates sender ID and standard SMS text so it cannot be traced by operator as an international A2P SMS.
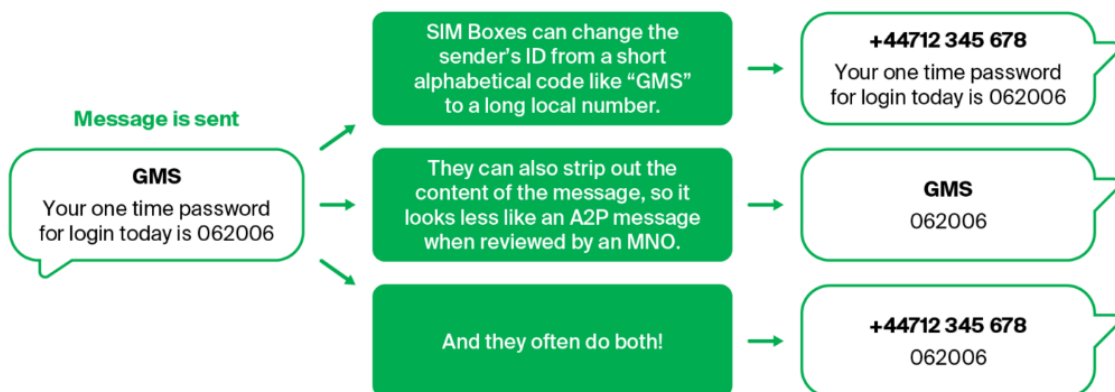
Since Telenor Pakistan was not filtering our on-net mobile originated SMS traffic we were unable to analyze this traffic in detail and block A2P SMS on this channel. MO SMS channel is associated with person-to-person communication but since it is cheap via SMS packages available at a very low-rate aggregators use this bypass most frequently. But because this is a P2P channel so A2P traffic via SIM Box is not allowed as it gives no benefit to the operator.

Another important grey route which was not under radar on launch of A2P monetization was flash call. Enterprises started using zero duration call just like a missed call to authenticate their services on android phones.

The detailed call flow for verifications using flash calls (zero calls duration):
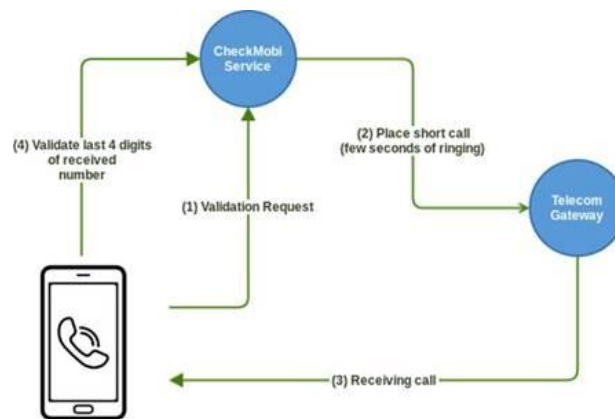


With this scenario, the application automatically rejects the incoming call, so no minutes are used. The application takes the last 4 (or more) digits of the inbound phone number (App requires user permission to access call logs) and uses them as PIN codes. This feature mainly works for Android OS and for Apple iOS.

This feature can reduce the cost of mobile number verification (for OTT providers) as it uses a missed call (with no answer), so telecom providers will not charge. However, it seriously hurt MNOs A2P revenues.

## Flash call compromises MNOs' revenue

Flash call is an alternate mechanism of authentication which significantly reduces costs for enterprises (from 60% to 70%). Conventionally this was done via A2P SMS, so this creates a dent in MNOs revenue.

GMS help MNOs to contain Flash calls and recover lost revenues. This will also discourage other enterprises to follow the similar trend.

If Flash call phenomenon is not addressed in a timely manner, it can be adopted by more enterprises that can potentially risk further drop in A2P revenues. Hence timely prevention is better before its too late.

GMS GLOBAL MESSAGE SERVICES

Reference: GMS-Telenor Pakistan Managed Services collaboration plan

Well we have discussed the worrying point around traffic growth saturation and revenue stagnancy so following figures show the traffic potential compared with the actual traffic.
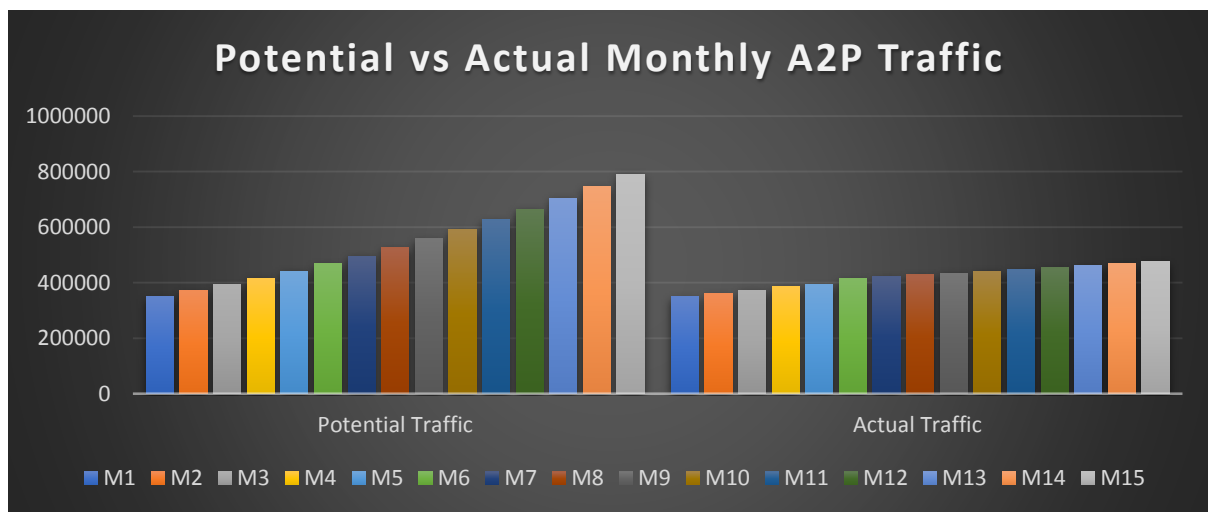


Figure 21: Revenue at stake

At inception stage and then after going live the assessment made by organization was to have around 6% per month growth on international A2P traffic. It was on right trend for first 5-6 months while after that the growth rate dropped to ~1.5%.

While translating that to revenue it had even much bigger impact on business proposition. Since one SMS was giving revenue of 3.5 to 4 USD cents.
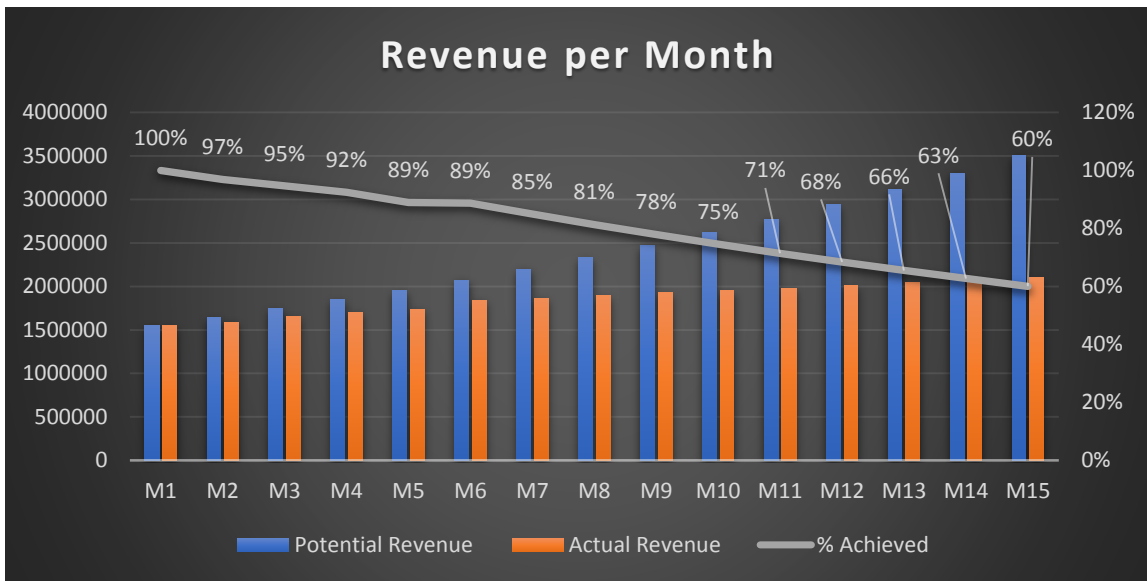
Figure 22: Revenue fulfillment statistics

it meant that apart from major applications where we saw a grey of 13% in testing sample it must have been much more traffic leakage on organic traffic which resulted in 60% of revenue target achievement by Q1 of 2nd year of go live. The potential could not be exactly matched as the on-net SMS traffic did not go via SMS Firewall. It was important to make critical decisions to recapture the leaked traffic and bring it closer to the actual margins.

