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James Taylor
CEO

Beyond the Data Warehouse

Telenor Pakistan's journey into Advanced Analytics

Telenor Pakistan is the country's single largest European investor, with investments in excess of US\$2 billion. It acquired a GSM license in 2004, began commercial operations on March 15, 2005 and quickly became the fastest growing mobile operator in Pakistan.

Telenor Pakistan is 100% owned by the Telenor Group, an international provider of high quality voice, data, content and communication services. As the fifth entrant into Pakistan, with well established competitors, Telenor Pakistan knew that it needed an integrated view of the business to understand the market and unleash new opportunities for growth. It developed a vision for Business Intelligence at Telenor Pakistan: "Availability of actionable information for the right person at the right time while monetizing overall BI efforts by maximizing ROI and minimizing OPEX. "

The Business Intelligence Department at Telenor Pakistan developed a robust Teradata® Enterprise Data Warehouse or EDW that delivers a 360o customer view using data from multiple source systems. The sponsors for the EDW implementation at Telenor Pakistan always envisioned the EDW as a strategic platform and one that can provide a sustainable competitive advantage to Telenor Pakistan. After establishing this robust EDW and integrated BI platform, Telenor Pakistan went much further. Telenor Pakistan went beyond traditional reporting, extending their EDW to powerful commercial applications of analytics that were tailored for every business user and aligned with Telenor Pakistan's long term business strategy.

This case study highlights six of the more than a dozen customer intelligence applications running on the EDW. These applications use the Teradata infrastructure to meet Telenor Pakistan's strategic objectives. These applications include Magic Screen, Behavior Centric Routing, Campaign

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Management System, Real-Time Rewards, Churn Prediction and Behavioral Segmentation.

These applications do more than report, they intelligently route calls, drive cross-sell and up-sell, enable customer centricity in marketing strategies by grouping customers with similar behavior together, customize offers for each individual customer and target micro-segments, predict customer behavior and more. These customer intelligence applications are enabling Telenor Pakistan to rise to be the number one mobile operator in Pakistan.

“Cashing in on Proactive intelligence and predictive analysis is what will separate successful Telco’s from the ‘also ran’s’. All decent companies have access to data; converting it into actionable information is the key to success.”

Aamir Ibrahim , CMO

Introduction to Telenor Pakistan

Telenor Pakistan is the country's single largest European investor, with investments in excess of US\$2 billion. It acquired a GSM license in 2004, began commercial operations on March 15, 2005 and quickly became the fastest growing mobile operator in Pakistan.

Mobile subscriber penetration in Pakistan has grown from 8.3% in 2005 to 69.2% by the end of 2011. Telenor Pakistan, with over 28 million subscribers and 24% market share, is growing faster than the market and has surpassed 3 other competitors in the past 5 years to become the second largest mobile operator in Pakistan. In some places Telenor Pakistan is the only operator connecting the previously unconnected in remote areas.

Telenor Pakistan is 100% owned by the Telenor Group, an international provider of high quality voice, data, content and communication services in 11 markets across Europe and Asia and additionally in 19 markets through its 32% ownership in VimpelCom Ltd. Telenor Group is among the largest mobile operators in the world with over 140 million mobile subscriptions and a workforce of approximately 30,000 (end 2011). Telenor Pakistan won Most Preferred Employer (across all industries in Pakistan) from Pakistan's no.1 online job website www.Rozee.pk in 2009 and won PSHRM's (Pakistan Society of Human Resource Management) “Best Place to Work Award” (across all industries in Pakistan) in 2010.

BI and EDW at Telenor Pakistan

The Business Intelligence Department at Telenor Pakistan has developed a robust Teradata Enterprise Data Warehouse that delivers a 360° customer view using data from multiple source systems. The sponsors for the EDW implementation at Telenor Pakistan always envisioned the EDW as a strategic platform and one that can provide a sustainable competitive advantage to Telenor Pakistan.

