



mobileum

Action driven by intelligence

Deep Network Analytics - DNA

Portfolio

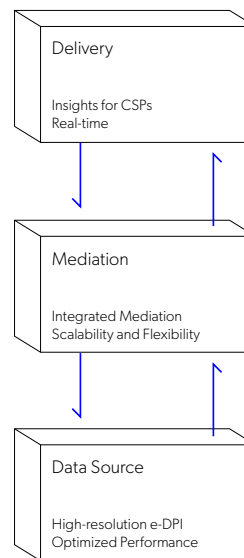
 **testing,
assurance
& observability**
POWERED BY MOBILEUM

Produce insights while analyzing data traffic in massive networks

Mobileum Deep Network Analytics (DNA) technology is a full-stack proprietary deep network analytics engine that processes high volumes of rich data streams, providing unprecedented depth, real-time oversight, scalability and efficiency. This end-to-end technology stack is purpose-built from ground-up for a seamless value chain of data extraction, interaction, mediation and visualization. It puts data in your control, whatever your organization's data requirements may be, and overcomes the integration pitfalls currently faced by telcos that use fragmented, multi-vendor generic, legacy big data tools.

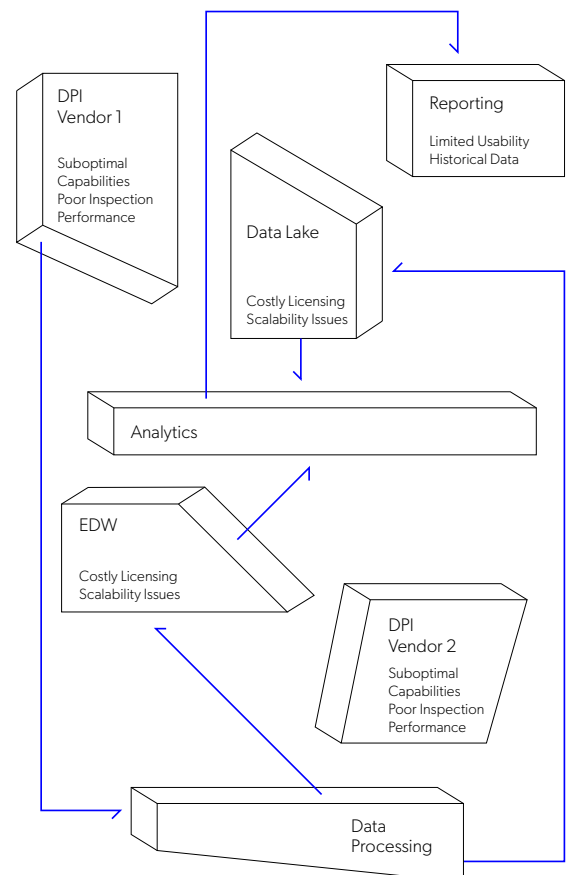
MOBILEUM APPROACH

Vertical Specialization for Network Analytics

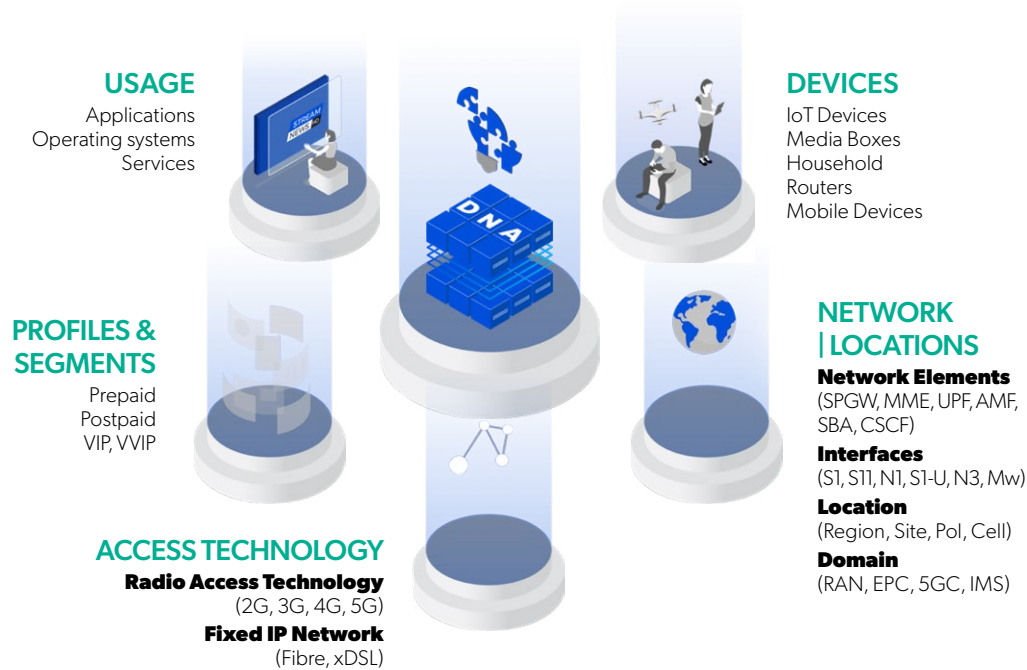


TRADITIONAL APPROACH

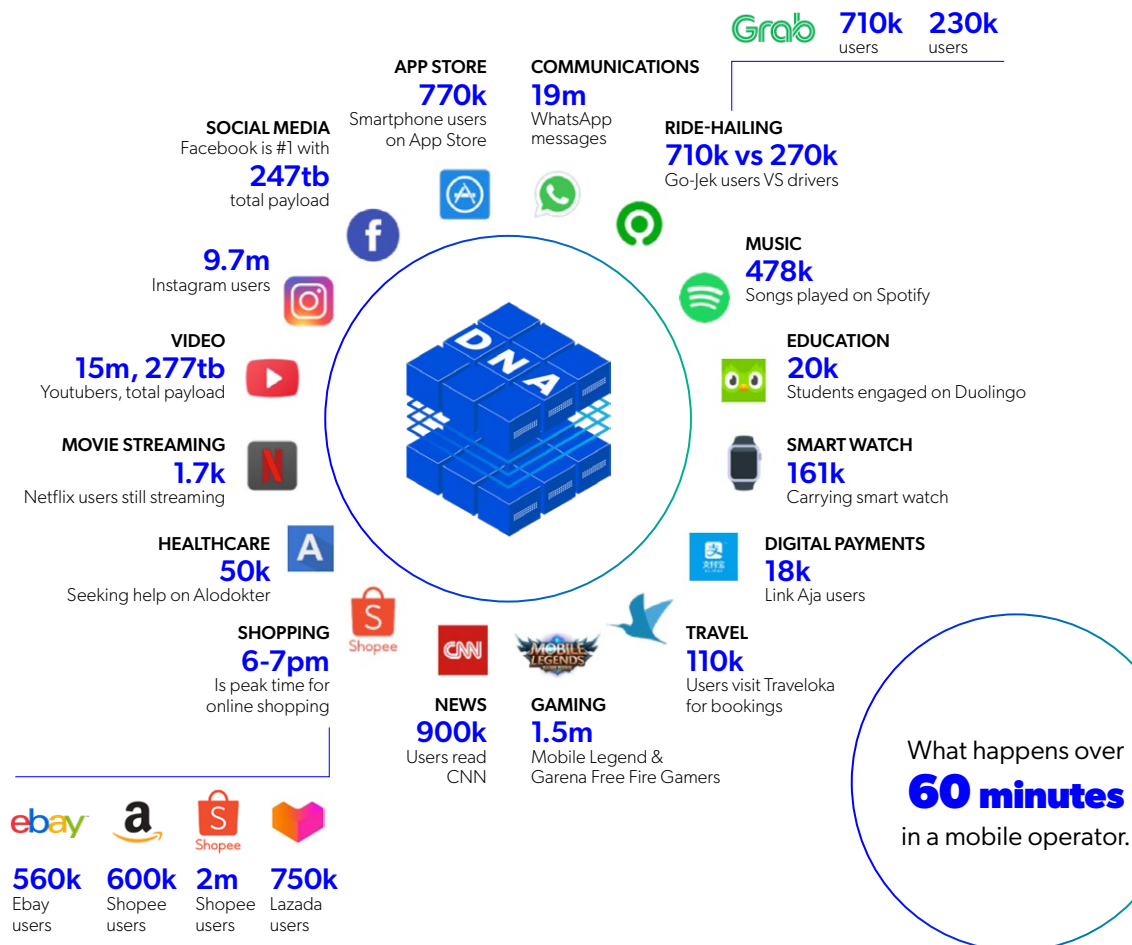
Multi-Vendor and Fragmented Systems



The insights produced by Mobileum DNA are granular and multi-dimensional



Mobileum DNA generates a comprehensive picture on all end-users' interactions with data applications





The key differentials of our technology:

1

Big data, small footprint

Data-intensive experiences are going to drive data traffic at exponential growth rates. Infrastructure costs do not need to commensurate with data traffic growth.

