

[ TEMS™ PRODUCTS ]

# ASCOM NETWORK TESTING EVOLVING NETWORKS. TRUSTED SOLUTIONS.



## ASCOM NETWORK TESTING – SOLUTIONS FOR TODAY’S AND TOMORROW’S MOBILE NETWORK CHALLENGES

# Ascom Network Testing leads the world in providing best-in-class solutions to measure, analyze, and optimize mobile networks.

The TEMS™ Portfolio offers a complete set of trusted solutions for drive testing, benchmarking, monitoring, and analyzing network performance. These state-of-the-art offerings facilitate the deployment, optimization, and maintenance of mobile networks. We are the industry leader, and our products are supplied to the world’s top mobile operators, equipment vendors, and professional service providers.

With a global presence and unparalleled experience, we enable operational excellence, cost efficiency, revenue growth, and user satisfaction. These competitive advantages help our customers to navigate the constant evolution of technology and thrive in the ever-changing telecommunications environment.

We have over 500 employees in 20 countries dedicated to serving our customers.

- Technology leadership
- Proven experience
- Quality-driven
- World-class support
- Global presence

### THE COMPANY

Ascom is an international provider of Mission-Critical Communication solutions. The company focuses on the areas of **Wireless Solutions** (high-value, customer-specific on-site communication solutions), **Network Testing** (a global leader in testing and optimization solutions for mobile networks) as well as **Security Communication** (secure, reliable communication solutions for alerts, mobilization and tactical communication). Communication is vital to our customers’ operations. We strive to develop products and solutions for them which optimally meet their high demands and operate quickly, reliably and seamlessly even under extreme conditions.

Ascom Holding AG is headquartered in Switzerland, has subsidiaries in 20 countries and employs about 2300 people around the world. Ascom registered shares (ASCN) are listed on the SIX Swiss Exchange in Zurich (Switzerland).

Ascom was founded in 1987. However, the origins of our company date back over 100 years. These days, Ascom is a technology group with a clear focus and a partner that our customers can rely on.



## OVERVIEW

Wireless communication has changed the world. Mobile phones and networks have evolved, speeds have increased, services have improved, and demand has exploded. However, the need for broad coverage, high quality, and efficient operation has remained through every stage of wireless evolution. The offerings in the TEMS™ Portfolio have given operators the ability to meet their needs every step of the way.

As networks and technologies evolve, our trusted solutions will help you troubleshoot, benchmark, and monitor your network to ensure your customers are satisfied. Ascom Network Testing has the experience and expertise you can rely on, both for today's networks and whatever is coming next.

We employ complex technology to create solutions that reduce complexity for our customers; we help them to identify problems quickly, monitor efficiently, and create reports almost effortlessly. We stand at the cutting edge of technology in order to both provide the most advanced solutions and to anticipate our customers' needs.

The TEMS Portfolio is the unrivaled industry leader in our market niche. It includes offerings in the areas of Test & Measurement, Reporting & Analysis, and Benchmarking & Monitoring.

Our offerings are in the following areas:

### Test & Measurement – “for troubleshooting and optimization”

Individual probes to test and evaluate the performance and quality of wireless networks and services.

- TEMS Investigation
- TEMS Pocket

### Reporting & Analysis – “for post-processing and optimization”

Software to visualize, analyze, and report mobile network performance and quality.

- TEMS Discovery
- TEMS Visualization

### Benchmarking & Monitoring – “for quality of service and experience”

Dedicated probe systems to benchmark and monitor the performance and quality of wireless networks, services, and content.

- TEMS Symphony
- TEMS Monitor Master
- TEMS Automatic

The TEMS Portfolio provides a full range of industry-leading solutions that help operators and other customers to optimally run their networks. The use of our products leads to higher network quality, customer loyalty, and improved operational efficiency. Experience, knowledge, and a focus on future technologies and services have made the TEMS Portfolio the number one choice for operators worldwide.

Our portfolio will meet your needs every step of the way.

## TEST & MEASUREMENT

For troubleshooting and optimization

Offering a true subscriber perspective, our Test & Measurement solutions enable operators to provide high-quality services faster and better than the competition.