Nearly 1,100 people (from groups as diverse as marketing, finance, technology, sales, IR, VAS, logistics, safety & security, regulatory, call center agents and vendors) at Telenor Pakistan use the EDW. Analytic models and segmentation, location intelligence, OLAP, dashboards and more each have their user communities. A 105TB installation with over 90TB of business data, the EDW has data from 37 source systems. 95% of this data is updated on a daily or better basis representing about 250GB every day - and 40% of this is updated intra-day. Information on 49M subscribers since inception is stored including 28M subscribers from the most recent months and more than 400M new records are added to the EDW every day.

“We wanted to reduce the time to collect and organize data and maximize the time we can spend on analyzing the data to gain insights. Teradata has helped us do just that ”

Karl Erik Broten , CFO

The BI department at Telenor Pakistan won the “Best Data Warehouse in the World” award from TDWI in 2009. In 2010, the BI department at Telenor Pakistan won the “Best Practice Global Award on Enterprise Wide Commercial Use of Business Intelligence” from TDWI.

After establishing a robust and integrated EDW and a BI platform, Telenor Pakistan went much further. Telenor Pakistan went beyond traditional BI, extending to powerful commercial applications of analytics that were tailored for every business user and that aligned with Telenor Pakistan’s long term business strategy. This case study highlights six of the more than a dozen commercial applications that use the Teradata infrastructure to meet strategic objectives. These applications include Magic Screen, Behavior Centric Routing, Campaign Management, Real-Time Rewards, Churn Prediction and Behavioral Segmentation.

Background

When Telenor Pakistan was launched in 2005, it had a basic reporting data warehouse developed by Accenture using Oracle and BusinessObjects. It used to accumulate only basic information on traffic, revenue and activation. Separate data marts to store other critical information such as recharges, interconnections, and prepaid SIM sales commissions etc. coexisted with the data warehouse. This met the

requirements for basic essential reporting but did not provide the actionable insight at the heart of Telenor Pakistan's vision for Business Intelligence:

“Availability of actionable information for the right person at the right time while monetizing overall BI efforts by maximizing ROI and minimizing OPEX.”

There were several specific shortcomings that led the management to opt for a robust, scalable and efficient data warehouse that would help realize the vision for Business Intelligence. According to Shahid Hussain, Head of BI Governance, the requirements for such a data warehouse were as follows:

- ▶ Scalable architecture to support growth and demand from internal users.
- ▶ A flexible architecture to answer today's questions and tomorrow's.
- ▶ Complete and detailed information from all business subject areas.
- ▶ Near real-time updates of information to enable active decision-making.
- ▶ Highly accurate data that can be stored once and used many times.
- ▶ Quick access to information

An RFQ was issued and, subsequently, Teradata was chosen to implement Telenor Pakistan's EDW

A year after launch of Telenor Pakistan, the data had started migrating from the old system into Teradata.

Implementation and results

The Teradata EDW replaced an existing data warehouse and this presented synchronization challenges as the new data warehouse replaced the old. The combined Telenor Pakistan/Teradata team delivered the migration with a clear vision, detailed planning and by focusing on moving urgent structured reporting while keeping changes to the data warehouse layer of the architecture as transparent as possible

Telenor Pakistan and Teradata jointly developed an initial EDW roadmap that focused on bringing traffic, charges, subscribers, sales and network data into an integrated environment. Integrating this data, and bridging technical and business requirements, was greatly aided by the use of Teradata's Communications Logical Data Model (cLDM).

“A comprehensive ETL approach was needed to handle large amounts of daily and intra-day data and a broad set of initial reports were developed to cover all the included sources and relevant business requirements”

Asad Khan, Head of BI Planning & DWH Operations

This roadmap was turned into a multi-phase implementation approach that the combined team followed almost exactly to deliver the envisioned solution.

“This infrastructure underpinned a robust set of daily analytical reports. These were made available to users for specified measures and dimensions while allowing the flexibility to include other information and drill into the details within the EDW”

Farrukh Aziz , Head of Business Analytics and Consumer Insights

The infrastructure also allows for a large number of ad-hoc reports. This laid the groundwork for going beyond traditional BI, adding advanced analytics and specific data-driven business functionality.