- Scalable with 80% lower hardware footprint
- Process up to 160Gbps per 2U node vs. next leading provider (40Gbps)
- Full-stack and fully-integrated from data source inspection to data mediation to insights delivery

2

Deeper data discovery

Surfaces more and deeper dimensions of data than any others in the Deep Packet Inspection (DPI) industry.

- >28,000 Applications & Components detected versus next leading provider (3,000)
- >30,000 models of devices and IoT sensors detected
- >15 million domains captured
- Localized signatures for each country market

3

True real-time analytics

- Live event indexing of 1 million inserts per second per node vs. next leading provider (0.5 million)
- Streaming indexing and aggregation of up to 1 million events per second per node
- Up to 600MB per second of data processed in 1 pass
- Less than 100ms for retrieving digital user activities; scalable to thousands of concurrent access as required

Mobileum DNA Drives Two Major Use Case Families In Network Operators: Network And Business

NETWORK

to enable the delivery of better and more efficient connectivity services

- **Network and service assurance**
- **Application analytics**
- **Customer experience management**
- **Network CAPEX/OPEX rationalization**

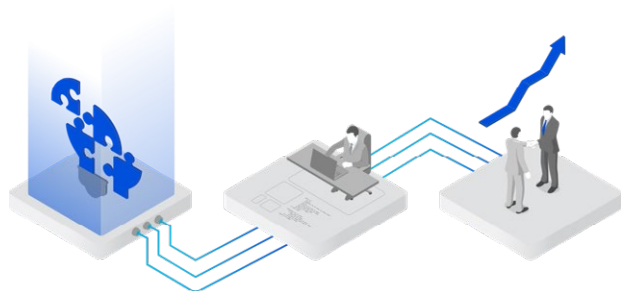


Deliver better network connectivity and achieve higher customer satisfaction

BUSINESS

to enhance customer value development and digital initiatives

- **Segmented marketing and sales**
- **Personalized end-user engagement**
- **Digital partnerships**
- **Data Monetization**



Analyze online behaviors and achieve higher returns from business plans and campaigns

Mobileum DNA possesses extensive technological capabilities for full-suite servicing of Communications Service Providers

Chief Technology Officer

Network Operations	Network Analytics
Network Operations	Mapview
Network Operations	Alerts
Network Service Quality Management	xAnalyser
Network Service Quality Management	Tracing
Network Service Quality Management	5G IoT Operator
Special Projects	Event Analytics

Chief Financial Officer

Fraud Protection	Fraud Management
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Chief Information Officer

Data Protection Office	Crypto-ID
Info Security	Access Rights Control
Info Security	User Monitoring

Chief Commercial Officer/ Chief Sales Officer

Sales	Digital Leads Generator
Sales	Home Analytics
Customer Care	Subscriber Care
Customer Care	Crisis Centre
Enterprise Account Management	5G Edge Analytics

Chief Marketing Officer/ Chief Digital Officer

Core Product	Explorer & Periodic Reports
Customer Lifecycle Management	Subscriber Churn Prediction
Marketing Campaigns	Intelligent Triggers
Customer Experience	Video Streaming Analytics
Customer Intelligence	SuperApps Intelligence
OTT Content	Digital Content Intelligence
IoT	IoT Device Analytics



Video Streaming Analytics

**A MACHINE LEARNING SOLUTION
TO UNDERSTAND AND MONITOR
YOUR SUBSCRIBERS' ONLINE VIDEO
EXPERIENCES**

Leverage machine learning to deduce video streaming KPIs

Video Streaming Analytics is a solution that computes Video KPIs, such as resolution, initial buffering time, and stall events, by employing machine-learning algorithms. With these KPIs, your network teams can monitor and analyze the QoE of the video streaming services delivered through the network. Video usage statistics and KPIs are presented in near real-time and historically, within a dedicated workspace that allows your network teams to observe trends and analyze deviations.

