

Transforming Telecom Business: Scaling the Shift using Predictive Analytics

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Abstract

The telecom industry is phasing towards a business model which is more data centric, as the industry sees a decline in its legacy services. As a result of this shift, the legacy metrics and KPIs which were once used to scale and understand respectively the performance of the industry need to evolve as per needs of the new environment to provide a more accurate picture of the industry as it undergoes a business transformation. As a result of shift from voice to data there is a change in the business trends in the telecom industry which in turn necessitates the need for new Key Performance Indicators to measure the performance of the telecom industry. So the objective of the paper is to study the changes happening in the telecom industry due to the shift of voice from data and the effect of this shift on the telecom business trends. The paper attempts to come up with new key performance indicators which will help the telecom managers' scale the usage and revenue generated by data services more accurately.

Keywords: Business Transformation, Business Trends, KPI, Legacy Metrics

1. Introduction and Motivation

The telecom industry as we know it, is about to undergo a paradigm shift. Where once scaled by the performance of legacy services such as voice and messaging, it has now started to gravitate towards a more data services centric model. With the meteoric rise of OTT players, consumers today are using data like never before. No longer are we using mobile internet for just checking mails. Today we use the same for gaming, shopping, exchanging multimedia and various other services. In times to come, data services will be pivotal in redefining the metrics to be used for scaling the performance of the industry. Driven by factors such as, the ever increasing tele-density and rapid smart phone penetration, data services are fast becoming a staple for most of the mobile subscribers. The KPIs of the telecom industry such as MoU (Minutes of Usage) and ARPU (Average Revenue Per User) are slowly becoming irrelevant with voice services

maturing and data services growing. To accommodate this rise of the data services and its subsequent change in subscriber consumption pattern, the industry needs to recognize the profound and ubiquitous impact of these services. Thus the metrics used by the industry should evolve so that that they stay relevant in the current market dynamics, emerging business and revenue models, and service offerings. Also it is vital that these new metrics should be applicable globally as operators widen their value propositions and investors as well as regulators call for innovative insights into potential markets and customers.

2. Literature Review

Increase in adoption of data usage:

The data traffic on mobile phones, globally, rose to 81 percent in the year 2013 . In 2012 year end it was 820 peta bytes per month and grew upto 1.5 exabytes per month by year ending 2013. There has been a huge growth in the

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data traffic rate form year 2000 to year 2013. In year 2000, the data traffic travelling across the mobile networks, globally, was 1 Exabyte which has grown up-to 18 Exabyte of traffic in year 2013. The usage of smart phones has grown up-to 50 per cent in the year 2013. As for the smart phones, the data traffic travelled, on an average, per smart phone per month, has risen from 353 MB in year 2012 to 529 MB in year 2013. It is surprising to note that, globally, out of the total number of handsets used in year 2013, smart phones usage accounted for just 27 per cent, and yet they accounted for 95% of total global handset traffic^{1,16}. As a result of the changes in technology, competition, and customer environment, there is a need to come up with a newer set of metrics for operators which will help them in measuring their business performance as well as reporting the same⁶. Mobile Internet revenues, will overshadow the fixed broadband revenues in the year 2014. Mobile Internet revenues worth US\$259bn in 2014, will represent more than 50% of the total spend on Internet access. These are expected to exceed US\$385bn and represent 58% of the total internet access spends by the end of year 2017. Penetration of mobile-Internet services will grow by 31% from 2012 to reach 54% by the end of 2017, in comparison to 11% rise to 51% for fixed broadband over the same period. The overall global spend on Internet access services is forecasted to have 11% Compound Annual Growth Rate (CAGR) over the span of next five years and is estimated to cross US\$665 billion in 2017. The major driver for growth for internet access services will happen in the emerging markets. It is expected that by end of the year 2017, out of the total number of subscriptions for fixed-broadband, 45 per cent will be represented by emerging countries like India, Brazil, Russia and China and out of total users for mobile Internet, 50% will be represented by the same countries again². In most of the developing countries it has been observed that, majority of the web-users are accessing web services through mobile. Egypt, being the highest with 70% and India with 59%. Whereas in the developed countries, like the US the percentage of users accessing internet through mobile alone is at 25%³. As per the data provided by research house Informa, worldwide, every day about 19 billion messages were sent through mobile applications in contrast to 17.6 billion messages being sent through SMS. According to their forecast, by the end of year 2015, 50 billion messages will be sent daily through mobile applications, in comparison to 21 billion messages sent through text⁴.