## Decisions to Make:

Business team and the technical teams needed to make important decisions to make amends for the ground lost on A2P monetization. It required few changes within processes, design, business margin of normal SMS and the close collaboration within and outside organization.



International Application To Person (A2P) Segment: Before MO Project
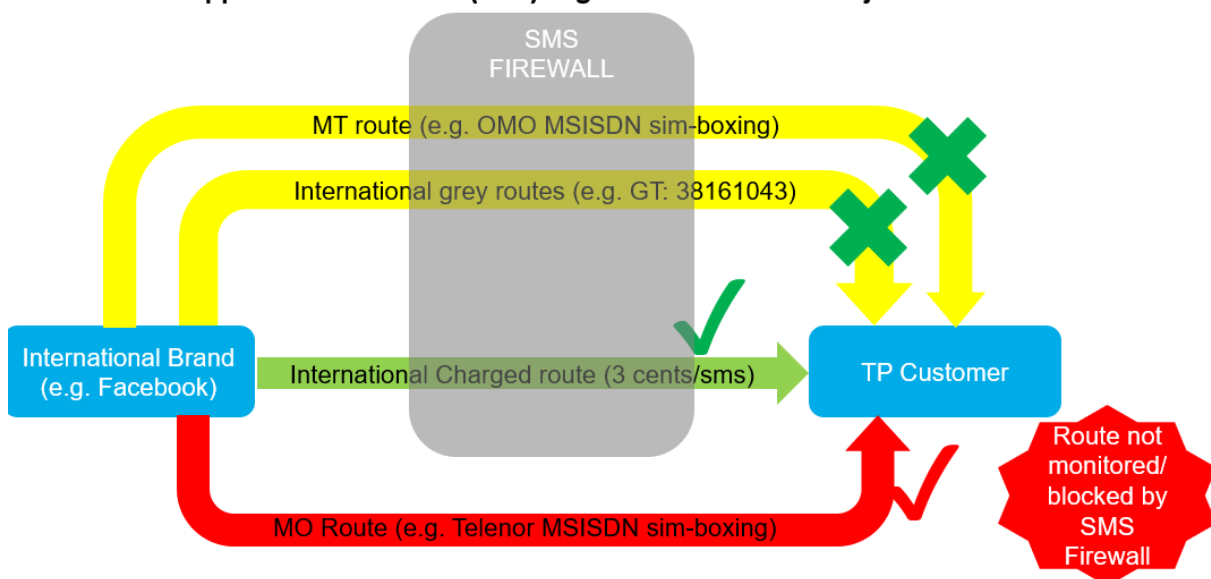
## Technical Changes:

1. The technical team needed to review the rules deployed on network and come up with any new protection rules required to block cases detected in testing
2. SMS Firewall was required to be updated on Software level to handle the on-net SMS traffic
3. Flow of SMS needed to be updated by introducing SMS Firewall into the chain
4. Changes were required on multiple entities to ensure that there is no customer impact on SMS delivery
5. Infrastructure changes were needed to make new virtual machines added to the stack
6. High processing storage / RAM was required to be linked with the new virtual machines to cope with the high volume
7. Redundancy plan was required to be made in SMS Firewall's integration in network so that this new network element did not create a single point of failure

Following diagram shows how we included the on-net SMS flow into SMS Firewall protection layer from integration perspective. This ensured that Telenor to Telenor and Telenor to other OMOs SMS were now inclusive to the SMS Firewall traffic control profile.
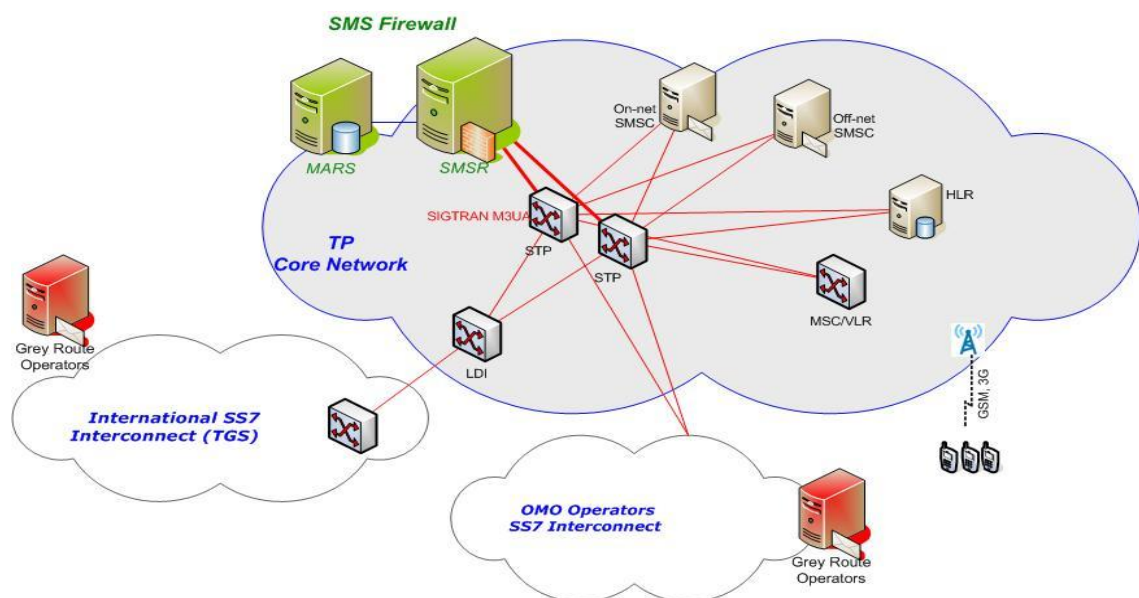


## Business Decisions:

Along with technology business owner of international A2P SMS revenue stream also needed to take important decisions and remove roadblocks for technical team to implement blocking rules on on-net P2P SMS traffic. Following critical measure were taken by business team:

1. Onboard the voice and SMS segments of organization on grey activity via Telenor SIMs for SIM Farms and flash calls
2. Review the business sales process and see how the identified numbers can be tracked back and what actions can be taken on SIMs and the selling point / franchise
3. Analysis on the overall revenue profile of identified SIM Farms and measure the impact of blocking on voice and SMS business

4. Onboard regulatory teams to back the process of blocking with conviction and under supervision of regulator guidelines
5. Add the new tagging of blocking reason in the data warehouse and respective IT systems so that the blocking reason is clearly segregated
6. Get approvals on automatic blocking of On-Net SIM Box based on their activity including volume per day or per hour and the SMS signatures
7. For the flash calls agree with international incoming calls segments and the local voice segments to block the CLIs reported for flash calls
8. Agree with revenue assurance and business intelligence team to provide a quick data analysis for segmentation of SIM Farms and support in approval of blocking based on the profile
9. Onboard call Centre teams on the blocking based on A2P fraud and deal with customer complaints
10. Draft a new process on unblocking of such numbers
11. Blocking of numbers on other network entities in addition to SMS Firewall including HLR and CRM
12. Book lost revenue on voice and SMS in business case of A2P monetization project to show the cumulative benefit to company and take consent of management

## Working Group:

As discussed earlier in the report we had a three-party arrangement going into this implementation.
**Telenor Global Wholesale** (Responsible for mediating between Telenor Business units and Enterprises and between Telenor business units and SMS Firewall vendor ANAM Technologies).
**Telenor Pakistan** (To protect network against grey routes by implementing SMS Firewall). Also to ensure all of the A2P SMS traffic lands on SMS Firewall for detailed analysis and blocking wherever applicable. Another responsibility was to block reported flash calls from testing and analysis on zero duration calls.

**ANAM Technologies** (SMS Firewall vendor and partner to communicate with enterprises). SMS Firewall partner's core responsibility was to provide an ever-available filtering and blocking solution so A2P traffic levels are always under check and analysis layer is always available to operator and to the global wholesale team. We can also say that SMS Firewall acts as an engine to all of this process which gave us eyes to see and arms to block the grey traffic. In addition to that SMS Firewall also provided us with the data required for invoicing to enterprises and for reconciliation of revenue.