“Knowledge is often mistaken for intelligence. In the Business Analysis and Consumer Insights team we try to extract the insights out of knowledge. We provide real value to our internal customers that translates into monetary benefits after action is taken on them”

Farrukh Aziz , Head of Business Analytics and Consumer Insights

Reports for the whole organization

The regular and ad-hoc reports are used by almost all the business users in the organization including people in the following teams:

Prepaid Segments & Pricing	Postpaid
Mobile Number Portability	Sales & Distribution
Financial Services	Value Added Services Planning and Operations
Customer Relations Department	Marketing
Product & Services	Micro Segmentation
Advanced Analytics & Research	Business Planning & Analysis
Accounts	Revenue Assurance & Credit
Taxation	Financial Operations
Fraud Management	Public & Government Affairs
Regulatory	Long Distance International (LDI)
Interconnect	Intelligent Network (IN) Operations
International Roaming (IR)	Data/LDI Network Services
IN Planning	Base Station Subsystem (BSS)
Information Security	Transmission Operations & Maintenance
Logistics	Safety & Security

Customer Intelligence Applications

More than a dozen customer intelligence applications have been developed on the Teradata platform. These systems do more than report, they intelligently route calls, drive cross-sell and up-sell, enable customer centricity in marketing strategies by grouping customers with similar behavior together, customize offers for each individual customer and target micro-segments, predict customer behavior and more. Thanks to these customer intelligence applications, the Telenor Pakistan call center moved from being a cost center to being a driver of revenue growth. These customer intelligence applications are enabling Telenor Pakistan to rise to be the number one mobile operator in Pakistan and stay there.

“The ability to focus attention on important things for the business is a defining characteristic of business intelligence.”

Rizwan Fazal , Director Business Intelligence

Applications powered by EDW

Magic Screen

Situation

Telenor Pakistan gives agents incentives to sell products to customers when they call in for customer service. Revenue from these products has higher margin than the core voice products for which competition is intense. By cross-selling additional services the call center is transforming itself from a cost center to a revenue center. The primary focus of Customer Relationship Officers (CROs) in the call center remains customer satisfaction, but CROs are incentivized to also generate revenue.

With no control over how or when these products were presented to customers, however, Telenor Pakistan found that customers were being pitched products they had repeatedly declined while others were not pitched products that they were/could be interested in. In addition, many agents decided which product to discuss almost randomly, resulting in poor acceptance rates. To make matters worse, sales were tracked in spreadsheets so that the agent could claim commission and this represented a significant investment in reporting and tracking.

To address these challenges, Telenor Pakistan launched an internal project named “Magic Screen”.

Solution

Magic Screen brings together customer data, CRM functionality, business intelligence and data mining in a single view. With Magic screen, CROs have access to a highly customizable, portlet-based environment through which multiple departments can help customer representatives better serve customers.

Portlets in Magic Screen deliver value to CROs in multiple ways. Some display the results of data mining used to determine the behavioral group the subscriber belongs to or the churn probability of the customer, others display cross-sell and up-sell opportunities for the current customer based on behavioral analysis done on a weekly basis by BI team. Some display elements of the 360° view of the customer such as historical usage while others display offers made previously that are recorded by the campaign management system and fed to Magic Screen periodically. Call scripts can appear and provisioning portlets can be opened when a customer agrees to purchase a new product or service. Agents can now determine how best to handle a customer at a glance. In particular, they can easily identify the right VAS to pitch to the customer.

Flexible and portlet-based, Magic Screen can be expanded easily to support new products and services, new information sources and new advice to the Agent. The delivery of up-sell offers directly to call centers agents based on a complete understanding of the behavior patterns of customers, and what those patterns mean, was not previously possible. The Teradata EDW makes it possible to deliver this information to the operators quickly and effectively during a call using Magic Screen. Below is a screenshot of Magic Screen in action for a live customer. Subscriber details have been omitted for privacy.