From the literature review stated above, the shift towards data services is very eminent and needs to be addressed and scaled with proper metrics and new KPIs.

3. Objective of the Paper

As a result of shift from voice to data there is a change in the business trends in the telecom industry which in turn necessitates the need for new Key Performance indicators to measure the performance of the telecom industry So the objective of the paper is

To study the changes happening due to the shift of voice from data,

To study the effect of this shift on the telecom business trends and

To come up with new Key performance indicators which need to be highlighted due to the new trends.

The new KPIs and metrics which will help the telecom managers scale the usage and revenue generated by data services more accurately.

4. Research Methodology

This paper is aimed at understanding the shift in the telecom world with respect to data services and their effect on the telecom industry's KPIs and metrics, which scale the performance of the telecom industry. This paper is compiled on the basis of secondary and primary research carried out in the field of telecom and data services. Secondary research has been carried out in form of data mining from various reports and white papers from industry stalwarts. Primary research was conducted in form of a questionnaire designed to map the subscriber consumption pattern on the basis of the responses recorded, a sample size of 200 was used in the city of Pune, Maharashtra. Predictive Analytics were carried out using the IBM SPSS modeler for analyzing and predicting the trends in data consumption and its impact on the industry KPIs. The tests used are- Multiple regression and Factor Analysis.

5. Analysis

5.1 Changes Happening Due to the Shift of Voice from Data

5.1.1 Decline of Legacy Services and Legacy Metrics

The current wave of rapid growth in Smartphone penetration and mobile data users is driving the consumption pattern for the mobile subscribers. The legacy services such as voice and messaging are being exposed to cross competition from the OTT players, with the revenues from messaging already being cannibalized by the instant messaging giants “WhatsApp”. The writing seems to be on the walls already for voice with the introduction of better technology and data speed. The legacy services such as Voice and Messaging, which contributed to a major chunk of the ARPU for the telecom operators, have seen their influence diminish and challenged by the rapid growth of data services into the revenue mix as mentioned later by Hong Leung Investment Bank in 2013. With growing penetration of smart phones across the globe, data services are fast becoming the one of the major KPI’s in the industry. Messaging revenues have already taken a huge hit with the rise of IM apps like Whatsapp⁵. And with the introduction of higher data speeds it will not be long before VoIP starts eating into the voice revenue as well. Also a large percentage of the new connections which are generated are due to the multi-SIM customers, by enterprise customers and M2M connections⁶. These new type of connections also differ in usage pattern, revenue profile and margin profile, in comparison to the legacy customer base. Also in times such as these, when there is a declining trend in the ARPU across the worldwide markets as shown in the Figure 1.

ARPU is growing irrelevant due to the multi-SIM users which distort its definition. With the increase in the ownership of mobile devices and SIM cards, the telecom operators are looking at novel methods to capture and represent customer spend. For example they would like to focus upon capturing Average Revenue Per Account (ARPA)⁷.