**GMS (Global Message Services)** was included in the monetization- as operations partner. GMS provided us with the testing services along with the recommendations for blocking on SMS Firewall and on network side.
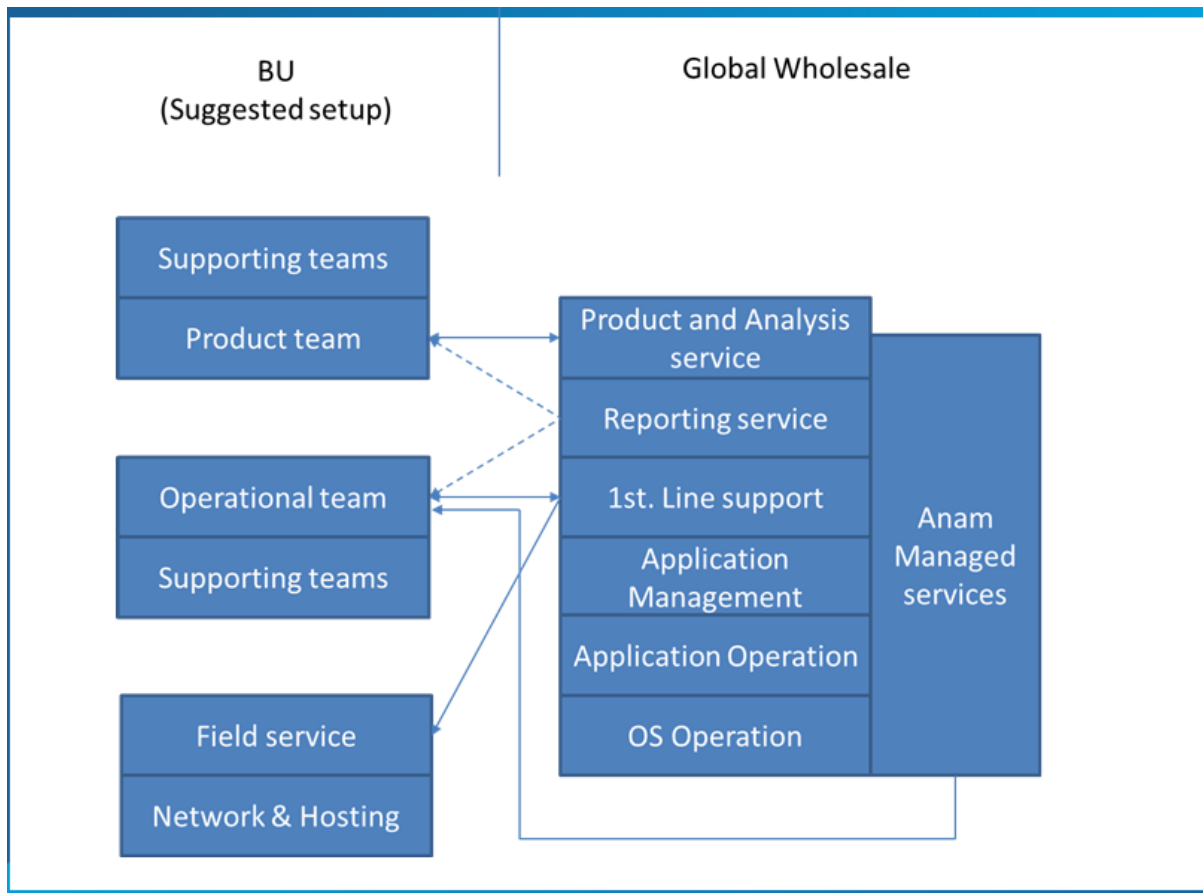
## Split of Responsibility:

Here is the split of responsibility which was agreed between the parties for different tasks. I have shared a complete definition of each role from Telenor Global Wholesale, Telenor Pakistan and ANAM Technologies.

**TGW** role in this scenario is more importantly on traffic collection. They coordinated and communicated with international enterprises and with other SMS Hub partners to ensure that the market rates are implemented as per Telenor Group approved price and the traffic is routed to TGW via legal route. It was their prime responsibility to ensure the traffic route quality and collection. In addition, the TGW team was also responsible for contract management with SMS Firewall vendor. Their payout and tracking of key deliverables of SMS Firewall vendor was done by TGW. Furthermore, the risk ownership related to project timelines, cost approvals, Firewall Software delivery and installation and the traffic collection belonged to the TGW team.

**Telenor Pakistan** on other hand was responsible for hosting the SMS Firewall, ensuring timely readiness of the infrastructure needed to install SMS Firewall software. Manage the traffic migration to SMS Firewall.

More key role was towards business side to take timely decisions by evaluating business impact of decisions taken around any blocking. Business team needed to onboard other stakeholders from other business segments including voice, data, B2B and B2C segments. Telenor Pakistan core responsibility included the efficient and timely installation of virtual infrastructure and the availability of virtual machines to SMS Firewall application.

**ANAM Technologies** was responsible for SMS Firewall features gathering and building an understanding of Telenor Pakistan network topology. Ensuring that network specific features are evaluated and developed correctly. Evaluation of capacity of SMS Firewall was also equally important to make it an efficient part of value chain in SMS flow.

Additionally, SMS Firewall deployment, testing and making it ready to handle live A2P traffic from all sources was shared but precisely a key responsibility of SMS Firewall vendor. Once the firewall was live in Telenor Pakistan network its managed services responsibility including monitoring of traffic and blocking of grey routes was massively important KPI of ANAM Technologies. **Appendices (**Table 1: Split of responsibility) refers to the list of KPIs for all stakeholders.

In addition to that an SLA was locked among the three parties to ensure how the teams interact and time bound all the actions. This was important as a three-party collaboration can only work smoothly if a clear responsibility matrix, SOR and SLA are locked in all partners to be accountable and responsible.

## Extended BU Team:

Implementation of SMS Firewall also needed the support from other teams of Telenor Pakistan which were led by the solution architect. **Appendices (**Table 2: Extended cross functional team) shows table with much more details about engagement of each team.

Major teams included **Infrastructure planning** and **operations** team that was responsible for installation of hardware and then readiness of virtualization to support installation and operations of SMS Firewall application. **IP and network teams** which ensured SMS Firewall inclusion into Telenor Pakistan network and routing of A2P SMS traffic from network entities to SMS Firewall. As SMS Firewall was placed in line to existing network so the network teams played a vital role to modify existing topology to ensure inclusion of SMS Firewall in the traffic flow.

**VAS team** also played a key role in terms of providing existing information of Anti-Spam network so it could be replicated into SMS Firewall, taking handover of SMS Firewall from Telenor Pakistan side and verification of traffic from the network side.

Similarly **Regulatory** team made sure that Pakistan regulatory laws are followed and no breach to the PTA license terms is done. While the **international business team** was responsible to provide forecast of the traffic, make business case on revenue side and coordinate with all business segments on blocking strategy.

## Project Phases:

The above cross functional team was responsible for routing the on-net SMS traffic to the SMS Firewall and analyze the traffic and block SIM Farms **Conceptualization** Phase where business need wad defined, and analysis was done on missing international A2P traffic and the categorization of SIM Farms.

**Design and Planning** included the network topology modification to implement network protection. It included requirement gathering for features of SMS Firewall and the infrastructure required. It also included cost estimation, resource allocation from teams and from cost perspective to make the

SMS Firewall ready to deal with MO SMS traffic, time calculation and project team structuring. It also included the roles definition and split of responsibility for clear objectivity of each team.

**Implementation of Software and Hardware** included the readiness of SMS Firewall software at ANAM Technology end to handle Telenor P2P traffic. It also included readiness of virtual machines and allocation of storage and network resources.

**Testing of application** included the quality assurance testing of SMS Firewall software, business testing of its features including monitoring and blocking and operational testing of Hardware and Software related features. It also included stress testing of SMS Firewall traffic handling capabilities.

**Traffic routing to SMS Firewall** included routing of Telenor P2P SMS traffic to SMS Firewall and ensure that the traffic is handled by application and there is no customer impact with new SMS flow.

**Monitoring of SMS Firewall and traffic** included the phase where traffic was shifted to SMS Firewall, and it was declared stable. After this monitoring rules were placed on SMS Firewall to monitor the traffic of international services and categorize these to implement monetization rules.

**Revenue monetization** started after the traffic was stable on SMS Firewall and was categorized based on the content signatures and volumes detected from MSISDNs. It also included correlation of traffic drop for certain services and analysis on increase of activity on OTP traffic on P2P channel.

This activity also had a feedback loop from testing which helped to identify MSISDNs generating similar text patterns as detected in testing and block these in addition to the SIM Farms detected in testing to increase the footprint of grey routes detection and blocking.

