

F R O S T & S U L L I V A N

FROST & SULLIVAN BEST PRACTICES AWARD

TELECOM ROAMING TEST AND SECURITY - GLOBAL

Price/Performance Value Leadership  
2019



FROST & SULLIVAN

2019

BEST  
PRACTICES  
AWARD

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## Background and Company Performance

### *Industry Challenges*

To deliver an optimal quality of experience to subscribers, a key challenge for mobile operators is ensuring that both in-bound and out-bound calls are of good quality each and every time. This challenge is compounded when an operator's subscriber is connecting with a subscriber who is situated in a region governed by a different set of telecommunications policies.

In situations where the subscriber receives or makes an international call, or when the subscriber moves to another region where their operator is not present, the original operator should ensure that the connection is established by drawing a fine line between good call quality and making sure it is not prohibitively expensive for neither the subscriber nor the operator.

To do this, the operator must leverage enhanced artificial intelligence (AI) and machine learning (ML) analytical capabilities. Since telecom policies differ from region to region, the ideal intelligent solution should be capable of simulating a phone call minding regional telecom regulations and billing policies, as well as the quality of service delivered by the other operator's network infrastructure, which is beyond the original operator's control.

Frost & Sullivan's industry research finds that today's global mobile network operators need a solution with enhanced roaming intelligence: such a solution must have the capability to emulate traffic of the operators' networks originating from different regions and then steer traffic into the network that remains economical and offers the best in terms of users' quality of experience.

### *Price/Performance Attributes and Customer Impact*

#### **Brand Equity**

US-based, Mobileum, originally known as Roamware, was established in 2001. During its initial years, Roamware provided specialized software that would help network operators manage their roaming traffic more intelligently, thereby helping them deliver improved quality of service and end-user experience to subscribers. The technology helped the company gain market recognition quickly and has fueled growth since its inception. Then, in 2016, Mobileum was acquired by Audax Private Equity, a leading investment company.

During the last decade, Mobileum had acquired a number of specialist companies, which helped it gain more traction in other associated market segments. Mobileum's most notable acquisitions are its 2018 acquisition of Evolved Intelligence and the 2019 acquisition of WeDo Technologies, its most recent. These acquisitions have helped Mobileum build an end-to-end intelligent solution for the mobile network operator, which spans across roaming and network services, network security, fraud, and revenue assurance. The offering is grouped into three business units, namely Roaming Intelligence; Security Intelligence; and Fraud and Revenue Risk Intelligence, which are built on top of the Active Intelligence platform.

Today, Mobileum delivers powerful analytics solutions that optimize roaming, enhance security, and generate revenue for well over 650 mobile network operators. Together with

WeDo Technologies, Mobileum is now backed by a 1,200-person strong team that caters to customers from over 200 countries. While based out of California, Mobileum has a solid presence across Europe, the Middle East, Asia-Pacific, and Latin America, with offices in Portugal, India, the UK, Brazil, Argentina, the United Arab Emirates, Hong Kong, and Singapore.

### **Functionality**

The Active Intelligence platform is the core of Mobileum's Roaming Solution. The platform is compartmentalized into two elements: wisdom and action. The *wisdom* component ingests data from the network infrastructure; it then models that data via its AI/ML framework, cleans outliers, and also profiles different types of risk associated with the data, thereby providing relevant insights of the network and subscriber which are of interest. The *action* component provides flexibility to act on insights via a data- or AI-driven approach.

In the data-driven methodology, the network operator can leverage its Mobileum solution to record specific insights from specific end users and then act upon them. Coupling that functionality with enhanced ML capabilities, the network operator can configure the network to automatically act upon the insights. A good example is steering roamers to a different partner when the operator's preferred network faces quality degradation. This feature set is especially useful while roaming, when the subscriber is in a region governed by a different set of telecom rules, or if the subscriber has to switch to a different carrier or deployment due to insufficient coverage.

The active test factory is the Active Intelligence platform's default offering. Together with visitor location register (VLR) robots, Mobileum's Active Intelligence platform can virtualize a profile via signaling, and then emulate synthetic traffic from the virtualized profile or robot. Mobileum is also betting big on software defined radio (SDR), which will offer more flexibility in terms of software-based filtering algorithms for frequency selection.