Figure 1: Magic Screen In Action

The screenshot displays the Magic Screen interface with several portlets:

- Customer Info:** Shows fields for MSISDN, Name (SME/FAMILY TP IT (CONTRACTUAL)), Package Plan (Official), Document Number, Status, Chaseable Amount, Bonus Min Account, Segment (SME/Family), Revenue Profile (High), and SMS Bonus Account.
- Usage History:** A table with columns for Usage, Value, Usage, and Value. It displays "No Usage History Data Found".
- VAS Activation:** A table with columns for Product, Amount, Status, Activate, Deactivate, Re-Activate, and Fetch. It lists products like PRBT, MCA, PassLoad, Cricket Alerts - Weekly Package, Cricket Alerts Monthly Package, and Call Screening.
- Upselling Camp:** A table with columns for Campaign Offer, Status, Accept, Reject, and Comments. It displays "No Upselling Data Found".
- Change Package:** A form with a "Change Plan" dropdown, a "Package Plan" dropdown (with "Select PackagePlan" button), and a "Status" field.
- Active VAS:** A table with columns for Product, Provisioning Date, and Expiry Date. It lists "Call Forwarding" with a provisioning date of 2012-03-22.
- SR Transaction:** A table with columns for SR ID, SR Work Code, TAT, Created Date/Time, Current Status, Sub Status, and Detailed De. It displays "No search made yet".
- Bonus Posting:** A form with a "User is not assigned to any group" message.
- SIP Transaction:** A table with columns for Creation Date/Time, Created By, Group Name, Order Reason, Transaction id, and Status. It displays "No search made yet".
- Refill Posting:** A form with fields for Refill Type, Refill Value, No. Of Refills to Post of Purchase, Total Refill Value, and Status. It includes a "Submit" button and a table with columns for Amount, Refill Value, Status, creation date, last_updated, User ID, and Comments.
- Comment Box:** A form with a "Comments" dropdown, a "Template" dropdown (with "Select Template" button), a "Comment" text area, and a "Status" field. It includes a "Submit" button and a table with columns for Template, Comments, Date, User ID, and Role.
- Running Camp:** A table with columns for Running Campaign, Campaign Offer, Start Date, and End Date. It displays "No Running Campaigns Data Found".

Results

Results have been impressive. Magic Screen has reduced the average handle time of calls by about 5 seconds while contributing directly to an increase in VAS revenue of about 0.55%. The increased efficiency of working with Magic Screen allows agents to handle more customers while providing a complete history of the actions they take so that commissions can be calculated directly from the system. Magic Screen is very customer centric as offers match customers' interests more closely. The data collected about which customers buy which VAS products has given Telenor Pakistan insight into the trends and capacity needs for products. Several products, such as Multimedia Message Services (MMS), have required capacity upgrades as

Magic Screen's ability to focus agents on pitching these services to the right people has resulted in dramatic increases in popularity. In addition to call center, Magic Screen has also been implemented at Telenor Pakistan's Sales and Service Centers (S&SCs).

Magic Screen has been a clear success. It has shown Telenor Pakistan that sometimes it is just a question of pitching the right product to the right customer.