## Business Case:

While we described how the hub and firewall act in this flow when we talk about an investment the business always looks for ROI (return on investment). So, a business case which balances cost and revenue is a basic ingredient to estimate risk on an investment and persuade management for approval. With A2P monetization in context following is a pictorial layout of how business works:
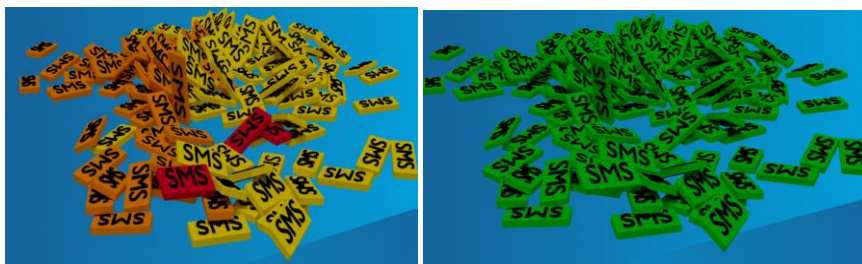


Following picture shows how the revenue payout is done in the market:
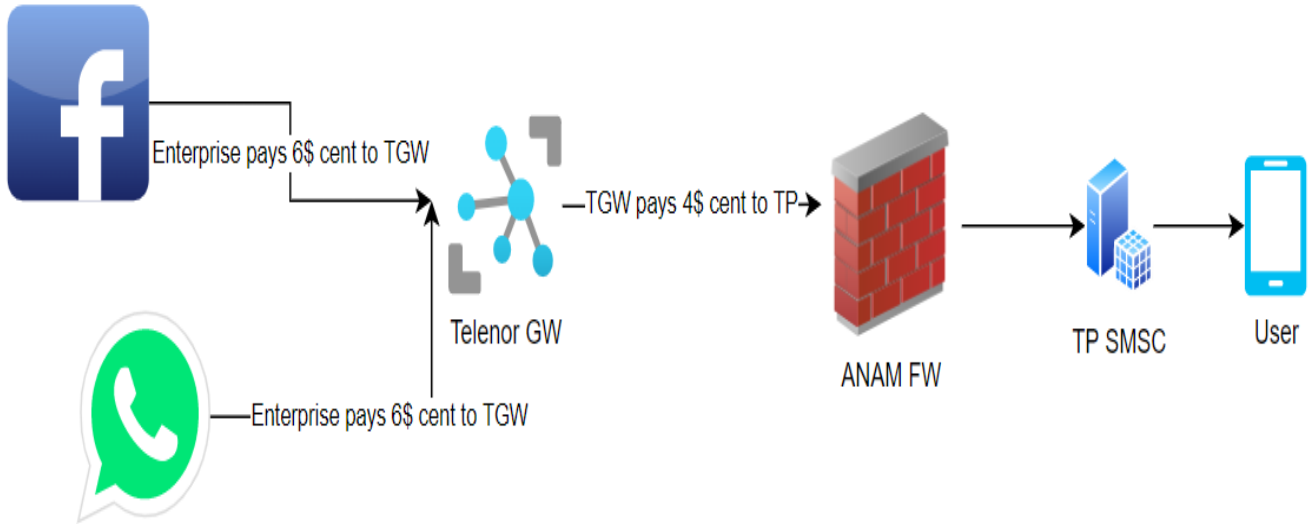
**Enterprises** terminate SMS to TGW as preferred route and pay them a certain price for each SMS
**TGW** on seeing the B party terminates the message towards recipient network of Telenor Group.
**TGW** pays a certain share to Telenor Pakistan for each delivered message and keeps a percentage
with them as a mediator commission which is their earning as well

Based on potential of traffic we drafted a simple business case for additional investment on the
virtual machines. The revenue that was leaked due to the SIM Farms we tagged it as the additional
revenue we will get once this channel is blocked. The cost was to be recovered within 5 months of
the MO SMS filtering and blocking.

All figures here are in PKR:

| Month | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Potential Revenue | 1,548,750 | 1,641,675 | 1,740,176 | 1,844,586 | 1,955,261 | 2,072,577 | 2,196,931 | 2,328,747 | 2,468,472 | 2,616,581 | 2,773,575 | 2,939,990 | 3,116,389 | 3,303,373 | 3,501,575 |
| Actual Revenue | 1,548,750 | 1,590,788 | 1,647,494 | 1,705,636 | 1,738,583 | 1,839,676 | 1,867,271 | 1,895,280 | 1,923,709 | 1,952,565 | 1,981,853 | 2,011,581 | 2,041,755 | 2,072,381 | 2,103,467 |
| Revenue at stake | 0 | 50,888 | 92,682 | 138,950 | 216,678 | 232,901 | 329,661 | 433,467 | 544,763 | 664,016 | 791,722 | 928,409 | 1,074,635 | 1,230,992 | 1,398,108 |

The formula is simple here, we simply see the A2P traffic / Day and calculate it by multiplying with
cost of each SMS (for example to start it was 2.5$ cent).

| SMS Cost | 4.425 |
|---|---|
| SMS / Day | 350,000 |
| Revenue / Day | 1,548,750 |
| Revenue/ Month | 46,462,500 |
| Yearly Revenue | 557,550,000 |

Rest of the forecast was built by taking following into consideration:

1. Organic growth in SMS / Day based on the subscriber growth and new applications getting
   into market

2. Price up of SMS towards enterprise to have an enhanced revenue share on TGW and Telenor Pakistan side
3. Traffic potential lost due to flash calls and sim farms.

## Cost Side:

Following was TCO (total cost of ownership) for the implementation of SMS Firewall which includes both Capex (One time investment for HW and ANAM FW solution) and Opex (Cost to run support for HW, SW and Database licenses etc.)

## SMS A2P Project – Total Cost

### Financial Break up

#### CAPEX

| Description | Cost (USD) | Cost (USD) | Total Cost  (USD) |
|---|---|---|---|
| | Year 1 | Year 2–5 | |
| SMS A2P Project | 180,722.27 | 0.00 | 180,722.27 |

#### OPEX

| Description | Cost (USD) | Cost (USD) | Total Cost  (USD) |
|---|---|---|---|
| | Year 1 | Year 2–5 | |
| SMS A2P Project | 37,048.73 | 181,381.37 | 218,430.09 |

Well now we can see the balance of cost and Revenue. An estimated revenue of 5,575,500 USD in Year 1 means that all of the cost is easily covered by Year 1 with a good margin of revenue as well. Then in Year 2 – onwards it is pure revenue.
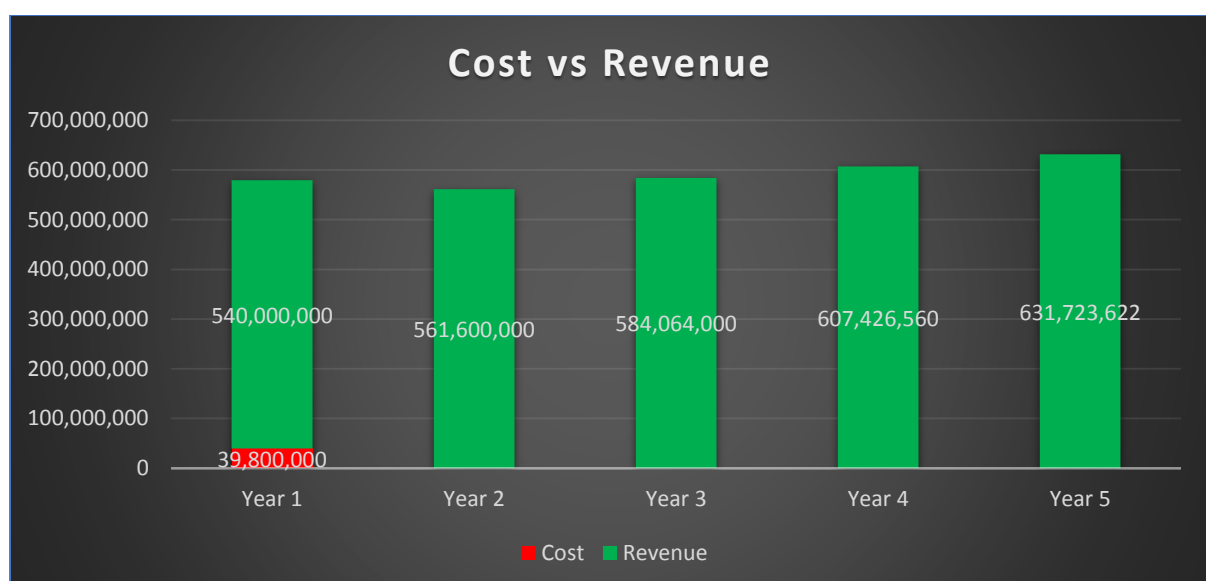
## Key Steps for Post Monetization Challenges:

I will try to elaborate the approach that the working group took to handle the challenges faced within first year of monetization launch.

**SMS Firewall** inclusion of P2P traffic into SMS Firewall to monitor sim farm activity and block the potential SIM Farms.

**Virtualization** was another key decision which helped us to implement the SMS Firewall earlier as compared to conventional hardware-based implementation. It also helped us to design a robust expandable resource on infrastructure which could dynamically alter resources as per requirement of SMS Firewall application. This helped us with a quick readiness of additional VMs for MO SMS traffic inclusion.

**Risk Evasion Strategy** by consuming the virtual infrastructure. We cautiously designed the traffic migration plan to SMS Firewall so that inclusion of this new entity doesn't impact the customers and revenue of Telenor Pakistan. We migrated traffic from the sources by choosing lower chunks first, monitor the traffic and then move for next one.

**Monitoring and Synergy Building** was another huge key to success. We rallied organization behind the team by creating awareness across organization about our intended target. SMS Firewall capabilities around reporting helped us in running that campaign as we were able to showcase the traffic leakages for international A2P services. We could exactly show the volumes of such traffic coming via local aggregators, international links or from other mobile operators from Pakistan. We created monitoring rules on SMS Firewall and arranged road shows in the company to show to all stakeholders how the traffic sources relevant to other business segments were being misused to send international A2P SMS traffic and what we could do about such scenarios.

**Communication with Enterprises** was continuous. While we were monitoring the traffic and identifying the illegal routes for international A2P SMS Telenor Global Wholesale was continuously in touch with enterprises and relevant samples were shared with them. This built a trust between Telenor group and enterprises on transparent view of traffic leakage.