Frost & Sullivan recognizes that the capability with which Mobileum virtualizes numerous end-user profiles in different regions governed by different telecom rules, and then effortlessly steers traffic to an alternate network operator when the quality of service on its preferred network goes bad—without a significant rise in cost—is an industry first, giving the company an edge over its top competition.

Also, as centralized-radio access networks (C-RAN) continue to take off, the company's remote radio testing capability will prove invaluable. Currently, Mobileum is integrating WeDo Technologies' portfolio of revenue assurance, which it acquired in 2019. Once complete, Mobileum will create an end-to-end risk management solution backed by active testing, security, and policy control.

### **Prioritization of Features**

Mobileum's three business units—Roaming Intelligence, Security Intelligence, and Fraud and Revenue Risk Intelligence—create an exemplary end-to-end solution for the roaming test and security industry. Roaming Intelligence is in itself a diversified unit, including solutions for steering, data management, and interconnect, as well as experience testing for core

network services such as VoLTE, VoWiFi, 4G, IoT, and 5G networks. Also, Mobileum supports legacy network deployments, such as 2G and 3G.

To ensure compliancy with 5G, the Active Intelligence platform is integrated with a number of representational state transfer (REST) application programming interfaces (APIs). REST APIs are important for 5G because they help users expand 5G networking requirements for sharing information.

Frost & Sullivan appreciates that Mobileum's active testing can empower a network operator to virtualize the SIM profile in a remote robot and schedule test case executions to measure a range of KPIs across all service types, key being throughput, latency, as well as speech quality. It performs the tests specified by the International Roaming Expert Group (IREG) of the Global System for Mobile Association (GSMA) for validating global roaming quality and experience, as well as others like over-the-top and application services. The active testing is also used to test security: tests such as penetration testing help the operator make its infrastructure more secure.

Since the acquisition of WeDo Technologies, there is greater synergy of active testing with fraud management and revenue assurance. Compounded by the rule-based intelligence and complemented by artificial intelligence, coverage for fraud is larger and almost instantaneous due to the company's proactive approach to fraud scenarios, such as IRSF, bypass fraud, and revenue assurance use cases, such as billing and rating validation.

Moreover, the active test factory is used with WeDo Technologies' risk management solutions; this enables Mobileum to offer customers a truly end-to-end solution that spans roaming, security, and fraud detection, something that has been missing in the telecom roaming test and security industry.

### **Ease of Use**

Frost & Sullivan is impressed that the Mobileum solution contains an industry-leading amount of artificial intelligence and machine learning capabilities. Coupled with its unique active testing features, the customer can incorporate Mobileum's solution into its network almost instantaneously while automating the network operator's entire core roaming functionalities, without compromising on security.

### **Customer Service Experience**

Mobileum's key value proposition is in preventing and blocking fraud in the least possible amount of time as well as cost-efficiently enhancing customer experience while roaming. To achieve both feats, Mobileum leverages its enhanced machine learning and active testing capabilities. In the case of stopping international revenue share fraud (IRSF), Mobileum uses enhanced analytics combined with voice and data firewalls to stop fraud in near real time. As fraud continues to evolve, the Mobileum solution helps operators identify a number of outliers via a technique similar to voice biometrics.

As part of its Action features, Mobileum also provides a Voice Firewall, that works as fraud blocking element for mobile operators, as it sits in line with Mobileum Active Intelligence platform, providing MNO with greater visibility by monitoring, alerting, and controlling

inbound and outbound voice network activity roaming voice traffic. This voice firewall together with the Fraud Management system contextual analysis of traffic and subscriber policies will work on protecting fraud based on user-defined call admission control (CAC) policies, voice application layer security threats or unauthorized service use violations.

Moreover, Sim Boxing is a type of fraud that has cost the telecom industry an average of 150 million dollars every year. To plug the revenue leak holes, the solution can be used as a type of voice biometric to automatically assess the pitch of a voice call and the frequency of calls made; also, it can cross reference them between the region from where the call initiated to the region where the voice call is made.

Behavioral analytics is leveraged extensively in this regard. The Active Intelligence platform is also used for enhancing the customer experience while roaming. For instance, an operator usually consults with its subscribers to understand their requirements for upcoming international travel, and then they are put on the most appropriate plan. But with the Mobileum solution, the operator can analyze its customer's profile, the likelihood of travel, and the frequency of calls made to thereby help promote the most appropriate service for each end user.