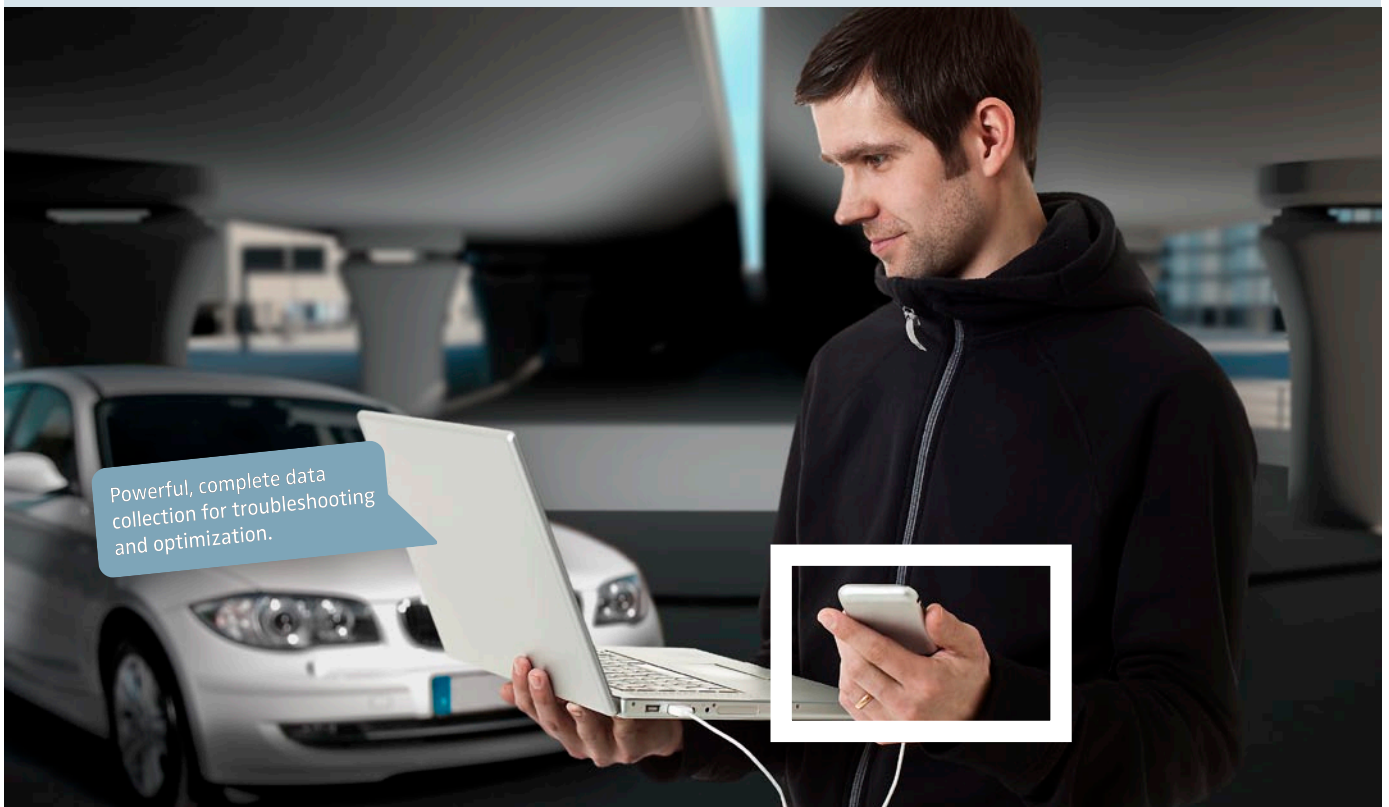
Our industry-leading products provide the best-known solutions in the world for troubleshooting, verifying, and optimizing new or existing networks. Our products also support seamless integration among the various types of networks during an upgrade or migration period.

Operators can rely on our experience and innovation in virtually every testing scenario as they strive to find and fix network problems before their customers become dissatisfied. We understand that quality is the key to any operator's success – it ensures customer satisfaction, boosts revenue, and provides an edge over the competition.

Our Test & Measurement solutions help operators efficiently provide the high-quality voice and data services their customers demand.

The entire TEMS Portfolio features multi-vendor, multi-technology capabilities. This is especially valuable in the Test & Measurement arena, because it allows operators to invest in tools that test all networks from a subscriber's point of view. The products are well-integrated and are designed for seamless post-processing with our Reporting & Analysis solutions.

Our Test & Measurement products allow operators to monitor, maintain, and troubleshoot a network efficiently, giving them the edge over their competition.



Powerful, complete data collection for troubleshooting and optimization.