**Price Setting and market onboarding** was our next milestone. Once we had identified major enterprises with traffic via illegal routes, we proceeded with setting up the price to collect legal traffic. This price notification from Telenor Global Wholesale notified the market that we were the exclusive traffic hub for A2P SMS traffic for Telenor Pakistan. Price was communicated via legal letter and deadline was set. Communication was made clear that if after deadline any traffic for enterprises is seen via illegal routes it will be blocked straight away.

**Blocking** of Fraudulent P2P traffic was the pivotal groundbreaking step to ensure that there were no leakage routes and all of traffic was routed via legal channels.

**Testing and Verification** was done for each rule implemented on SMS Firewall to block any grey route scenario. We had team aboard to test services manually as well as in automated way to see how the blocking affected the leakage control. We made virtual sims available via which we automatically tested the affected services. Once any other source was detected it was logged and reported to team for further action.

**Auto Blocking** was introduced into the testing regime where we defined few test numbers on SMS Firewall on which message termination was blocked. We generated automated testing on these numbers and the illegal sender IDs were automatically blocked on SMS Firewall. This helped to increase the spread of blocking of SIM Farms.

**War Room** was set up during first couple of months after blocking was started. Team was monitoring the test results and the reports from SMS Firewall constantly and reporting potential threats to decision making body of business segments and regulatory. Quick decisions were made by the management and the team to swiftly approve and block such instances to protect the network and monetize the traffic on legal route.

**Communication with Pakistan Telecom Authority** was also done continuously so that any action taken to block any channel. It was important so that any decision and every decision is taken in right context of the regulator's bindings so if any consumer/customer challenges us we can protect it by the already secured approvals from PTA.

## Way of Work in Target Architecture:

After the firewall implementation the following picture shows the way of work on protected network. We can see the placement of Telenor Global Wholesale, SMS Firewall Layer and Telenor business units.
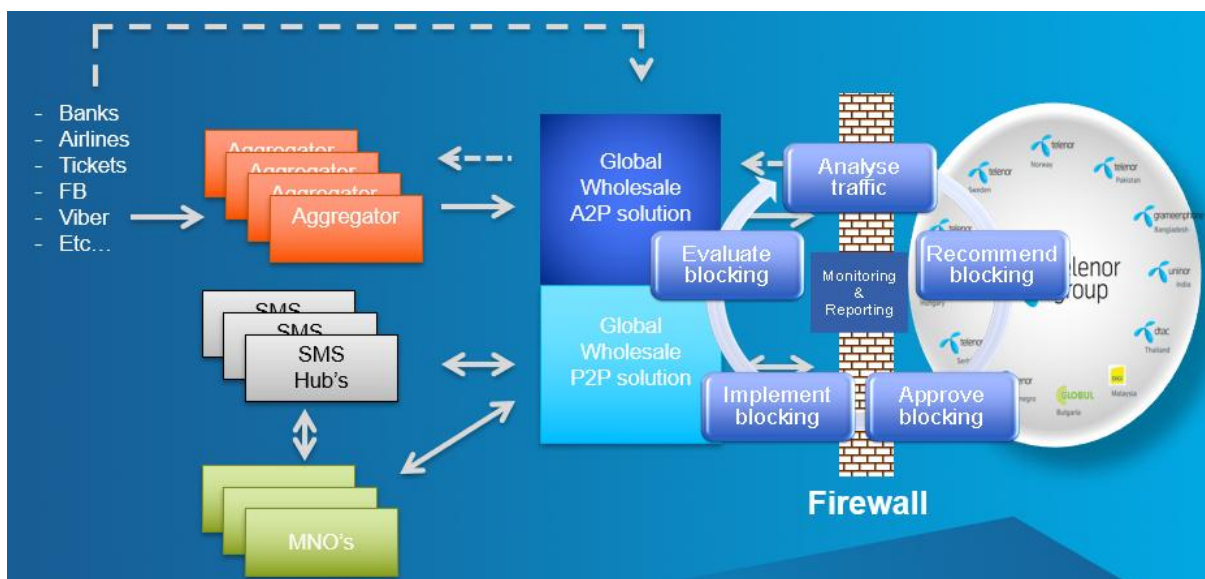


In this case following was the collaboration model:

TGW interacts with enterprises on collection of potential traffic. TGW has a contract and SLAs in place with ANAM and Telenor Pakistan.

Telenor Pakistan is responsible for ensuring incoming A2P traffic towards SMS Firewall. Telenor Pakistan is responsible for ensuring high availability of infrastructure for SMS Firewall

ANAM is responsible for analysis of traffic and blocking of grey routes after approval where required. Telenor Pakistan is responsible to approve the provided recommendation and block SMS Firewall bypass cases on network side. Telenor Pakistan also supports in providing data regarding SMS termination of TGW for reconciliation. TGW is responsible to get payments from enterprises and partner hubs and pass on the revenue share to Telenor Pakistan. TGW is responsible for tracking of SLA with ANAM. Overall SLA of an incident consists of the time taken by all the 3 parties for each type of incident. Telenor Pakistan is responsible to provide any SIMs required for testing. Telenor Pakistan is responsible for HW monitoring and maintenance. ANAM and TGW NOC teams are primarily responsible for monitoring software and traffic stats.

With above defined responsibility matrix the traffic monitoring and blocking are done on daily basis to ensure that there is no potential revenue leakage.

## How Monetization Works on Day in Day out Basis:

Monetization of A2P traffic is a rigorous job. Fraudsters are changing their patterns of traffic based on multiple parameters on daily basis to find loophole in SMS Firewall. Once they find one, they expose it and terminate maximum traffic via grey route. All the hubs are in touch with such fraudster aggregators and try to steal some revenue from operator by terminating it via non-monetized route.

Traffic is analyzed by ANAM business analyst along with Telenor Pakistan business analyst to see for any dips in legal traffic. Once such dip is seen analysis is done on SMS Firewall for any manipulation of traffic. To support that testing is also done by resources from TGW, ANAM and Telenor Pakistan to replicate user journey. Once any grey route is found a recommendation of blocking is sent to Telenor Pakistan. After due approvals Telenor Pakistan approves blocking and it is implemented by ANAM. After such blocking similar scenario is again tested to verify if traffic has recovered to the local route.
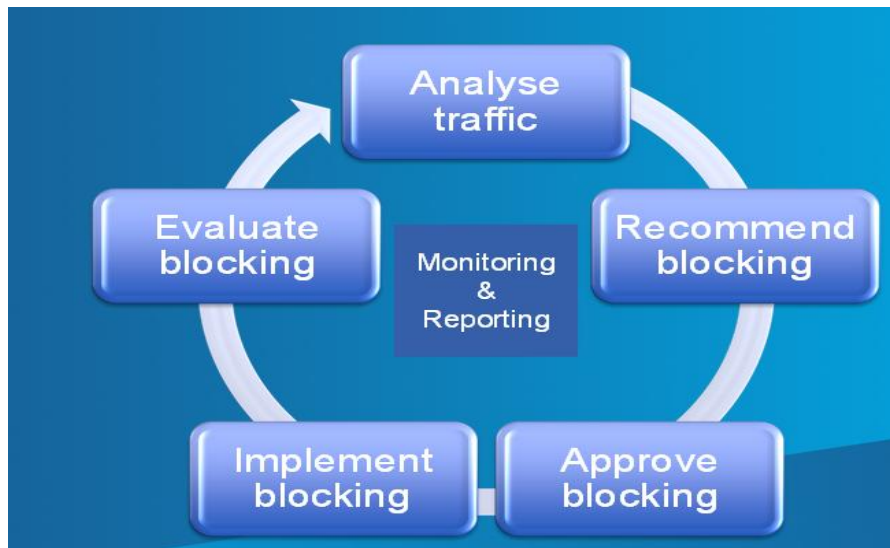


Reference: Telenor Pakistan monetization strategy

We can refer to this loop diagram as the life of A2P monetization team that they live each day. It is not easy to keep network protected since the fraudster aggregation itself is a huge business and

these illegal aggregators are always experimenting and exploring ways to find a loophole and steal from the monetized stream of A2P revenue.

## Engagement Matrix:

Following table shows the engagement between the teams on reporting and analysis and relevant action to be taken for blocking. It also highlights what types of reporting is done to ensure Traffic **sustainability, Performance of SMS Firewall** and **Network protection**.

| Type of report | Content | Frequency |
| --- | --- | --- |
| Recommendation for blocking | • Recommendation to act/not to act on abnormality<br>• If act, recommendation on blocking<br>• Basis for recommendation | Whenever abnormities are detected in traffic |
| Management report | • Aggregated data on:<br>  • Revenue collected<br>  • Traffic blocked | Monthly |
| Summary report | • Result of blocking on traffic<br>• Details on blocked traffic<br>• Comments to traffic pattern | Weekly |
| Service Performance Report | • Result for service levels<br>• KPI trends and analysis<br>• General information on performance of service | Monthly |

Reference: Telenor Pakistan operations strategy

## Workflow for Traffic Monitoring:

It is important to have a closed loop for monitoring traffic so that the route quality is known end to end from an enterprise to an operator's consumer. With this it is equally important to have tap points to control traffic flow and log it for clean invoicing. **Appendices (**Figure 16: Workflow for operations and support) shows how TGW created multiple reconciliation points in the value chain starting from enterprise to any partner to TGW hub to SMS Firewall to Telenor Pakistan SMS network. So, any loophole was not left to avoid any delays in payments and reconciliation.