### *Conclusion*

The Mobileum Active Intelligence platform has been a hit amongst mobile network operators that are looking to enhance the roaming experience of their subscribers without increasing the cost significantly. In today's digitally transforming world, network operators must protect subscribers from any circumstance of overcharging or undercharging as well as from fraud as they travel across regions and interact via mobile with people around the world. Mobileum's Active Intelligence platform is a timely one-stop solution that not only enhances the roaming experience for subscribers but also assures network operators' revenue.

For its strong overall performance, Mobileum is recognized with Frost & Sullivan's 2019 Price/Performance Value Leadership Award in the global telecom roaming test and security industry.

## Significance of Price/Performance Value Leadership

Ultimately, growth in any organization depends on customers purchasing from your company, and then making the decision to return time and again. A key component of customer retention is the delivery of a high-quality product at a reasonable price. To achieve the dual goals of customer engagement and price/performance value, an organization must strive to be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



## Understanding Price/Performance Value Leadership

Best-in-class organizations are particularly successful in two critical areas: helping customers appreciate and enjoy the product at every price point; and ensuring that customers perceive a demonstrable difference in performance features at every price point. Ultimately, this balance allows companies to profitably deliver a variety of product options to customers, differentiate the product portfolio, and compete at every level of the market.

## Key Benchmarking Criteria

For the Price/Performance Value Leadership Award, Frost & Sullivan analysts independently evaluated 2 key factors—Price/Performance Attributes and Customer Impact—according to the criteria identified below.

### Price/Performance Attributes

- Criterion 1: Functionality
- Criterion 2: Ease of Use
- Criterion 3: Product/Service Quality
- Criterion 4: Performance Reliability
- Criterion 5: Prioritization of Features

### Customer Impact

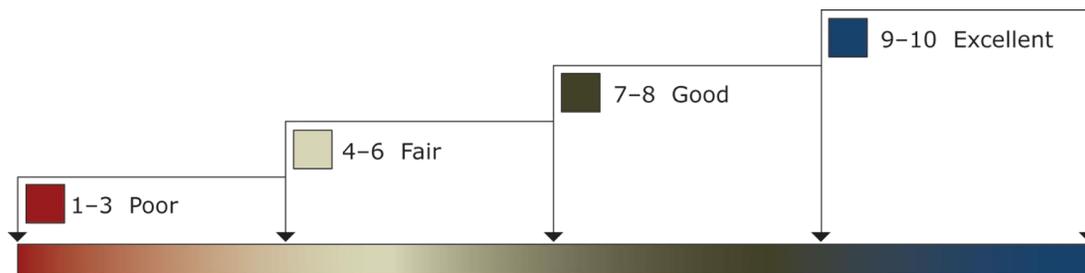
- Criterion 1: Perceived Value
- Criterion 2: Customer Purchase Experience
- Criterion 3: Customer Ownership Experience
- Criterion 4: Customer Service Experience
- Criterion 5: Brand Equity

## Best Practices Award Analysis for Mobileum

### Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows research and consulting teams to objectively analyze performance according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

#### RATINGS GUIDELINES



The Decision Support Scorecard considers Growth Performance and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, Frost & Sullivan has chosen to refer to the other key participants as Competitor 1 and Competitor 2.

| <i>Measurement of 1-10 (1 = poor; 10 = excellent)</i> |                              |                 |                       |
|---|------------------------------|-----------------|-----------------------|
| <b>Price/Performance Value Leadership</b>             | Price/Performance Attributes | Customer Impact | <b>Average Rating</b> |
| <b>Mobileum</b>                                       | <b>9.0</b>                   | <b>9.1</b>      | <b>9.1</b>            |
| Competitor 1  | 7.4                          | 7.8             | 7.6                   |
| Competitor 2  | 7.0                          | 7.3             | 7.2                   |

### *Price/Performance Attributes*

#### **Criterion 1: Functionality**

Requirement: The product offers enhanced functionality to serve the broadest range of applications.

#### **Criterion 2: Ease of Use**

Requirement: Customers typically feel that the products are easy to use to generate optimal performance.