Normalize the definition of video quality with a single metric

With the availability of video KPIs, Mobileum has defined and converged on a single metric that normalizes the definition of video quality: the video Mean Opinion Score (vMOS). It is the unitary quality indicator, built up from video KPIs, that allows network teams to objectively assess if the QoE of video streaming services delivered meets the desired quality expectations.

Understand video streaming utilization and performance across the network

The Overview and KPIs Dashboards offer a consolidated view of video streaming utilization and performance throughout the network. Network teams can seamlessly navigate between map and chart visualizations to get up-to-date insights for utilization and key performance metrics over the past 24 hours or for the desired custom range, and monitor trends. Beyond an intuitive interface that offers a bird's-eye view of total and per session video streaming QoE, at different locations and for the desired custom time range, network teams can combine multiple filtering options, such as application, granularity, and RAT, to drill down to their desired level of analysis.

Monitor video streaming QoE per location, network element, and device

The Location, Core Network, and Devices Dashboards offer more focused analyses for network planning and optimization teams, who need to monitor and isolate service degradation issues occurring in particular locations, network elements, or device models. Using interactive visualizations, they can monitor critical metrics that affect subscribers' video QoE over a selected time period. By isolating problematic geographical areas, network topologies, and devices where most streaming issues are encountered, they can take proactive steps to optimize and distribute network resources more effectively.

Benefits

- **Proactively manage the quality of video streaming services**

by tracking key metrics that impact subscribers' streaming experiences.

- **Fix radio interference or congestion in hotspot cells**

by identifying the worst-performing locations of video streaming services for metrics like resolution downgrades, stalling, and initial buffering time.

- **Find and remediate problematic video streaming devices**

by monitoring the variance in video streaming quality across different device models.

- **Selectively manage network resources during peak hours**

by activating traffic shaping tools that limit video streaming within areas and times of the day.

- **Optimize capacity management and expansions**

by increasing the number of eNodeBs/gNodeBs and adding new frequency carriers in locations with heavy video streaming demand.

5G Edge Analytics

PROVIDING DIRECT VISIBILITY ON CONNECTED ENTERPRISE ASSETS

Bringing the analytics closer to the end-user

Mobileum's 5G Edge Analytics is a comprehensive solution that enables Enterprises to monitor and analyze the connectivity and data usage of all their devices (smartphones, sensors, IoT) over private 5G networks or APNs.

This is essential on two fronts: to ensure network security and verify that Communications Service Providers upkeep the promised quality of service offered to those Enterprises.

Get the most of low latency communication to increase security and lower your costs

With the number of IoT edge devices expected to rise over the next decade, telecom companies are struggling to make sure their edge computing framework can handle the increased data traffic. By implementing mobile edge computing infrastructures, CSPs can leverage many of the computing resources they already own while delivering faster service with reduced latency.

With Mobileum 5G Edge Analytics, CSPs can provide enterprises the experience of enhanced network security and asset protection, through firsthand identification of irregular data usage while achieving greater operation and lower maintenance costs, through an optimized investigation on connectivity issues.

Providing faster insights to get faster decisions

Edge computing will reduce network latency by processing data closer to the end-user. With Mobileum 5G Edge Analytics, the insights that can be delivered to the CSP or the Enterprise, in the case of a private network, are much faster.

The processing time of network events is drastically reduced, providing a faster decision criterion on all the enterprise core elements.



Aggregating levels of intelligence can bring a new multi-dimensional set of insights

Mobileum's 5G edge analytics provides the enterprises with different levels of intelligence, like network, service, and device-level that can be monitored in a multi-dimensional strategy. Looking at parameters like time, KPIs, service rating scores, or location enterprises can have an aggregated view of all these metrics giving them the flexibility to bring their business model to the 5G edge and perform its digital transformation with all the necessary information on a real-time basis.

Benefits

- **Direct monitoring of connectivity**

Access to both real-time and historical data to get service metrics in order to control edge devices connectivity performance.

- **Identify issues affecting devices**

Detect devices showing sub-standard Service Rating Scores (SRS).

- **Increase precision in troubleshooting**

The troubleshooting of device-specific issues can be enhanced by real-time and historical information from individual device usage.

- **Minimize on-site interventions**

On-site maintenance interventions can be minimized by allowing remote validation of device status, providing the necessary info to evaluate the deployment of field engineers.