# Conclusion and Way Forward:

To conclude the report I would like to share key learnings and way forward:

1. It is pivotal to design any solution in a future centric way by looking at all possible aspects that can come into picture
2. For any unforeseen issues it is better to have some forecast in cost that can be allocated later on based on requirement.
3. In Pakistan market we need further regularization of SIM sale process. The stiff sales targets of operators are a source of violation of regulatory benchmarks for new SIMs sale
4. For Flash and Robo Calls blocking operators have dependency in terms of technical and regulatory aspects. Signaling Firewall and new blocking solutions for this grey area are a need of hour

5. We can further monetize the A2P traffic but having premium and normal rates for OTP and campaign (Advertisement) traffic respectively.
6. Our Business Intelligence platforms need to have incorporation of artificial intelligence to predict and analyze patterns to identify grey routes along with SMS Firewall since BI is integrated with each network entity.
7. Approval of known grey routes should be automated and moderation should be removed.
8. We can use same learnings to monetize domestic A2P traffic in future.

By considering above points we can further optimize the revenues earned by international A2P traffic in Pakistan market and give breathing space to operators in highly saturated market.

# Appendices:

**56%** of global telecommunications executives say that traditional value chains are being replaced with new value models[1]

**52%** of global telecommunications executives tell us that the boundaries between industries are blurring[2]

**52%** of global telecommunications executives report that competition is coming from new and unexpected places[3]

Figure 1: Changing opinion of CXOs of Telecom Operators.

Reference: 2008 IBM - Social networkings growing influence on telecom providers - GBE03121USEN
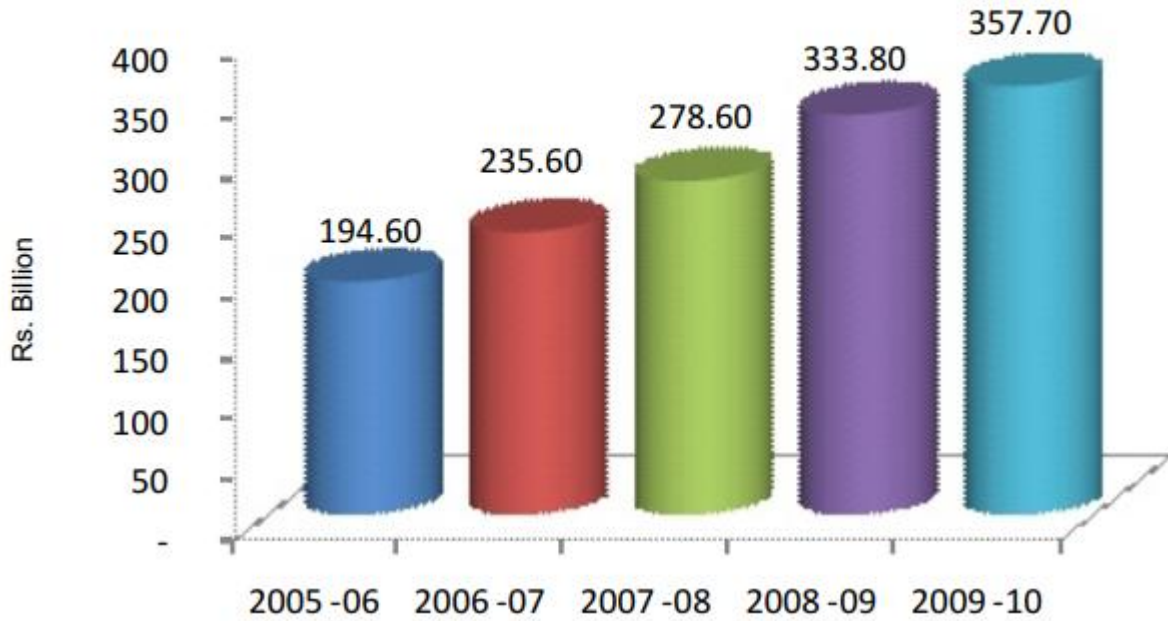
Figure 2: Revenue trend in 2000s.

Reference: PTA official website

| | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|---|---|---|---|---|---|
| Cellular | 89,896.3 | 133,131.9 | 182,122.2 | 212,423 | 236,047 |
| Local Loop | 71,185.9 | 68,368.2 | 63,693.1 | 62,568 | 61,464 |
| LDI | 7,199.6 | 15,567.4 | 21,982.6 | 47,969 | 47,067 |
| WLL | 12,453.5 | 2,644.9 | 2,704.0 | 2,670 | 2,880 |
| VAS (Estimated) | 13,827.0 | 15,901.1 | 8,048 | 8,179 | 10,202 |
| **Total** | **194,562.3** | **235,613.4** | **278,549.6** | **333,809** | **357,712** |

Figure 3: Revenue Breakdown in Millions (PKR)