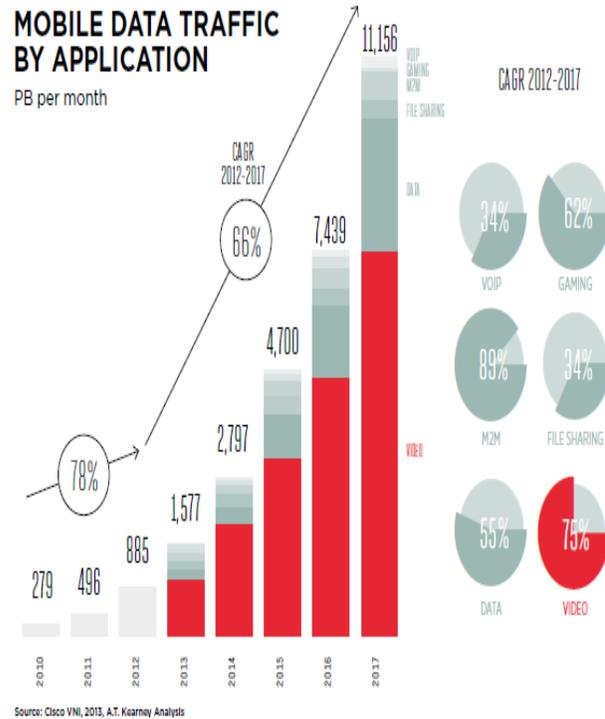
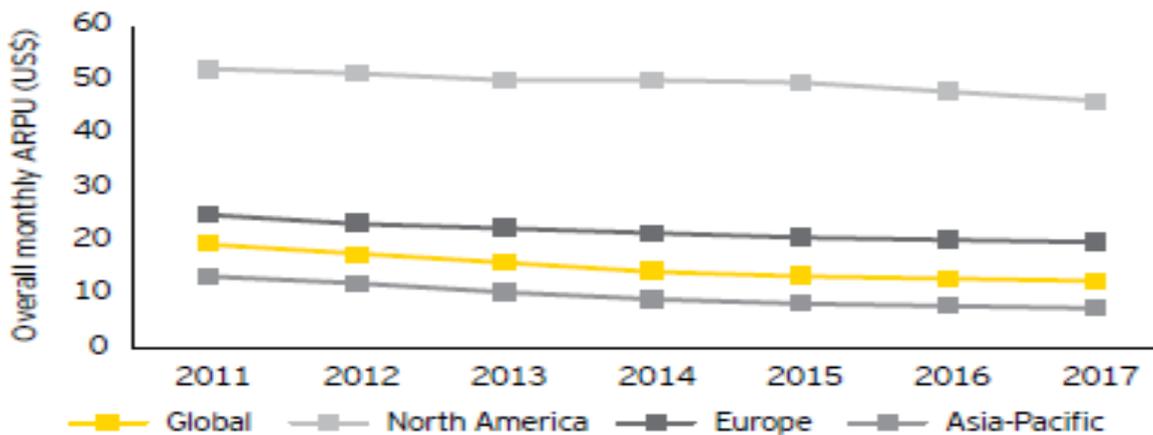


Figure 2. Mobile Data Traffic by application



Source: "Mobile Regional and Country Forecast 2012-2017," Ovum, August 2012

Figure 1. Declining ARPU over the years by region.

The above graph from Cisco's visual networking index shows us the growth of mobile data traffic touch 1,577 petabytes per month in the year 2013 and it is forecasted to hit 11,156 petabytes in 2017. The graph also gives us the breakdown of the type of traffic, as shown above video accounts for a lion share of the traffic followed by M2M, gaming, VoIP and file sharing applications. Machine to Machine (M2M) data traffic is going to represent approximately 5% of all traffic by 2017, but it is projected to rise to almost 90% p.a. This rise is driven by a wide range of applications in the machine to machine environment such as smart utility meters and in-car telematics services. By 2017 this would have led to an increase in volume by a factor of 10 –surpassing the milestone of 500 Terabytes per month⁸. With the expansion in the use cases of telecom infrastructure and market saturation, the reporting of the customers who are consuming more than one service is vital. RGU metrics can communicate multi-play and multi-screen take-up. RGU will showcase a much clearer picture of cross-selling and up-selling of services by the telcos, whether they have been successful in selling such transactions and also communicate the number of services their average customer is consuming as a result. As mentioned above, with ARPU losing its relevance due to multi-sim users and telcos offering other services for alternate revenue streams, RGU will provide a more comprehensive scaling as it scales the user on the basis of number of services being consumed by the user instead of just the user. This would overcome the handicap of network coverage and ARPU metrics. It would also address the distorted definition of user. Hence, the traditional definition of ARPU metric will not be accurate in case of multi-SIM users and M2M connections, to track these services we would require a new set of metrics Metric suggested: Revenue Generation Unit, M2M ARP-SIM

5.1.2 Decline of Legacy Services and Legacy Metrics

An over-the-top player uses generic internet access to provide applications and content to the consumers, without further involvement from the underlying network provider. This allows the OTT player to bypass the Telco and reach the customer directly. OTT content the transfer of content such as video, audio or any other media over Internet, without an operator's involvement in the distribution or control of the content. The internet service provider might be privy to the content being

transferred but does not hold responsibility with regard to the scope of viewing, or the control of the copyright, distribution or redistribution. The content is provided to the OTT provider by a third party such as Now TV, Netflix etc. which is delivered to the device at the end user side. Thus the internet service provider's accountability is limited to transportation of the IP packets. The role of the mobile operators thus gets reduced to that of a "dumb pipe" wherein they bear expenses for providing the infrastructure, which is being used by the OTT providers for free to provide content to customers in order to generate revenue for themselves⁹. Hence mobile operators need to devise a strategy by which they will be converted to a "smart pipe" which help them to discover new revenue streams. The delivery of digital services by OTT providers, has brought about a major shift in the way information, communications and technology services are being consumed and delivered. The OTT player severs the connecting link between the service and the service delivery network. Under OTT conditions, voice and video services are no longer tied to any particular network¹⁰.