- **Identify rogue usage of resources**

With 5G analytics, there is a faster way to identify the rogue usage of legitimate SIMs or non-authorized devices, by detecting anomalous applications and non-authorized services.

- **Advanced DPI capability**

5G Edge Analytics makes use of an industry-leading high-performance, multi-threaded inspection engine capable of high rates of massive data processing to enable fast and precise decisions to be taken.



Event Analytics

PROVIDING VISIBILITY ON TRAFFIC USAGE WITHIN EVENT BOUNDARIES

Provide seamless in-event services

Achieve higher subscriber satisfaction and retention rates due to the delivery of superior experiences in memorable moments. Build an improved subscriber perception of network quality that translates into higher willingness to pay for better connectivity. Deliver better ROI for event-focused campaigns with the precise measurement of in-event usage behaviors.

Evaluate subscriber usage within event boundaries

Mobileum Event Analytics solution isolates application usage in a specific geographic area for a defined period, extracting the experience of event attendees while excluding irrelevant regions or time intervals. The solution records the performance of periodical events in a single User Interface (UI), so CSPs can compare year-on-year subscriber experiences, profile network traffic, and identify hotspots.

Understand the changing trends

Network planners must also understand the changing trends in in-event subscriber consumption and identify the main contributors to uplink and downlink traffic. Based on our experience, temporary spikes in uplink traffic during “instagrammable moments” are often accompanied by significantly degraded subscriber experiences.

Real-time observations

Real-time observations should also steer better ‘command center’ decisions, by quickly identifying areas with degrading experience and drilling down to cell level for troubleshooting. The immediate tracking of what is happening in each point of interest/group of cells supports network fine-tuning for optimal resources allocation and helps to define which cells to offload subscribers to, or to trigger other strategies (such as adjusting antenna angles).

Benefits

- **Enable precise troubleshooting of cell congestion**

to address deteriorated connectivity experienced by event attendees through various load-balancing methods.

- **Perform efficient interventions in the backhaul network**

by producing Subscriber Rating System (SRS) scores for event-goers.

- **Optimize core network traffic policies for poorly-performing apps**

by isolating them during an event and preemptively securing resources for future demand/adjustments in transport networks.

- **Formulate better radio planning and optimization strategies**

by detecting the worst-performing cells during an event and provisioning additional radio resources.

- **Standby network resources to cope with in-event**

usage anomalies, by identifying moments that significantly strain the network.

- **Assess the impact of in-event marketing campaigns**

by measuring subscribers’ usage of different applications within the event area.

Subscriber Care

MOVING TELCO CUSTOMER CARE TO THE DIGITAL ERA

Leverage insights from a comprehensive 360-degree customer view

Subscriber Care has been designed to cover CSPs' customer care needs end-to-end, providing Customer Care Agents (CCAs) the right information they need in an intuitive-to-use workspace. CCAs can query by MSISDN, IMSI, IP or IMEI and instantly retrieve a complete and up-to-date view of each subscriber's digital profile, combining multi-dimensional historical and real-time insights, such as quality of experience, local and roaming web and application activity, tethered devices, geo-location history, user plane and control plane KPIs, and more.

Optimize bill waiver requests resolution

With the popularisation of data-intensive applications, customer calls regarding bill shocks are on the rise. Subscribers need to know when, where, and how the disputed usage happened. Subscriber Care provides a comprehensive and detailed distribution of data consumption across applications and enables CCAs to instantly pinpoint the date, time, and particular applications that caused consumption spikes. Using this information in conjunction with the latest billing data, CCAs can handle effectively local and roaming bill waiver scenarios, resolve the dispute in a timely manner and give accurate answers to customers.

Initiate context-aware troubleshooting for network experience complaints

Subscriber Care provides detailed user plane and control plane insights, which can be visualized in real-time, allowing CCAs to address queries on service degradation events. With end-to-end visibility on each subscribers' digital experience, CCAs can quickly escalate network performance issues to troubleshooting teams. By providing them with accurate guidance about the problems they need to tackle, troubleshooting and network teams can holistically investigate and promptly resolve the issue, ensuring positive customer experience and satisfaction.

Benefits

- **Get a complete and up-to-date view of the subscriber's digital profile**

Through a single interface combining detailed network usage and performance with real-time and historical experience and usage metrics, for both local and roaming activity, as well as billing and EDW data.