Reference: PTA Official website

## Cellular Mobile Average Revenue per User per Month

Figure 4: ARPU increase trend in 2000s

Reference: PTA official website



## Subscriber wise - Cellular Market Share
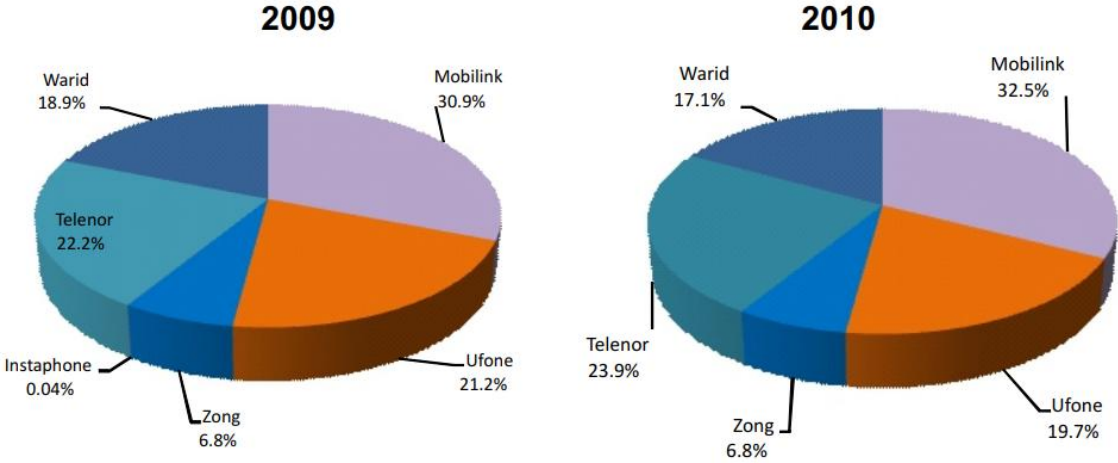
Figure 5: Subscriber Base Share YoY

Source: PTA official website

## Revenue Share by Cellular Operaters

### 2008-09



### 2009-10
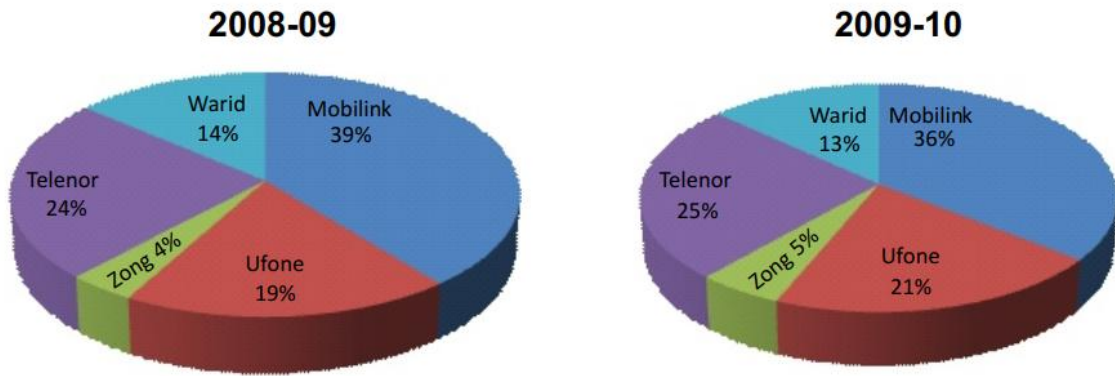


Figure 6: Revenue Share YoY

Source: PTA official website
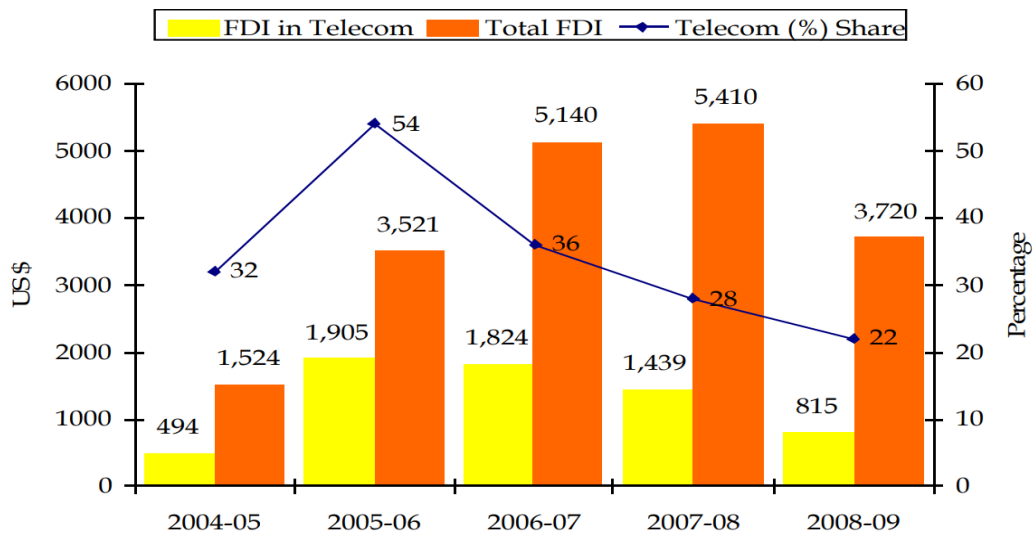


Figure 7: Investment trend

Source: PTA official website

## Sources of FDI in Pakistan Telecom Sector

*US$ Million*

| Country | FY05 | FY06 | FY07 | FY08 | FY09 | Grand Total |
|---|---|---|---|---|---|---|
| UAE | 311.96 | 1360.06 | 358.77 | 366.19 | -54.27 | 2,342.70 |
| U.S.A | 82.44 | 58.81 | 208.92 | 446.17 | 157.43 | 953.8 |
| Norway | 30.61 | 245.27 | 24.68 | 270 | 99.25 | 669.8 |
| China | 0.02 | 0.04 | 706.17 | 0.06 | -106.78 | 599.5 |
| U.K | 1.73 | 100.92 | 255.27 | 15.37 | -9.63 | 363.7 |
| Mauritius | 0 | 59.4 | 59.4 | 49.24 | 140.39 | 308.4 |
| Hong Kong | 10.02 | 2.05 | 8 | 180 | 103.89 | 304 |
| Malta | 0 | 0 | 0 | 60 | 187 | 247 |
| Singapore | 0 | 0.06 | 0.23 | 0 | 210.6 | 210.9 |
| Netherlands | 10.88 | 31.28 | 42.28 | 25.37 | -26.43 | 83.4 |
| Germany | 0.11 | 2.8 | 48.97 | 4.87 | 0.32 | 57.1 |

Figure 7: Investment trend in Telecom sector in 2000s

Reference: PTA official website



Figure 8: Telecom imports in 2000s

Reference: PTA official website

|  | 2013-14 (R) | 2014-15 (R) | 2015-16 (R) | 2016-17 (E) |
|---|---|---|---|---|
| | | | | (Rs. Million) |
| Cellular | 322,683 | 317,016 | 345,537 | 369,118 |
| Local Loop | 88,952 | 81,914 | 76,344 | 72,937 |
| Long Distance International | 43,901 | 40,890 | 32,554 | 23,083 |
| Class Value Added Services (E) | 4,123 | 2,468 | 2,499 | 2,503 |
| Total | 459,632 | 442,287 | 457,024 | 467,642 |

R = Revised

E = Estimated

Figure 9: Revenue drop for VAS in 2010s

Source: PTA official website



Figure 10: Shift of market towards internet enabled applications

Reference: PTA official website
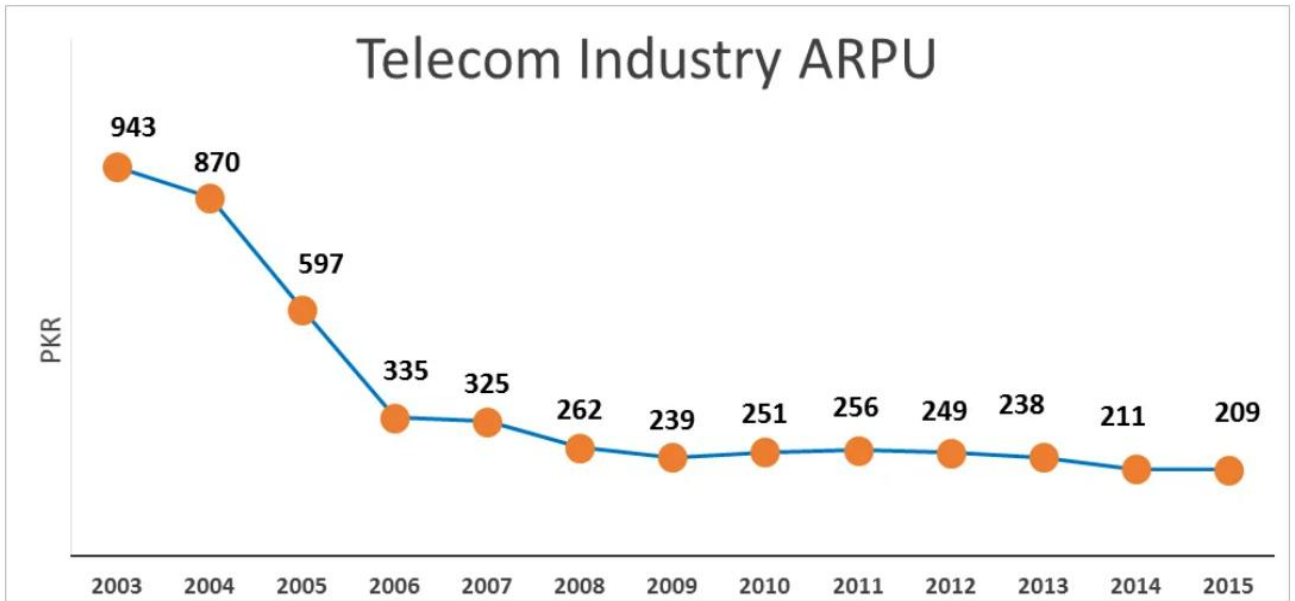
Figure 11: Industry ARPU drop

Reference: https://www.phoneworld.com.pk/low-arpus-mnos-challenge/
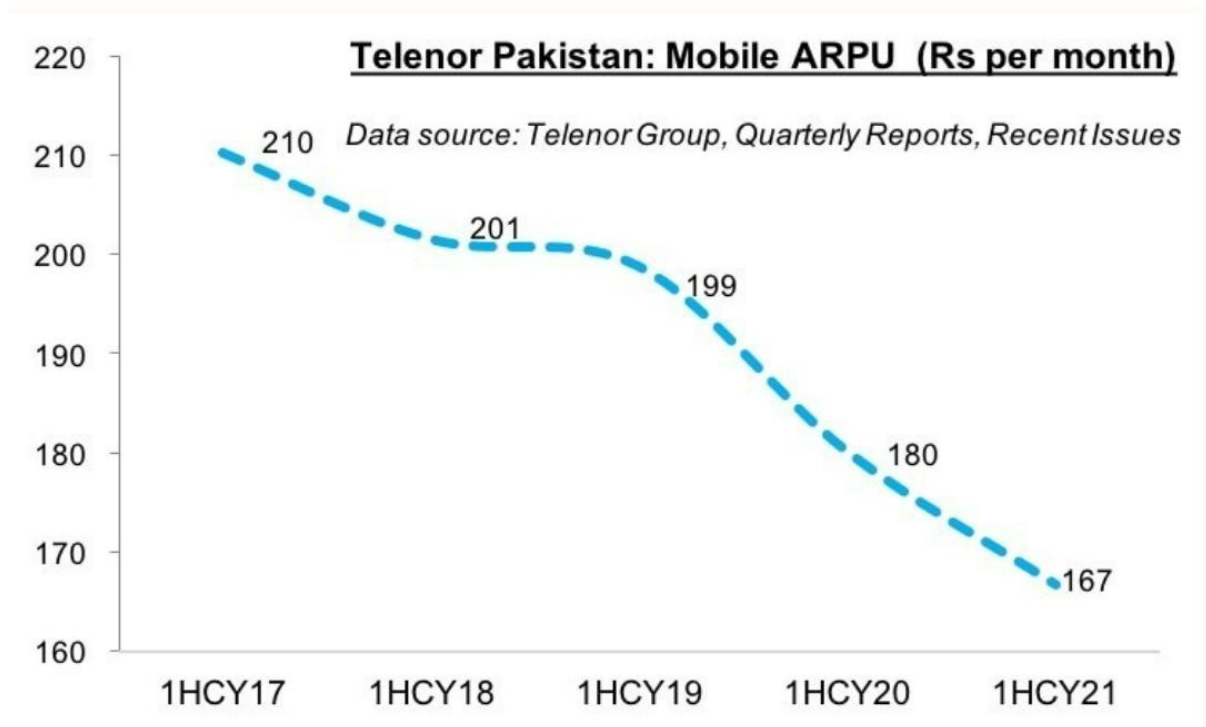