## PRODUCT OVERVIEW

Individual probes to test and evaluate the performance and quality of wireless networks and services



### TEMS™ INVESTIGATION

TEMS Investigation is the industry-leading tool for troubleshooting, verification, optimization, and maintenance of wireless networks. Offering data collection, real-time analysis, and post-processing all in one, TEMS Investigation is a complete solution for all of a network operator's daily network optimization tasks. Supporting all major technologies, including LTE and all the latest advances, this complete solution eliminates the need for multiple tools, reducing costs and saving time and effort for operations staff.

#### Offers comprehensive, industry-leading functionality

- Data collection as well as service testing
- Drive testing and indoor data collection
- Multiple means of presentation and total flexibility
- Single logfile replay as well as post-processing of multiple logfiles
- RAN tuning, KPI, and HTML-based reports
- Measurement access (export)

### TEMS™ POCKET

TEMS Pocket is the most advanced and powerful hand-held tool on the market for verification, maintenance, and troubleshooting of mobile networks. Built directly into a variety of popular consumer phones, TEMS Pocket works as both a regular phone and as a powerful measurement solution that truly tests from the user's perspective.

#### Gives you the freedom to test anywhere

- Available in different packages for different users with different needs
- Data views for real-time monitoring
- Network event presentation
- Graph views (real-time)

Perform indoor, pedestrian, and outdoor measurements.