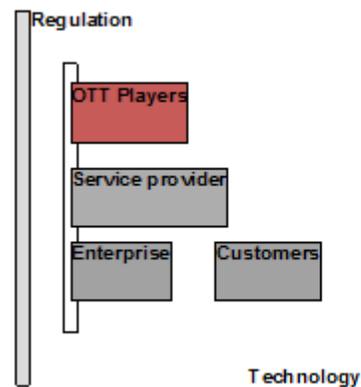


Figure 3. OTT ecosystem.

5.1.3 Decline of Legacy Services and Legacy Metrics

Voice services have been accounting for a major share of the Telco revenues, since their inception. It accounts for approximately 50%-70%¹¹ of the total revenues generated by the telcos¹². With the advent of VoIP services, there is a threat to this share of revenues as VoIP service providers and OTT players are able to offer these services virtually free, as they are just using the infrastructure provided by telcos, so they do not have any heavy investment in it. Thus the consumer would prefer using apps such as Skype,

Viber etc. as they do not charge per use if the consumer has activated a data pack. This gradual shift in the usage pattern of the consumer would affect the telcos heavily as the bulk of their revenue would shift towards data services, which are offered at a flat-rate in form of plans and data packs. Since in the current markets the telcos have not yet focused on the monetization of demand for data consumption and have focused more on anti-churn strategies. This has led to a commoditized value perception which has put the telcos in a fix, as this approach has been exploited by the OTT players to gain entry and expose the previously impervious services such as voice and messaging to cross industry competition.

5.1.4 Impact of OTT on Messaging Services

The impact of the OTT players and data services on the traditional messaging services has been devastating, as they have cannibalized the revenue generated from messaging almost completely. As applications such as Whatsapp, have made instant messaging a popular service, OTT messaging now is a significant threat to telcos' messaging revenues. In some markets, such as South Korea and the Netherland, OTT messaging has risen to such a high level that it is creating a material threat to SMS volumes and revenues¹³. As per the findings of a study conducted by Deloitte¹⁴, these OTT applications have become so popular that, in UK, it has resulted in the decrease of number of text messages sent from 152 billion in year 2012 to 145 billion in year 2013, which has never happened earlier in this country. Whereas, in 2013, the messages sent through internet applications has grown drastically to 160 billion over 57 million in year 2012.

5.2 Impact of Data Services on Customer Consumption Pattern

A primary research was conducted on a sample size of 200, to find out the customer consumption pattern of the sample size. And the below mentioned analysis is based on the responses gathered.

5.2.1 Data Usage

Inferences:

- According to the obtained data the largest bracket is 47% of consumers using data for 5 hrs or more, followed by consumers using data in the range of 2-5 hrs, which account for 28% of the total sample size.

- People who use data for 1-2 hrs account for 19% and the least share is of the users using data for less than 1 hr which amount to 6%.

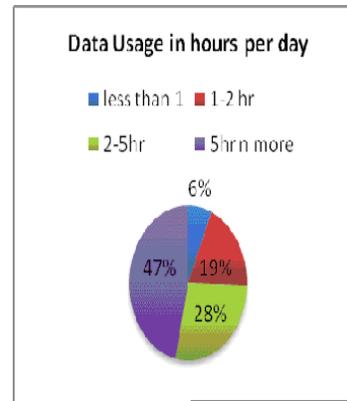


Figure 4. Data Usage in hours.