Behavior Centric Routing

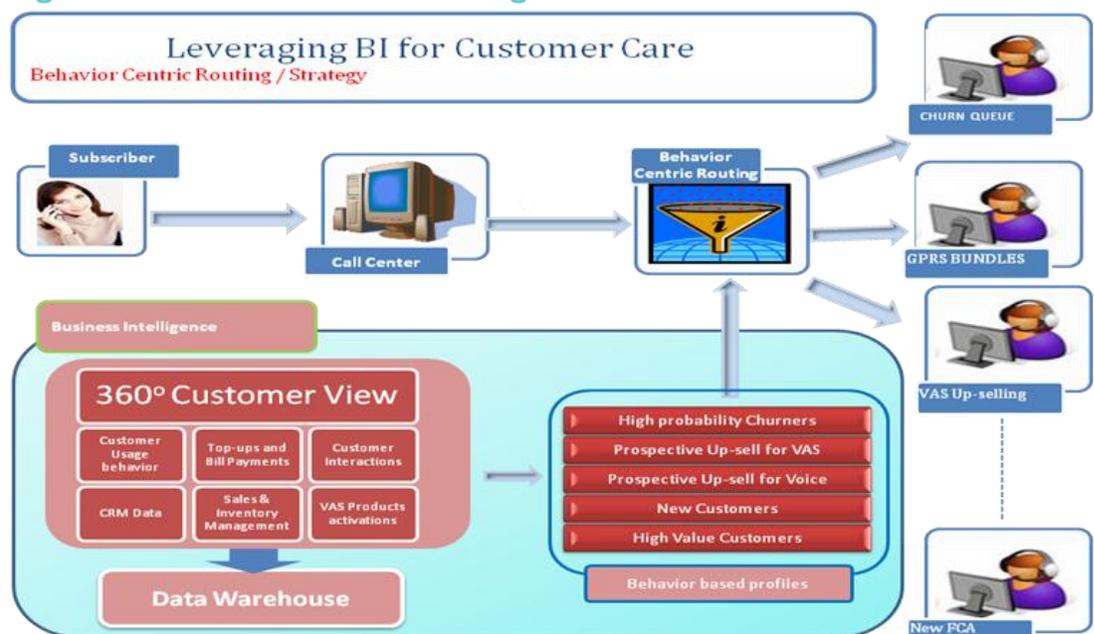
Situation

Telenor Pakistan, like almost all companies, was using very basic criteria to route calls in its call center. This simplistic model resulted in high value customers and customers who were thinking about leaving (high churn risk customers) being sent to regular agents and made it hard to direct calls to specialty agents.

Solution

Telenor developed a customer scoring scheme that scored each and every customer based on a host of criteria. This compound score reflected a customer's overall relationship with and value to Telenor Pakistan. Using this score they were able to identify those most at risk of churning, high value customers, and those considered to be good targets for up-selling voice products or cross-selling VAS. This business-oriented segmentation was then used to route callers to the right kind of agent – one trained in selling a specific product such as Ring-Back Tones for instance.

Figure 2: Behavior Centric Routing Architecture



Results

The routing is algorithm based on business rules and thresholds. This decreases human intervention leading to lower IT costs. Churn probabilities are calculated every month for every customer. Customers are then allocated to a micro-segment that determines which retention initiative to apply.

Originally only life-time revenue and service plans were used to route calls. Moving forward Telenor Pakistan is experimenting with techniques to identify potential revenue generating customers and their propensity to buy and plans to route using those criteria also.

BCR has changed perceptions—it had previously been thought that only a few select products were worth cross-selling but now Telenor Pakistan has data showing that other products can be effectively cross-sold in the right circumstances. Dynamic Interactive Voice Response (IVR) is also planned that will use a subscriber's profile and predictions about them to drive a customized IVR menu for each customer, further enhancing the customer experience and the effectiveness of BCR.

A combination of BCR, targeted SMS marketing using micro-segmentation and some above the line campaigns have reduced net churn of Telenor Pakistan to lowest in the industry.

Campaign Management (Micro-Segmentation)

Situation

With a sharp decline in ARPU due to a fierce price war, Telenor Pakistan was forced to look for stealth marketing methods. Driven by its strategy of becoming customer centric, it adopted targeted marketing using SMS/automated voice calling. The complete customer lifecycle was managed in this way by engaging customers early on, educating customers to maximize benefits during the growth stage, keeping them satisfied through the maturity phase and working to retain customers if they entered the decline/defection stage.

This was easier said than done since this required a robust campaign management system that would close the loop of customer interaction. Before the campaign management system was put in place it took a long time to obtain relevant information about subscribers and to slice and dice the subscriber base to create target and control groups. Most of the time this resulted in subscribers receiving offers that may have been relevant two weeks previously but isn't anymore. Furthermore, after the campaigns were sent, there was no tracking of how many and which campaigns had been sent to a subscriber. This resulted in the same offer being sent twice to some subscribers.