- **Address subscribers' queries timely and effectively**

From bill disputes and service complaints to application-centric issues.

- **Reduce bill waivers**

Leveraging real-time and historical data consumption insights, for both local and roaming data usage, in conjunction with the latest billing data.

- **Increase first-call resolution rate and decrease average handling time**

By equipping your CCAs with all the information they need to be context-aware, and quickly and efficiently assist subscribers with their requests.

- **Achieve higher subscriber satisfaction and retention rates**

Stemming from superior and personalized customer care service.

- **Protect subscribers personal data**

Thanks to robust Privacy and Data Protection complementary tools and solutions, which let you maintain efficient operations and best serve your subscribers while protecting their personal information and privacy.

Digital Leads Generator

CREATE SUBSCRIBER SEGMENTS BASED ON USAGE AND BEHAVIORAL PROFILE

Personalization can deliver better customer experience and higher business value

Marketing teams require tools to size the markets for their digital content and services, identify the target customers for campaign efforts, and leverage customer data insights to forge partnerships with external brands.

Digital Leads Generator is a solution designed for telco marketing and campaign departments. Leveraging a rich database comprising of digital consumption, CRM, and billing attributes, marketing and campaign teams can generate leads for up-selling and cross-selling, and precisely match their campaign offer catalog to the right subscribers.

Mobileum Digital Leads Generator allows you and your team to instantly create subscriber segments based on usage and behavioral profiles and generate leads for campaign opportunities.

Micro-segmentation in less than 60 seconds

Digital Leads Generator allows campaign managers and marketers to return a query result in less than 60 seconds for databases of over 120,000,000 subscribers when it might require several hours or even days with traditional big data solutions.

The solution is powered by Mobileum Deep Network Analytics (DNA) and its evolved Deep Packet Inspection (DPI) technology, which enables rich signatures for web and applications, providing deep details on the digital consumption patterns of individuals.

Pinpoint customer segments with hyper-granular traits

Mobileum Digital Leads Generator is a dual-purpose solution, serving both as a campaign audience creator and as a database experimentation tool.

The solution extends beyond the typical audience creation functionality — not only does it enable managers to identify the right subscribers for a particular campaign, but it also serves as a dynamic profiling tool that allows marketing and campaign management teams to perform quick experiments within their customers' attributes database. It helps understand consumer behaviors and preferences, leading to better profiling and definition of customer segments.

Leads generation for campaign optimization and data monetization

Digital Leads Generator features an interactive User Interface (UI) that enables campaign managers to quickly query a database of rich and detailed customer attributes to pinpoint the subscribers for which each campaign message will best resonate and best match the campaign offer catalog to the right audience.

You can easily compare the results of each query and quickly evaluate the impact of criteria refinement on the size of the target pool. Once the target audience is identified, you can export the leads for immediate action. Post-campaign, the solution enables you to assess the impact on the subscriber base's digital behavior by understanding changes to the usage trends.



Benefits

- **Discover new customer segments**
and verify campaign and marketing hypotheses.
- **Perform dynamic profiling**
by running, combining, and comparing multiple queries.
- **Match offerings to the right audience**
by iterating and refining queries, and exporting the leads.
- **Optimize targeting**
by quickly iterating queries and comparing the impact of changes in qualification criteria.
- **Monetize your data**
by generating leads for partner merchants and enterprises.
- **Evaluate and rebalance partnerships**
by assessing the reach of different channel partners.

Home Analytics

IDENTIFY AND ACQUIRE COMPETITOR MOBILE DEVICES ON FIXED BROADBAND NETWORKS

Identify the best acquisition opportunity in every household

Home Analytics is an unprecedented solution. Its foundational technology lies in Mobileum's exclusive device-matching method, which can accurately identify unique devices across your fixed and mobile networks, giving you a holistic view of your subscribers.

With the differentiation of devices using your mobile network and those that are not, Home Analytics provides actionable insights at the household level. Through comprehensive dashboards, Sales and Customer Lifecycle Management teams can directly identify the acquisition opportunity in every household.

Comprehensive Insights into Fixed Broadband Connections

The Overall Dashboard provides a comprehensive view of the competitive landscape across all the fixed broadband connections.