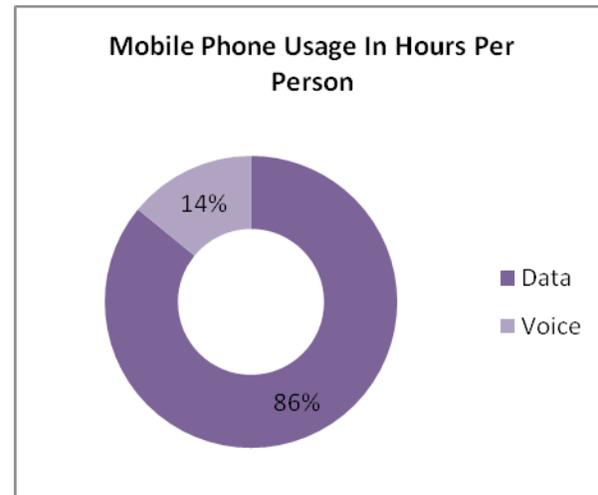


Figure 5. Mobile Phone Usage per person.

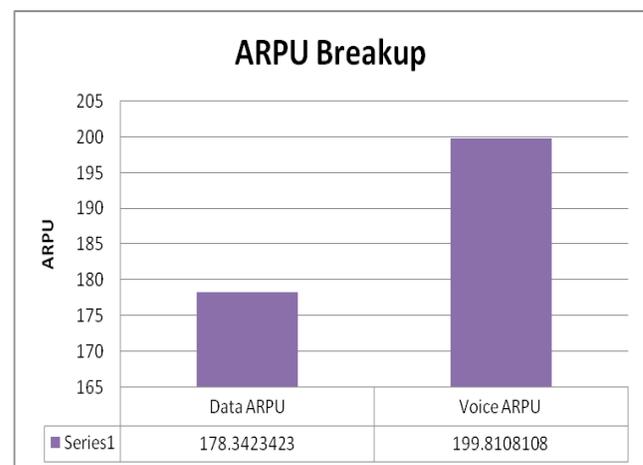


Figure 6. ARPU breakup of Voice and Data.

Inferences:

On further analysis we deduce that the Data ARPU is lower than the Voice ARPU. Thus the revenues being generated by the data usage is not corresponding to the usage of the data services which stand at a massive 86%. Hence as we can see that the data consumption is not yet returning revenue which is on par with its usage growth. And as per the graph given below we can see that the experience of a customer increases with increase in data speeds and it opens the door to a plethora of options such as video streaming, VoIP calls, fast multimedia exchange etc, which further drives up the data consumption. In year 2011, the overall margin earned by the telecom operators was estimated to be approximately 45-50%. However, despite the fact that usage of data services has increased immensely, and was expected to contribute to the revenue mix, it is estimated that overall margins of the operators may come down even below 45%¹⁵. This low return of data revenue despite such heavy usage is due to the defensive mindset of the telcos as their business strategies till now had mostly been focused to avoid and curb churn. This led to data services being offered at flat rates, fixed broadband, free upgrades, multi-play packages etc. This has led the customers into using ever larger amounts of data with very low incremental cost. This commoditized value perception of data services will hit the telcos hard in the long run. As the consumers start to move towards more and more data services with better internet speeds, there is a risk for the telcos of losing their voice service revenue to VoIP services, which bleed them significantly. Thus the operators need to take an urgent look at the issue and find out ways to monetize this growing demand for data usage. As the legacy voice service hits its maturity stage, the previously impervious services are now being dragged into cross-industry competition by the OTT players.

To address this growing concern of monetizing the increasing use of data services, there is a need to better understand the customer insights regarding the same. The consumers are exposed to a variety of choices, from gaming apps to information apps etc, apart from the regular instant messaging and VoIP OTT applications. Greater insights into what drives a customer's experience with data services will allow for better deals and strategies to drive up the revenues from data usage.

So now we have established the trend of growing experience of customers in relation to higher data speeds, we can safely assume that with introduction improved technology and the rapidly increasing smartphone penetration the data service are going to play a major role going forward for the telcos as the decline in legacy services becomes apparent. The telcos must act quickly to understand the customer insights and take appropriate measures to monetize this demand and also tackle the OTT threat from playing the role of a "dumb pipe" and convert itself to a "smart pipe". **This underlines the point that an average customer is consuming data service more than voice service by a high margin. Hence the tracking of data usage will gain importance to monetize the consumption of data services.** Metric suggested: Data Share of revenue, Data usage per user

5.3 Multiple Regression Analysis

Inferences:

Using Multiple regression we find that the positive trend in customer experience with improvement or upgrade in technology and hours of usage. R square shows that this regression model represents 99.6% of the data.