Solution

Telenor Pakistan uses SAS Campaign Management to run all of their below-the-line campaigns, and the SAS suite uses Teradata as its base to extract and store data. Most of the campaign design and execution leverages Teradata and campaign management also leverages the in-database synergy between SAS and Teradata to provide fast, integrated execution.

Results

One campaign delivered a 10% increase in Smart Tunes revenue between September and October 2011. This was achieved by correctly identifying a bigger pool of prospective subscribers to Ring Back Tone with an additional focus on activations of new content through SMS.

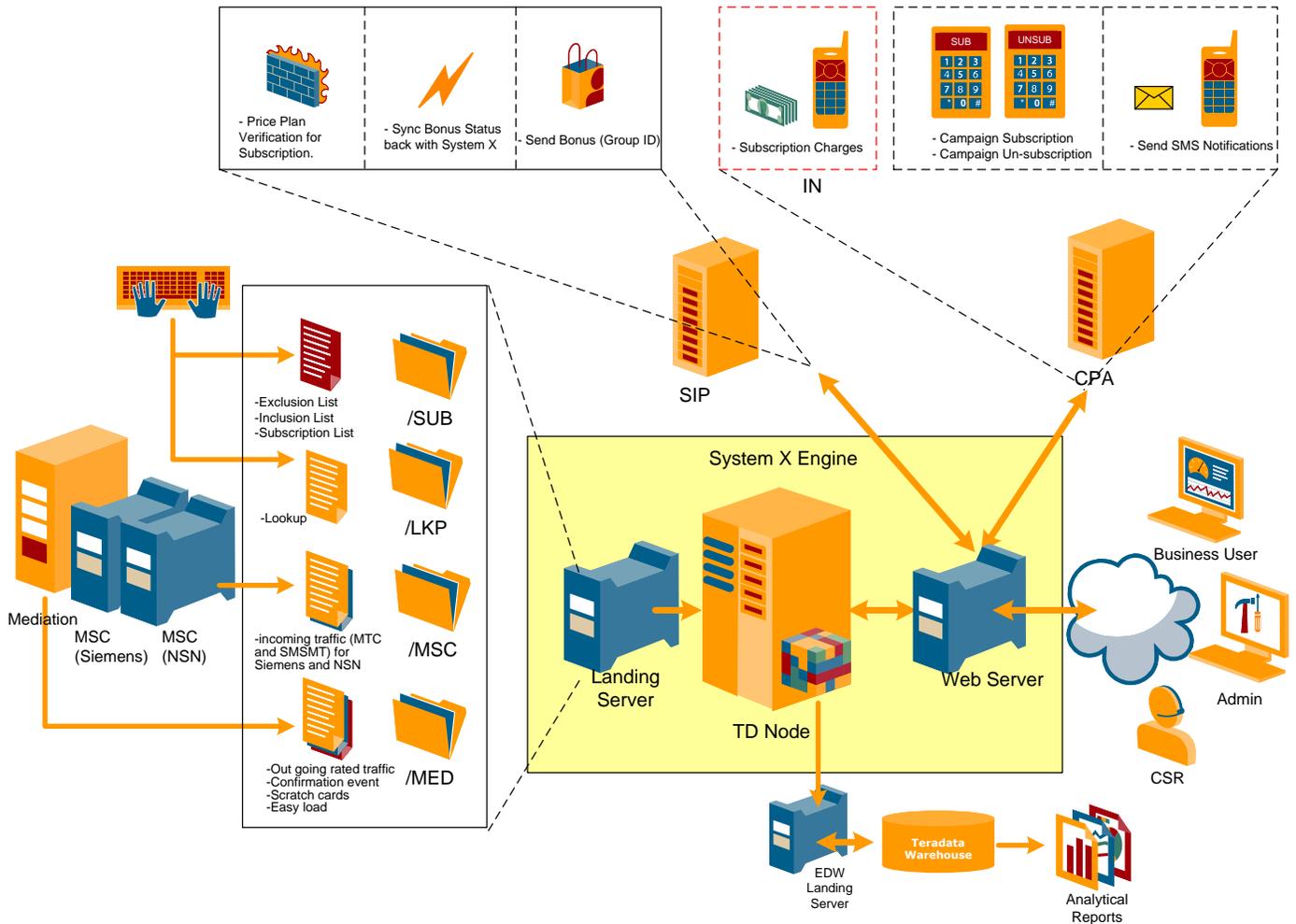
Real-Time Traffic and Reward**Situation**