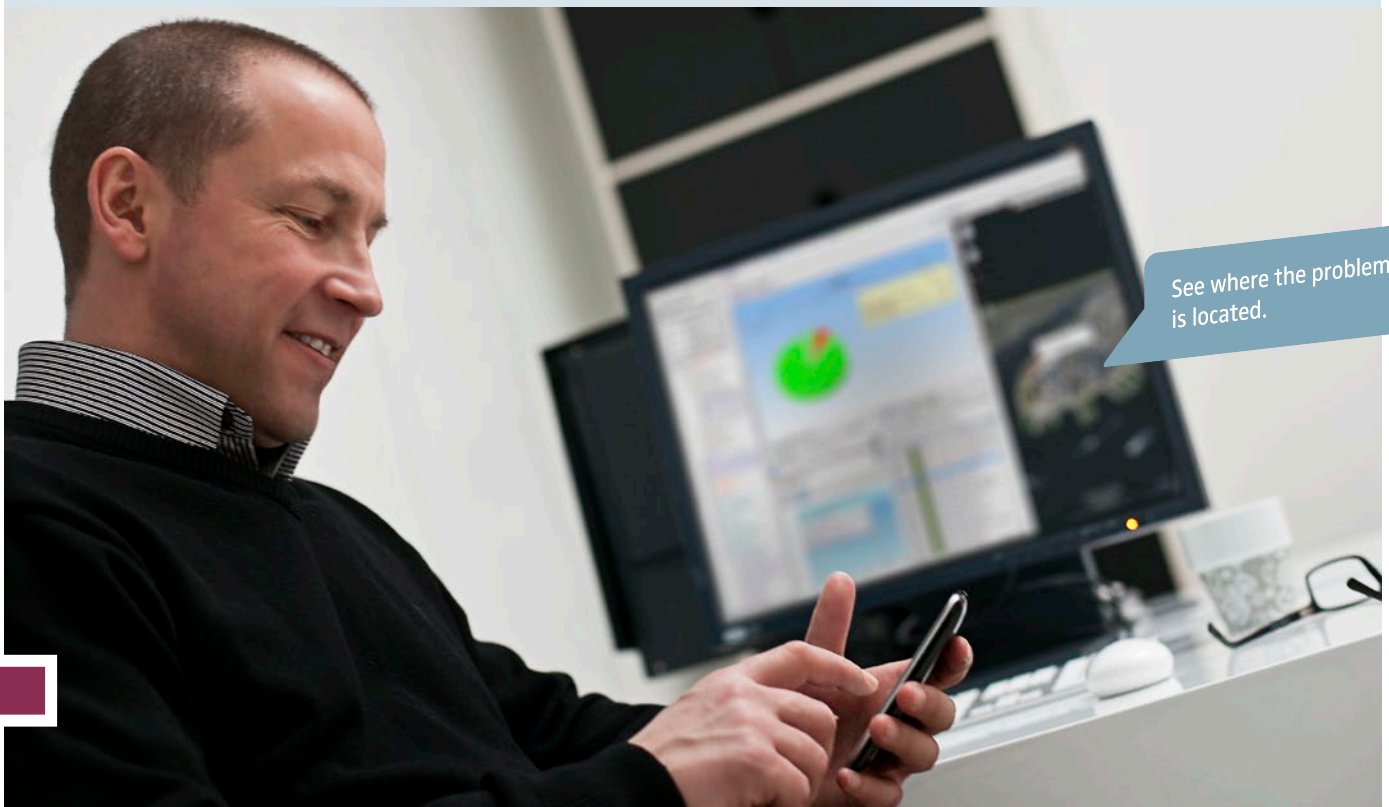
## REPORTING & ANALYSIS

For post-processing and optimization

The benefits of TEMS Portfolio extend beyond our world-class collection and benchmarking offerings. Our Reporting & Analysis solutions allow our customers to make the most of their network data, using it to identify, analyze, and accurately present network problems, foresee trends, and forecast network traffic.

The full range of our Reporting & Analysis offering corresponds to the breadth of the TEMS Portfolio. Our solutions are specifically designed and integrated with the other products in the portfolio to fulfill the operator's specific needs. This aids in making successful, long- and short-term network decisions (including the move to LTE), improves internal efficiency, promotes network quality, supports customer satisfaction, and adds value to the investment in data collection solutions.

Reporting & Analysis allows network data to be transformed into actionable information, useful throughout the organization to improve quality and efficiency. Including proprietary algorithms, the most advanced functionality, and valuable, informative output, these products take Network Testing to the next level.



## PRODUCT OVERVIEW

Software to visualize, analyze, and report mobile network performance and quality



### TEMS™ DISCOVERY

TEMS Discovery is a highly configurable and user-friendly post-processing solution for air interface measurement data. It allows engineers to easily assess wireless performance and quickly pinpoint network problems. With TEMS Discovery, the user has the flexibility to configure a wide range of items, from simple view layouts to sophisticated report templates and user-defined key performance indicators (KPIs). TEMS Discovery is the preferred reporting solution for our Test & Measurement products.

### TEMS™ VISUALIZATION

TEMS Visualization is revolutionizing the way network operators troubleshoot and optimize their networks, allowing them to find problems that were impossible to pinpoint before. TEMS Visualization analyzes the event-based data captured directly from the infrastructure, bridging the gap between traditional performance management solutions and drive-test tools.

Detailed analysis of large volumes of real user traffic.

## BENCHMARKING & MONITORING

For quality of service and experience

It is essential for operators to test the quality of service of their networks against their own standards as well as against the competition. Our Benchmarking products perform comprehensive data collection and analysis of service quality, while our Monitoring solutions focus on active testing and monitoring of mobile applications.

The key to our Benchmarking & Monitoring solutions is the focus on optimizing the user's experience. Our goal is making sure that mobile services and applications work the way they're supposed to, designing our software to provide solutions to specific challenges – and we always look at whole services from the only perspective that really matters: the user's. Doing that successfully means being able to coordinate a multitude of disciplines, ranging from content validation to network infrastructure and operations, hand-set design, and service deployment.

The comprehensive offerings in our Benchmarking & Monitoring segment provide the types of network performance analysis required throughout the organization – from optimization engineers and the testing and benchmarking staff to the top managers.

These solutions help operators prioritize network enhancement and troubleshooting projects, which improves the efficiency of operations. Encompassing field measurements, analysis, final reports, and network improvement data, our offerings provide the accurate, comprehensive information operators require to make intelligent business decisions.



## PRODUCT OVERVIEW

Dedicated probe systems to benchmark and monitor the performance and quality of wireless networks, services, and content



### TEMS™ SYMPHONY

TEMS Symphony is Ascom Network Testing’s comprehensive benchmarking offering for measuring and comparing the quality of service (QoS) of multiple wireless service providers, over legacy, 3G, and LTE networks. Mixing power with flexibility, this advanced, durable product taps the market-leading processing and channel capacity of the MTP-4 hardware platform to empower operators worldwide to test and monitor mobile network QoS over the widest number of phone and modem types, wireless carriers, and mobile transmission technologies.

Using TEMS Symphony, mobile operators can now address all of their benchmarking needs, including drive, indoor, and nomadic testing, with a single, cost-effective solution, eliminating the need for separate network benchmarking products for each of these testing environments.