5.4 Factor Analysis

We carried out a factor analysis using the IBM SPSS modeler of the 18 parameters that we had highlighted for derived customer experience.

Inferences:

Here the parameters were divided into buckets on the basis of factor analysis.

- Bucket 1 (Applications) comprises of Application based performance and preferences (entertainment apps, information apps, gaming apps, communication apps, free apps). In factor analysis the closer the value is to 1, the more is the importance.
- Bucket 2 (Data Usage) comprises of factors of data usage (Coverage, Data Speeds, Data Connectivity, improved network)
- Bucket 3 (Tariffs) comprises of tariffs and offers (Lower tariff plans, Discounts and competitive offers, Relevant offers, Application specific plans, Customized data plans) Although according to the output Improved network is also included in this bucket but since it has a higher significance in bucket 2, it is considered to be a part of bucket 2.

- Bucket 4 (Billing) comprises of billing and customer care services (Unified data plan, Billing accuracy, Itemized bill, Device support).
The factor analysis shows that the Application and Data Usage buckets are the most important out of the four buckets representing the data obtained. Both the buckets deal with the factors affecting the data usage and application consumption pattern. Hence the fact that data services are playing a key role in customer experience is underlined.

6. Limitations of Legacy KPIs & their Metrics

Network Coverage: Network coverage is gradually losing its relevance as the smartphone penetration and innovation in technology has seen the, the developed markets being saturated and the emerging markets catching up at a rapid pace

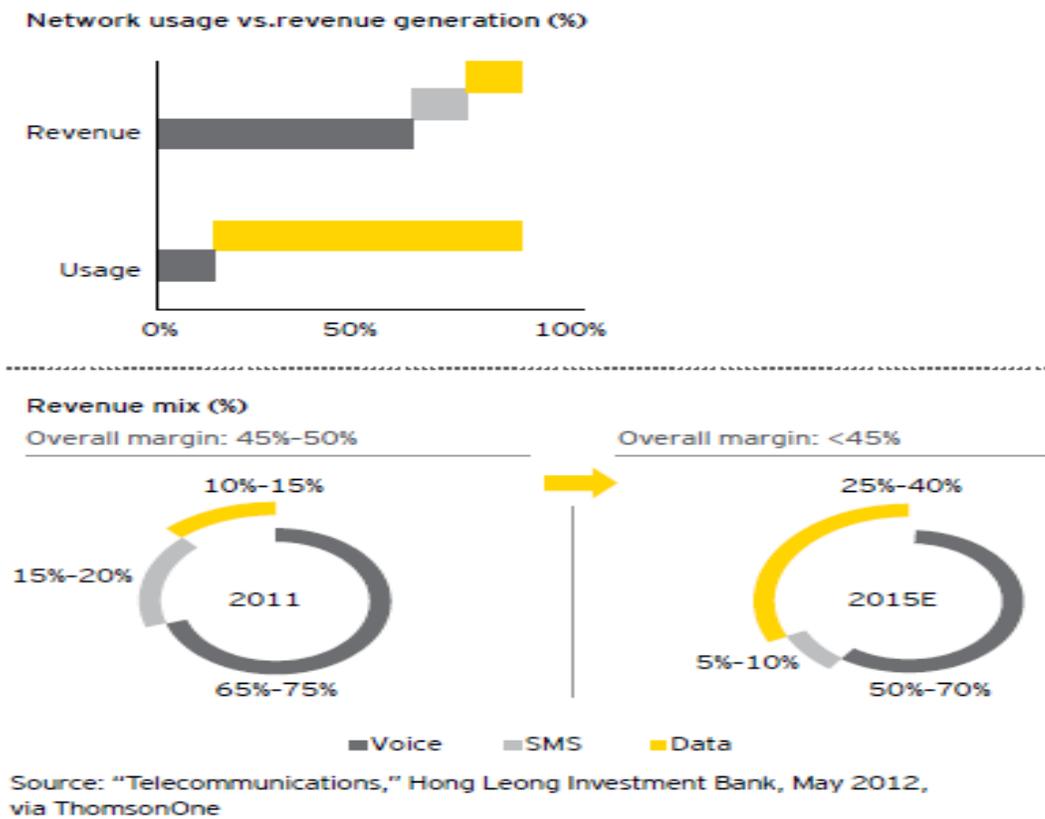


Figure 7. Data Usage and Revenue.