Telenor Pakistan delivers offers and incentives to customers as they use the network. For instance, if a customer uses messaging more than a certain amount in a month they get a bonus in terms of cheaper messages the following month or even a free message to use this month. To configure these near real-time offers required Telenor Pakistan to work directly with their network service vendors to set up campaigns. This meant that campaigns were costly to develop and hard to change. It also meant that there were very restrictive in terms of what could be monitored and used as the basis for a reward.

Solution

Targeted at pre-paid and data plans, System X was developed to allow the Marketing department to rapidly and easily define incentives to be offered to customers in near real-time. Teradata ensures that data from incoming and outgoing voice calls, all SMS messages, pre-paid vouchers and even the call detail record (CDR) is available to the campaign designer. Individual and combined criteria can be defined by the Marketing department to use this information and then, in near-real time, offer incentives to customers. The system relies on Teradata to track customer behavior once they accept or are awarded the incentive and bonuses are awarded automatically. Other than the design phase, the entire process has no manual intervention.

Figure 3: System X Architecture



Results

“ The lead time for a campaign has dropped almost to zero – Marketing can define and implement the campaigns it wants, when it wants them ”

Usman Javaid , Director of Marketing

The Marketing department can change and update them as necessary and all the tracking and management is automatic. Thanks to the Teradata EDW, campaigns can be defined based on potentially complex combinations of behavior, letting Marketing target exactly the behavior it wants. Giving bonuses for targeted behavior in near real-time improves retention, usage and revenue across the entire customer base.

The ROI for System X is very strong. Not only has the cost of developing and modifying campaigns been dramatically reduced, the new campaigns can be across multiple services for the first time. Such cross-service campaigns and the ability to

rapidly create and modify campaigns are a source of competitive differentiation for Telenor Pakistan in the competitive prepaid market.

Initially the bonuses were awarded through the provisioning system but the Marketing department has started using SMS for bonus notification so that cross-sell and up-sell can be integrated into the bonus awards – taking more advantage of existing investments in analytics for cross-sell and up-sell. In addition Telenor Pakistan has acquired a micro-finance bank and has integrated financial services offerings. Campaigns can now be developed to offer rewards to customers who use telecommunication and banking services or to cross-promote these services by awarding them as bonuses.

Churn Prediction

Situation

In an effort to manage and decrease churn, Telenor Pakistan's business intelligence team conducted some analyses to identify drivers of churn. They found that at times before churning, subscribers exhibit a change in behavior that is indicative of churn. However, the intensity of change and types of changes in behavior can at times be difficult to gauge with reasonable certainty. Sometimes these can even be conflicting in different groups of customers, for instance some subscribers may make a lot of calls before churning while others may decrease the number of calls they make. Telenor Pakistan adopted data mining techniques to quickly identify probable churners and act to remove their desire to churn and incentivize them to stay with Telenor Pakistan.

Solution

Teradata was hired to deploy churn prediction models. The models deployed by Teradata are unique churn models based on over 600 variables targeting high- and medium-value prepaid customers as well as the whole postpaid customer base.

“Teradata's tool-independent approach allowed Telenor Pakistan to leverage on the right tools necessary to gain the relevant advantages. The Teradata Warehouse Miner tool was used to design the Analytical Data Set (ADS) while SAS Enterprise Miner was used to create logistic regression based models”

Usman Tariq Qazi , Head of Advanced Analytics

The ADS is stored in the Teradata EDW, which allows the models to be updated and executed frequently.