The entire fixed broadband base is segmented and presented in an intuitive grid, which allows Sales and Customer Lifecycle Managers to quickly perform sizing and download target lists for acquisition campaign activities.

Designed for Top Line Impact

Home Analytics provides a set of intuitive dashboards, custom-designed for Sales and Customer Lifecycle Managers to understand the competitive landscape at the household level. Home Analytics surfaces new knowledge and insights that were invisible before. With this, outreach efforts can be tailored to capture new acquisition opportunities, thereby achieving revenue uplift and market share gain.

Competitive Insights into each Fixed Broadband Household

The Household Devices Dashboard provides a granular view of each Fixed Broadband Household's device composition. With this visibility, Sales and Customer Lifecycle Managers can differentiate and optimize the promotional offer for each individual Fixed Broadband Household.

Benefits

- **Acquire new subscribers and increase market share**
- **Optimize costs of acquisition and achieve higher campaign ROI**
- **Increase ARPU via up-sell and cross-sell**

Intelligent Triggers

24/7 REAL-TIME ANALYTICS OF INDIVIDUAL SUBSCRIBER DIGITAL ACTIVITY AND EXPERIENCE

Capitalize on subscriber activity in real-time

Directly integrated to the Campaign Management System (CMS), Intelligent Triggers allows you to send contextually relevant messages, by automatically activating campaigns to up-sell or cross-sell data packages at the right moment, based on real-time subscribers' online behavior and location.

The solution also enables you to monetize your data, by performing customer acquisition campaigns for external partners, and to automatically activate retention campaigns to reduce churn, by identifying and targeting subscribers who experience dropped calls, substandard quality of experience (QoE), or are interested in competitor products.

With Mobileum Intelligent Triggers, you can proactively engage with VVIPs customers with a decreased QoE, by monitoring the experience they receive, overall and for key applications.



Increase revenues with Intelligent Triggers

As Intelligent Triggers continuously analyzes individual subscriber digital activity and experience to activate, in real-time, the right campaign for the right customer, it will allow you to sharpen targeting and:

- **Increase customer acquisition and conversion rates.**
- **Achieve higher ROI for promotional initiatives and campaigns.**
- **Monetize data by acquiring customers for partners.**
- **Reduce churn by proactively engaging customers with reduced QoS/QoE.**

True real-time analytics

Intelligent Triggers leverages Mobileum evolved Deep Packet Inspection (DPI) and augmented signatures intelligence technologies, that can detect and classify >28K applications and components, including localized signatures for each country and market, and >30K models of devices. With high throughput, Intelligent Triggers can send up to 5,000 triggers per second.

Intelligent Triggers comprises of 5 Triggers types:

- **Data Usage, to target relevant customers for up-selling, cross-selling, and acquisition campaigns;**
- **Voice Dropped Calls, to proactively engage with subscribers who experienced dropped calls to reduce churn;**
- **Data Silent Roamers, to promote roaming packages and capture roaming revenues;**
- **Application Quality of Service (QoS), to engage timely with subscribers who experienced poor QoS while using key applications;**
- **Overall Subscriber Quality of Experience (QoE), to proactively address customers with poor QoE.**

Benefits

- **Send contextually relevant messages**

by automatically activating campaigns to up-sell data packages at the right moment, based on real-time subscribers' online behavior.

- **Automatically activate retention campaigns to reduce churn**

by identifying and targeting subscribers who experience dropped calls, substandard quality of experience (QoE), or are interested in competitor products.

- **Proactively engage with VVIPs customers with a decreased QoE**

by monitoring the experience they receive, overall and for key applications.

- **Capture roaming revenue**

by promoting roaming packages to silent data roamers.

- **Increase revenues**

by achieving higher ROI for promotional initiatives and campaigns.

- **Monetize your data**

by performing customer acquisition campaigns for external partners.



Why Mobileum?

Mobileum is a leading provider of Telecom analytics solutions for roaming, core network, security, risk management, domestic and international connectivity testing, and customer intelligence. More than 1,000 customers rely on its Active Intelligence Platform, which provides advanced analytics solutions, allowing customers to connect deep network and operational intelligence with real-time actions that increase revenue, improve customer experience and reduce costs. Headquartered in Silicon Valley, Mobileum has global offices in Australia, Germany, Greece, India, Portugal, Singapore, UK and United Arab Emirates.

More in www.mobileum.com

Meet us