Figure 12: Telenor Pakistan drop in ARPU

Reference: https://www.brecorder.com/news/40109415
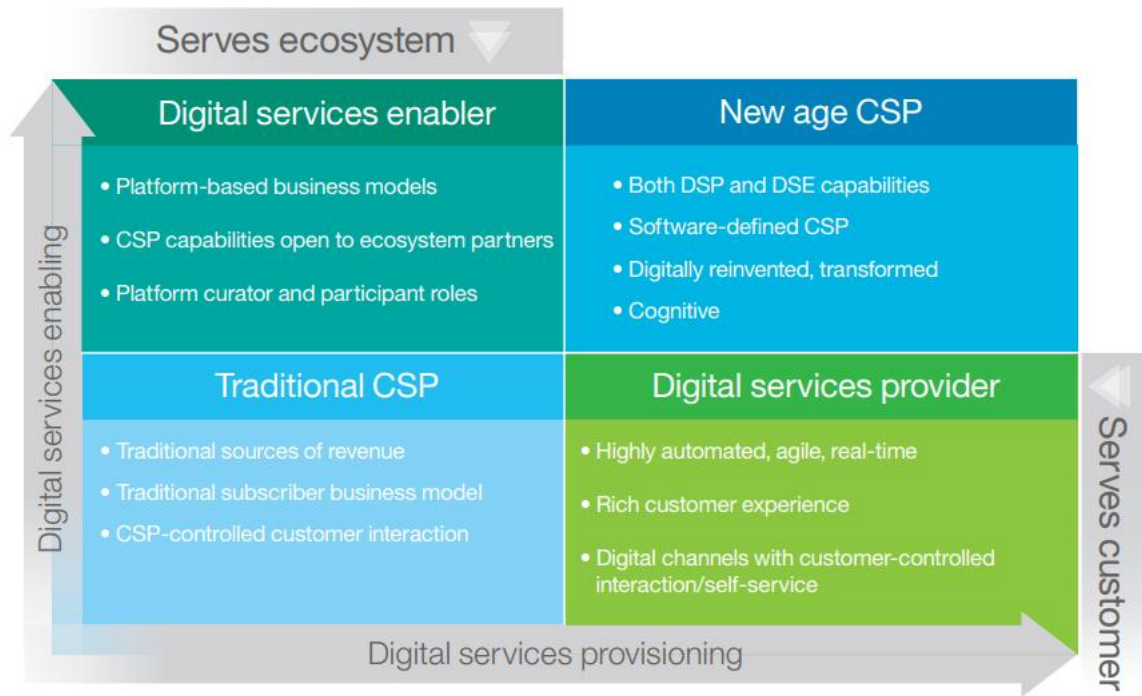
Figure 13: Digital Ecosystem in modern market dynamics

Reference: Overwhelming-OTT-telcos-growth-strategy-in-a-digital-world



| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| Of which A2P/P2A | 1.113.929 | 1.419.586 | 1.649.924 | 1.832.762 | 1.985.040 | 2.124.237 | 2.213.470 | 2.193.841 |
| Basic text messaging traffic | 6.546.869 | 7.225.547 | 7.470.380 | 7.519.356 | 7.356.980 | 7.095.645 | 6.781.789 | 6.341.599 |
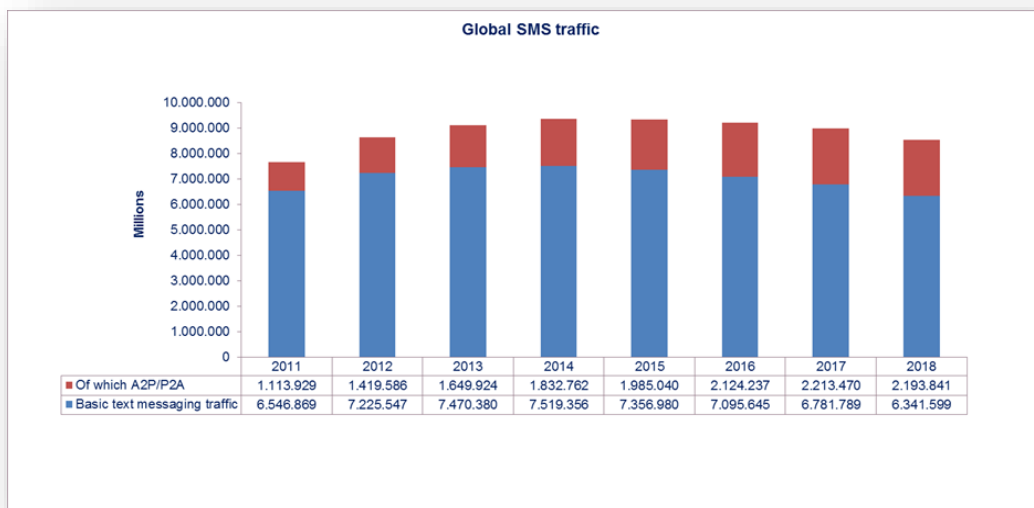
Figure 14: A2P SMS Forecast

Figure 15: Why SMS is reliable

Reference: Ovum and Hallingby

| Role | Responsible | KPIs |
|---|---|---|
| Project Manager | TGW | 1. Interact with Enterprises via commercial teams<br>2. Manage approvals of project plan, resources and cost<br>3. Manage risk register and issue register<br>4. Showcase progress to management<br>5. Accountable for timelines<br>6. Bridge between SMS Firewall vendor and Business unit of Telenor |
| Solution Consultant BU Project Manager | Telenor Pakistan | 1. Onboard all internal teams of Telenor<br>2. Communicate and govern changes and implementation<br>3. Ensure processes are followed<br>4. Design of network to place SMS Firewall<br>5. Discussion with technical and business teams for necessary approvals and actions<br>6. Implementation of SMS Firewall and traffic routing<br>7. Accountable for time and resource management from Telenor Pakistan<br>8. Accountable for infrastructure from business unit for SMS Firewall hosting |

| | | |
|---|---|---|
| ANAM Technologies Architect | ANAM Technologies | 1. Responsible for firewall implementation<br>2. Responsible for testing of SMS Firewall<br>3. Responsible for design and handover of Firewall to Telenor<br>4. Respobsible for Firewall managed services and operations |
| Business Manager | Telenor Pakistan | 1. To provide SMS forecast<br>2. To prepare revenue forecast<br>3. Monitor and book new revenue stream in financial books<br>4. Risk owner for A2P business stream |

Table 1: Split of responsibility

Reference: Telenor Pakistan A2P monetization strategy

| Team | Role |
|---|---|
| Infrastructure Planning | 1. Dimension the hardware and virtual infrastructure as per application and traffic<br>2. Cost estimation of infrastructure<br>3. Issue purchase order to suppliers<br>4. Ensure timely delivery of equipment |
| Infrastructure operations | 1. Installation of hardware and virtual machines<br>2. Readiness of infrastructure for application installation<br>3. Operations and maintenance of infrastructure |
| IP and networks team | 1. Connectivity of SMS Firewall with core and IT networks |
| VAS Team | 1. Connectivity of SMS Firewall with SMSC<br>2. Monitoring of SMS traffic |
| NOC Teams | 1. Integration of SMS firewall with Telenor's monitoring<br>2. Monitoring of application and traffic alerts 24x7 |
| Regulatory | 1. Interact with PTA for the blocking implementation sign off |

Table 2: Extended cross functional team
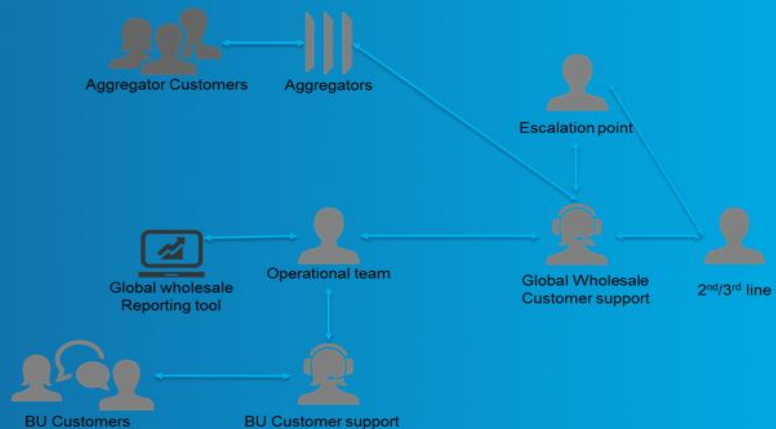
Reference: Telenor Pakistan A2P monetization strategy

Figure 16: Workflow for operations and support

Reference: Telenor Pakistan A2P monetization strategy



Figure 17: SMS Firewall Feature list

Reference: ANAM SMS Firewall manual