Results

As an example, throughout 2010 the high-revenue prepaid churn prediction model kept accurately predicting actionable churners in the top 25,000 customers with 29% accuracy. Compared with a control group, this model allowed Telenor Pakistan to successfully retain an additional 1% in a month through below-the-line campaigns.

Behavioral Segmentation

Situation

“Behavioral segmentation took our understanding of the consumers to a new level and resulted in more efficient micro segmentation campaigns. Combining behavioral segments with market research on each segment allowed us to combine mobile usage behavior with the lifestyle of the consumer which helped in designing effective offers”

Hammad Kabir , Head of Mass (Prepaid) Brand Talkshawk

Before behavioral segmentation was implemented in Telenor Pakistan the Marketing team always wondered if there could be a better way of segmenting the prepaid subscriber base (which constitutes 99% of the base) instead of just using two brands (Talkshawk and Djuice).

“When we talk about usage based segmentations, historically there were several segmentations based on 1 or 2 metrics like recharge or monthly subscriber revenue but there was nothing before behavioral segmentation that would take into account all aspects of a subscriber including cellular usage behavior as well as demographics.”

Khawaja Shariq Mustafa , Head of Youth (Prepaid) Brand Djuice

Solution

SAS was contracted to build a behavioral segmentation that would segment the Talkshawk and Djuice base into like-minded people. This would allow the respective brand managers to identify which groups of their subscribers are behaving in line with the brand’s unique selling proposition so that they can be treated differently from those who are misfits and probably should be invited to move to the other brand to increase or maintain their satisfaction with Telenor Pakistan. The solution brought by SAS is built on the K-means clustering algorithm, and usually results in 14 to 16 segments each of Talkshawk and Djuice. This number is manageable but at the same time does not force merger of groups with starkly distinct behaviors.

Results

“We have re-aligned our below-the-line campaigning strategy using behavioral segmentation”

Muhammad Harris, Head of CLM in BI

The insights obtained through behavioral segments and their elaborate profiling of subscribers (that includes demographic information obtained through market research) has been a real eye opener for the brand teams. A couple of recent brand repositionings took behavioral segmentation into account before reaching a decision, e.g. Talkshawk’s “Baaton baaton main” campaign.

“Now, every month, the current subscriber base is scored on the basis of a recently developed behavioral segmentation model, and the micro-segmentation team uses this as a jumping platform to build more targeted campaigns with greater speed and with greater chances of success”

Usman Tariq Qazi, Head of Advanced Analytics

Figure 4, Figure 5 and Figure 6 are screenshots of a segment from one of the first segmentations done in 2010 comparing the segment with the base. Figure 7 further describes the customers in an actionable format. Some sensitive information has been either omitted or replaced with XXX.

Figure 4: Basic Voice, VAS and Revenue profile

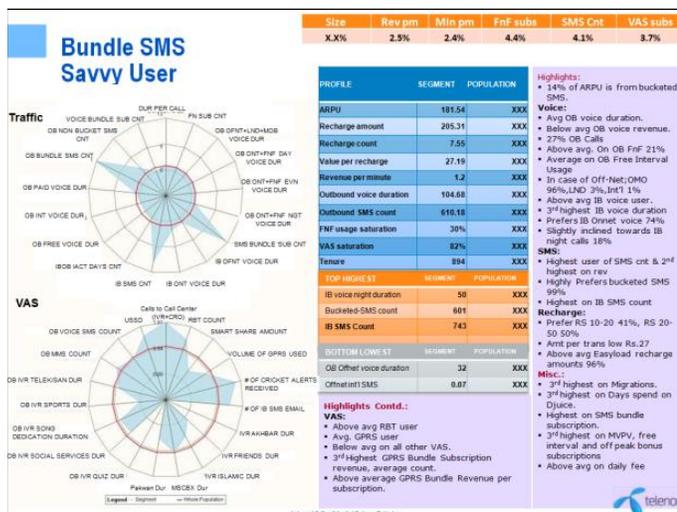


Figure 5: Detailed profile with Share of wallet, Region International calling, etc.