#### **Criterion 3: Product/Service Quality**

Requirement: Products or services offer the best quality for the price, compared to similar offerings in the market.

#### **Criterion 4: Performance Reliability**

Requirement: The product consistently meets or exceeds customer expectations for performance over its life cycle.

#### **Criterion 5: Prioritization of Features**

Requirement: The features that customers most value and expect are commonly available and aggressively priced.

### *Customer Impact*

#### **Criterion 1: Perceived Value**

Requirement: Customers typically feel that they received more from the product or solution than they paid for it.

#### **Criterion 2: Customer Purchase Experience**

Requirement: Customers feel like they are buying the optimal solution that addresses both their unique needs and their unique constraints.

#### **Criterion 3: Customer Ownership Experience**

Requirement: Customers are proud to own the company’s product or service, and have a positive experience throughout the life of the product or service.

**Criterion 4: Customer Service Experience**

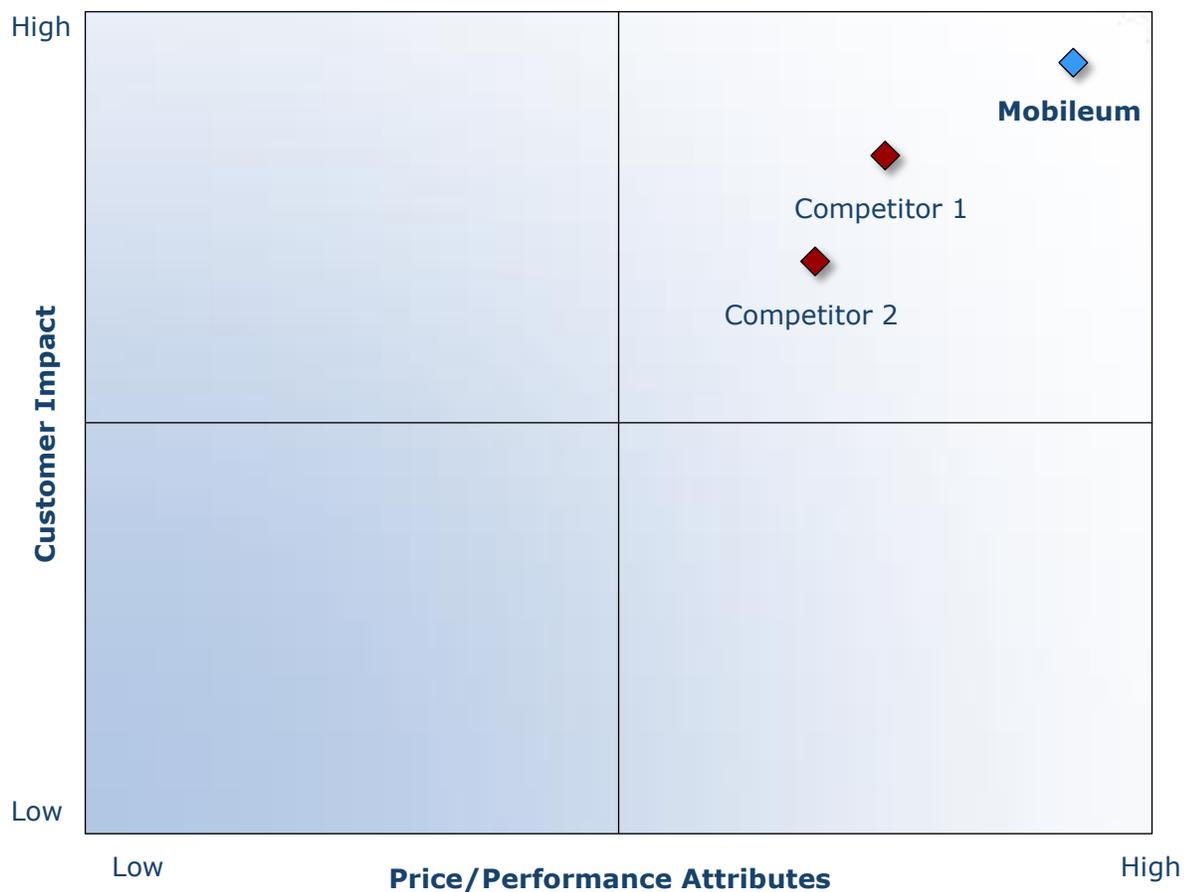
Requirement: Customer service is accessible, fast, stress-free, and of high quality.