### TEMS™ AUTOMATIC

TEMS Automatic is a truly autonomous system that delivers end-to-end QoS information to all levels within the organization. It provides coverage analysis using various types of tests that place test calls throughout the network and transmit the data for processing and reporting. TEMS Automatic provides an overview of network quality as perceived by subscribers, while also providing details necessary for reporting, thorough troubleshooting, and analysis. In the competitive wireless environment, network quality is a key success factor. At the same time, efficient use of resources and personnel is crucial. TEMS Automatic lets operators boost quality efficiently.

### TEMS™ MONITOR MASTER

TEMS Monitor Master is a software and hardware product for measuring the end-to-end quality and user experience of wireless and fixed line data and voice services. Designed to be highly flexible, TEMS Monitor Master is used by customers around the world for a variety of activities including large-scale revenue assurance testing, content testing, pre-launch multi-modal service testing, and roaming solutions. TEMS Monitor Master diagnoses and resolves faults quickly, and adapts easily to new and emergent technologies, so operators are always one step ahead.

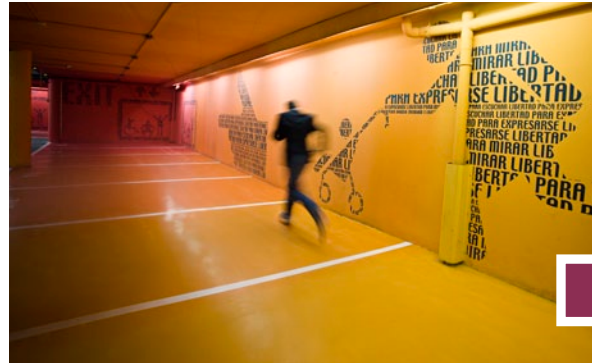
Network quality as perceived by your subscribers.

## LTE OFFERINGS

The TEMS Portfolio helps operators begin their LTE journey with commercially available products that support this exciting new technology. Jump ahead of the competition with the current releases of these products available with LTE support.



## GO AHEAD



Ascom Network Testing demonstrates its technological leadership through the early and extensive development of its TEMS Long Term Evolution (LTE) solutions.

Worldwide deployment of LTE technology is being driven by explosive growth in demand for mobile broadband services, creating a need to increase bandwidth significantly – and cost-effectively.

From LTE's infancy, Ascom Network Testing has understood its potential contributions, and has been developing tools that support its capabilities. As a result, we are helping mobile operators begin their LTE evolution today, with commercially available products that support this exciting new technology.

Although the rollout of LTE networks is just beginning in most regions, we have already built a rich array of LTE capabilities into our industry-leading tools. TEMS Investigation, TEMS Discovery, TEMS Symphony, TEMS Visualization, and TEMS Monitor Master are LTE-ready.

With nearly two decades of experience and a proven track record of technological innovation and quality-based offerings, Ascom Network Testing is the right partner for mobile operators to place their trust in when taking the next step toward LTE. We understand the challenges faced by operators today and the opportunities presented by LTE.

Network Testing helps guide your LTE evolution.



Networks are constantly changing and growing. As you strive to grow your business and satisfy your customers, Ascom Network Testing will be right there with you.

Through 4G and beyond, we have the experience, the expertise, and the commitment to help you navigate through the ever-changing communications landscape.

For many people around the world, mobile voice and data communication services have become a basic necessity in their everyday lives. To fulfill this ever-increasing need, telecommunications providers must deliver high-quality services efficiently. Ascom's Network Testing solutions are indispensable for operators if they want to maintain quality, retain subscribers, and streamline internal processes.

Along with high-quality voice services, Network Testing products support the explosive growth of mobile broadband and value-added data and content services. Our specialized expertise encompasses all major telecommunications technologies from any infrastructure vendor, with a special emphasis on the latest emerging technology standards.

Network operators, infrastructure vendors, service providers, and governmental regulatory bodies benefit from Network Testing offerings. We focus on multi-technology, multi-vendor solutions that test from the end-user's perspective, so that our customers can know exactly what consumers are experiencing. This subscriber perspective is incredibly valuable for troubleshooting, optimization, and benchmarking purposes.

Comprised of industry-leading products and complementary support and services, the TEMS Portfolio is the unrivaled industry leader in our market niche. Through internal development and strategic acquisitions, Ascom has assembled the strongest portfolio available for troubleshooting, monitoring, and analysis.

The TEMS Portfolio includes offerings in the areas of Test & Measurement, Reporting & Analysis, and Benchmarking & Monitoring.

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