Table 1. Multiple Regression

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.998 ^a	.996	.988	1.95164

Table 2. Multiple Regression

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	858.139	2	429.069	125.145	.063 ^b
	Residual	3.429	1	3.429		
	Total	861.568	3			

A. Dependent Variable : Derived Experience

B. Predictors : (Constant),Technology, Usage

Rotated Component Matrix^a

	Component			
	1	2	3	4
I1		.852		
I2		.823		
I3		.792		
I4		.519	.422	
I5			.692	
I6			.758	
I7			.608	
I8			.671	
I9			.580	
I10				.402
I11				.825
I12				.743
I13				.682
I14	.727			
I15	.813			
I16	.775			
I17	.736			
I18	.714			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Table 3. Factor Analysis

Minutes of Use: (MoU) As and when the increasingly popular VoIP services achieve regular usage with the upgrades in technology leading to higher mobile data speeds, minutes of use will lose its relevance. Minutes of use do not successfully isolate the effects and consequences of the bundled packages and the flat-rate packages.

ARPU: Average revenue per user is already fading away as some countries have started to report ARPM (Average Revenue per Minute) or ARPA (Average Revenue Per Account). The multi-SIM users are distorting the definition of ARPU.

Net Mobile Connection Additions: The relevance of net mobile connection additions has been decreasing as a result of the decrease in number of new subscriptions in recent years. Majority of the upcoming connections are currently being generated by enterprise users, by users who are using more than one SIM card, and by Machine to machine connections, distorting the meaning of net addition.

Market Penetration: Initially it was designed to measure and represent the take-up of core services (voice and messaging) in the markets. These legacy market penetration metrics do not

successfully represent the full potential of the market for new services.

User: The concept of the “user” is a little blurred in the current evolving market environment and it needs to be revised in wake of current trends such as one person using more than one device and the growth of machine to machine connectivity.

7. Findings

According to the primary and secondary analysis carried out above in the paper we have arrived the following findings

- Data usage accounts for majority of the mobile phone usage (86% by primary data and 70% according to Hong Leong Investment Bank in 2013)
- The revenue by data usage does not correspond to its usage by the consumers (Rs. 178 by primary data analysis compared to voice ARPU of Rs. 199 and 20% according to Hong Leong Investment Bank in 2012)
- M2M data is set to rise in the coming years¹⁶ and multi-SIM users account for most of the new connections⁶.
- Customers experience increases with the increase in data speeds as shown above in the primary analysis

8. Proposed New KPIs & Metrics

To overcome the above mentioned limitations of the above mentioned KPI and metrics, we propose the following set of KPIs and metrics. Data Share of Revenue: As seen in the paper, data services are going to play an important role in the times to come and given their rapidly increasing rate of consumption, their monetization and scaling will play a major part for the telcos to measure their performance and revenues. According to the analysis of the primary data the data usage accounted for 86% of the total use to 14% of voice usage and generated an ARPU of Rs. 178 only compared to Rs. 199 generated by voice service. Thus with the shift in focus towards data services it will important to know how much data would account for the total revenue as from a support service it is moving towards being one of the major services.

Revenue Generation Units (RGU): With the expansion in the use cases of telecom infrastructure and market saturation, the reporting of the customers who are consuming more than one service is vital. RGU metrics can communicate multi-play and multi-screen take-up.

RGU will showcase a much clearer picture of cross-selling and up-selling of services by the telcos, whether they have been successful in selling such transactions and also communicate the number of services their average customer is consuming as a result. As mentioned above, with ARPU losing its relevance due to multi-sim users and telcos offering other services for alternate revenue streams, RGU will provide a more comprehensive scaling as it scales the user on the basis of number of services being consumed by the user instead of just the user. This would overcome the handicap of network coverage and ARPU metrics. It would also address the distorted definition of user.

Data Usage Per Subscriber: As the consumption of data services grow ever rapidly, with VoIP services primed to play a major role in the coming years, the MoU will decline in relevance and there will be a need to keep a real time check on Megabytes per user. With the focus shifting mainly towards data and growing consumption of OTT services and the need to monetize data as stated by Ernst & Young data usage per subscriber will be handy for billing purposes.