**Criterion 5: Brand Equity**

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

*Decision Support Matrix*

Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



## Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with select best practices criteria. The reputation and integrity of the awards are based on close adherence to this process.

| STEP  | OBJECTIVE   | KEY ACTIVITIES   | OUTPUT   |
|---|---|--|--|
| 1<br><b>Monitor, target, and screen</b>                 | Identify award recipient candidates from around the world                           | <ul style="list-style-type: none"> <li>• Conduct in-depth industry research</li> <li>• Identify emerging industries</li> <li>• Scan multiple regions</li> </ul>  | Pipeline of candidates that potentially meet all best-practices criteria                         |
| 2<br><b>Perform 360-degree research</b>                 | Perform comprehensive, 360-degree research on all candidates in the pipeline        | <ul style="list-style-type: none"> <li>• Interview thought leaders and industry practitioners</li> <li>• Assess candidates' fit with best practices criteria</li> <li>• Rank all candidates</li> </ul>   | Matrix positioning all candidates' performance relative to one another                           |
| 3<br><b>Invite thought leadership in best practices</b> | Perform in-depth examination of all candidates                                      | <ul style="list-style-type: none"> <li>• Confirm best practices criteria</li> <li>• Examine eligibility of all candidates</li> <li>• Identify any information gaps</li> </ul>                            | Detailed profiles of all ranked candidates   |
| 4<br><b>Initiate research director review</b>           | Conduct an unbiased evaluation of all candidate profiles                            | <ul style="list-style-type: none"> <li>• Brainstorm ranking options</li> <li>• Invite multiple perspectives on candidates' performance</li> <li>• Update candidate profiles</li> </ul>                   | Final prioritization of all eligible candidates and companion best practices positioning paper   |
| 5<br><b>Assemble panel of industry experts</b>          | Present findings to an expert panel of industry thought leaders                     | <ul style="list-style-type: none"> <li>• Share findings</li> <li>• Strengthen cases for candidate eligibility</li> <li>• Prioritize candidates</li> </ul>  | Refined list of prioritized award candidates   |
| 6<br><b>Conduct global industry review</b>              | Build consensus on award candidates' eligibility                                    | <ul style="list-style-type: none"> <li>• Hold global team meeting to review all candidates</li> <li>• Pressure-test fit with criteria</li> <li>• Confirm inclusion of all eligible candidates</li> </ul> | Final list of eligible award candidates, representing success stories worldwide                  |
| 7<br><b>Perform quality check</b>                       | Develop official award consideration materials                                      | <ul style="list-style-type: none"> <li>• Perform final performance benchmarking activities</li> <li>• Write nominations</li> <li>• Perform quality review</li> </ul>                                     | High-quality, accurate, and creative presentation of nominees' successes                         |
| 8<br><b>Reconnect with panel of industry experts</b>    | Finalize the selection of the best-practices award recipient                        | <ul style="list-style-type: none"> <li>• Review analysis with panel</li> <li>• Build consensus</li> <li>• Select recipient</li> </ul>  | Decision on which company performs best against all best practices criteria                      |
| 9<br><b>Communicate recognition</b>                     | Inform award recipient of recognition   | <ul style="list-style-type: none"> <li>• Inspire the organization for continued success</li> <li>• Celebrate the recipient's performance</li> </ul>  | Announcement of award and plan for how recipient can use the award to enhance the brand          |
| 10<br><b>Take strategic action</b>                      | Upon licensing, company is able to share award news with stakeholders and customers | <ul style="list-style-type: none"> <li>• Coordinate media outreach</li> <li>• Design a marketing plan</li> <li>• Assess award's role in strategic planning</li> </ul>                                    | Widespread awareness of recipient's award status among investors, media personnel, and employees |

## The Intersection between 360-Degree Research and Best Practices Awards

### Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of the research process. It offers a 360-degree view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, resulting in errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.



### About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, helps clients accelerate growth and achieve best-in-class positions in growth, innovation, and leadership. The company's Growth Partnership Service provides the CEO and the CEO's growth team with disciplined research and best practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit <http://www.frost.com>.