M2M ARP-SIM (Machine to Machine Average Revenue Per SIM): With M2M connections also increasing in number, it is important to scale the revenue generated per SIM in M2M environment. As mentioned in paper the cisco VNI report in 2014, M2M services are projected to grow by a factor of 10 in the volume increase it is important to have a metric to scale it.

9. Limitations and Scope for Further Research

There are many other KPI and metrics which should be developed in the light of shift of focus towards data services, but due to a limited sample size we could only arrive at the above mentioned KPIs and metrics. Thus these are addressing a more customer specific view of the shift. Further research can be carried out in terms of developing new business models based on the new KPIs and metrics and drafting new strategies for an environment where the voice services have matured and the data services are seeing a rapid rise and molding the entire industry around them gradually.

10. Conclusion and Managerial Implications

We have seen that a time when the telecom industry has to embrace a data services centric business model is not a far off situation, but one which may present itself in the near future and hence with the evolution of the business environment of the telecom industry, the KPIs

of the industry need to evolve as well to keep carrying out the task of scaling the performance of the industry. The new set of proposed metrics will allow the telecom managers to scale the usage of data and revenue share of the data services which will grow in the future.

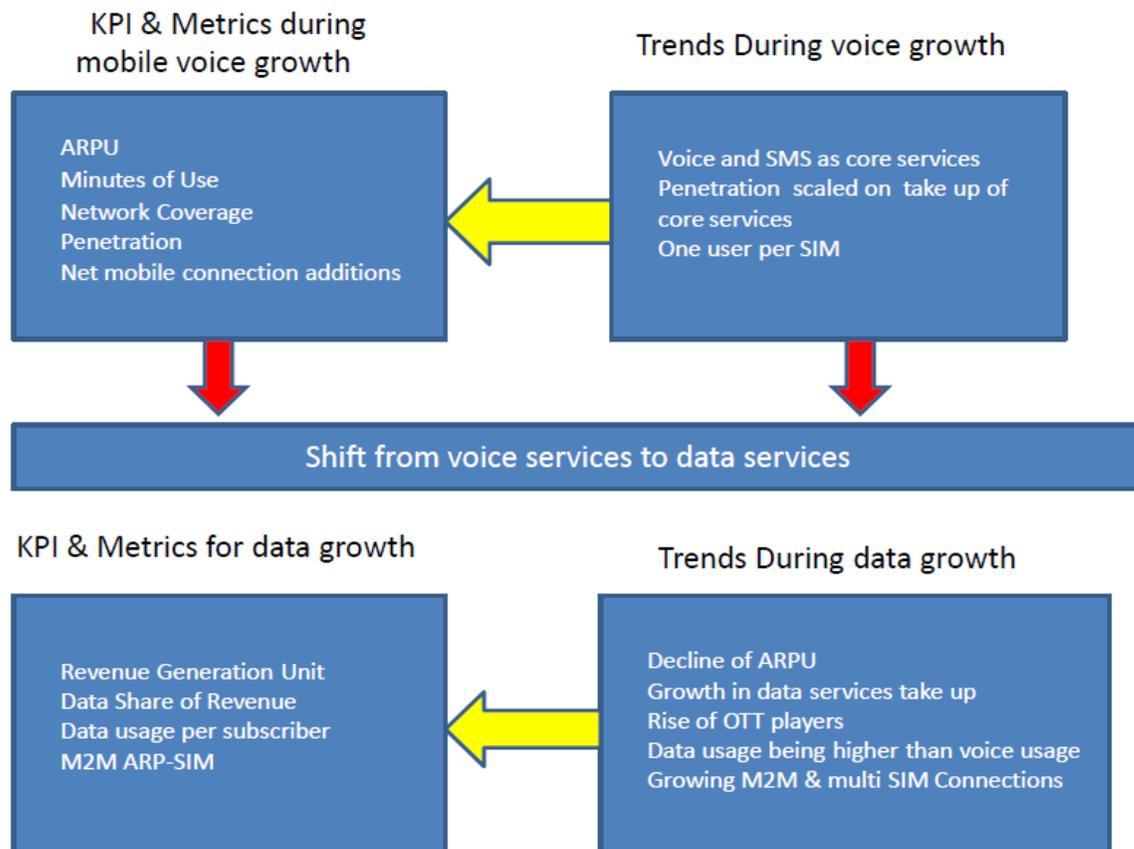


Figure 8. The shift in trends and evolution of KPI and Metrics.

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