Your partner in network performance

Accuver is a leading provider of wireless test and measurement solutions that optimise the performance and reliability of mobile networks.

We have developed a robust suite of products and services that enable you to measure, troubleshoot and optimise every aspect of network quality and service.

Whether you are a network operator, infrastructure vendor, chipset manufacturer or wireless equipment OEM, we have the expertise to address challenges such as:

- Rising consumer expectations of speed, dependability, quality of service and personalisation of mobile services
- Voice service issues including poor or inconsistent network coverage, dropped calls and falling revenues
- Pressure on mobile network capacity due to increasing demand, traffic and congestion
- Soaring volumes of data from mixed media such as apps, videos, games and web conferencing
- Incorporating new technologies, networks and devices, and overlaying existing systems
- Urgent need for automation to reduce manual tasks and deal with configuration and optimisation of the next generation

Leading tools in the quest for quality

Browse our products in broad categories, from air interface testing to performance monitoring and management, optimisation and maintenance. Our customisation capabilities mean we are always ready to go one step further and evolve our solutions with you.

For further information and advice, please contact your nearest Accuver regional office, contact details can be found on the reverse of this brochure.
### Air Interface

Our air interface test solutions bring you a versatile measurement and analysis platform for mobile communication networks. With flexible, user-friendly test data, you can quickly gain valuable insights and perform troubleshooting, network optimisation and benchmarking.

<table>
<thead>
<tr>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone</td>
<td>5</td>
</tr>
<tr>
<td>XCAL-P8E</td>
<td>6</td>
</tr>
<tr>
<td>XCAL-MPM</td>
<td>7</td>
</tr>
<tr>
<td>XCAL-MO</td>
<td>8</td>
</tr>
<tr>
<td>XCAL-MTS</td>
<td>9</td>
</tr>
</tbody>
</table>

### Performance

An intelligent range of performance management solutions to help you accurately calibrate user performance. With continuous feedback from the network about service experienced with popular phones, you can quickly identify and resolve weak points and maintain a superior service.

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<th>Page</th>
</tr>
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<td>9</td>
</tr>
</tbody>
</table>

### Optimisation

Mobile network operators have to collect and analyse data from a range of different sources in order to optimise performance. With our flexible network analysing and monitoring tools, data is processed only once - saving you time and energy, and avoiding downtown and revenue loss.

<table>
<thead>
<tr>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>XCAP Series</td>
<td>10</td>
</tr>
<tr>
<td>XCAP-Vuze</td>
<td>11</td>
</tr>
<tr>
<td>E2E</td>
<td>13</td>
</tr>
</tbody>
</table>

### Customisation

Our unique customisation service gives you the opportunity to adapt our products, adding new features or aiding integration into your existing systems. We can work in partnership with you to manage product design, software development, integration of hardware and ongoing support.

For further information and advice on our customisation service, please contact your nearest Accuver regional office.
Used extensively on many of the world’s largest networks, the intuitive and flexible XCAL series of drive test and post-processing tools is designed to troubleshoot, monitor, maintain and optimise wireless voice and data network performance - all in realtime. XCAL assesses QoS/QoE and ensures seamless service integration with existing GSM, WCDMA, HSPA, EVDO, WiMAX and LTE systems.

It supports all major wireless standards and technologies and is available in many licensable variations, for example: GSM, GPRS, EDGE, WCDMA, HSPA, CDMA 2000 1x, EVDO Rev.0, Rev.A, Rev.B, TD-SCDMA, DVB-H, Mobile WiMAX and LTE 4G (FDD, TDD).

By automatically recording and deciphering messages from the air interface, XCAL detects any network bottlenecks and impediments to delivering high quality voice and data services, giving you invaluable input for your network enterprise.

**Benefits**
- Huge return on investment, because many technologies can be measured on the same simple platform (eg. GSM, GPRS, WCDMA, WiMAX and LTE technology etc)
- Single platform for QoS, QoE and benchmarking
- Intuitive - very simple to use with minimal / no training involved
- Highly customisable, stable and robust
- User modifications (eg. new features/functions) are encouraged and delivered through annual maintenance
- Easy and cheap to maintain

**Features**
- Easy to learn, easy to configure
- Support various LTE devices on time - UEs, Scanners
- Support various LTE test scenarios - FTP, Ping, UDP, Mobile VoIP, VOD etc
- Support LTE metrics - PHY, HARQ, Scheduling, RRM, MAC, RRC, NAS etc
- Support LTE network performance KPIs - throughput, latency, mobility etc.

**Key Parameters**

**Layer 1 Information**
Cell Info, Channel Info, CQI, Serving cell RSRP, RSRQ, UE Tx power, RACH Info, PDSCH throughput, PDSCH BLER, PBCH BLER, DL grant, UL Ack/Nack status, PUSCH PHY throughput, UL scheduling status, UL grant, DL Ack/Nack status.

**Layer 2, 3 Information**
PDCP Info (pdu, throughput, configuration, security), RLC Info (states, throughput), MAC Info (pdu, throughput, HARQ Ack/Nack info, BLER, TA), RRC message, NAS message.

**System Requirements**

<table>
<thead>
<tr>
<th>Item</th>
<th>Minimum Requirements</th>
<th>Recommended Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Pentium M processor 1.7GHz or higher processor</td>
<td>Pentium Duo Core processor 2.0GHz or higher processor</td>
</tr>
<tr>
<td>Monitor</td>
<td>1024*768 (16bit) or above</td>
<td>1280*2048 (32bit) or above</td>
</tr>
<tr>
<td>RAM</td>
<td>1GB or above</td>
<td>2 GB or above</td>
</tr>
<tr>
<td>Hard Drive</td>
<td>40GB or larger hard disk for collecting data</td>
<td>80GB (7200 RPM) or larger hard disk for collecting data</td>
</tr>
<tr>
<td>Operation System</td>
<td>Windows XP or higher</td>
<td>Windows XP or higher</td>
</tr>
</tbody>
</table>
Capturing RAN performance has never been easier. XCAL-Mobile is a leading handheld air interface monitoring tool that enables QoS and QoE testing across all GSM/WCDMA/ EVDO/WiFi technologies. It supports extensive application testing and delivers realtime network measurement and visualisation capability in simple mobile phones. All features can be controlled using the normal handset keys, which means anybody can use it.

XCAL-Mobile also supports all major smartphones and can be extended to include Apple’s iPhone and Android devices. It supports the measurement of network data throughput performance and voice quality (PESQ and POLQA).

**Use XCAL-Mobile to**
- Record radio interface data to optimise RAN performance (network rollout, tuning, verification and maintenance)
- Calibrate the performance of network services (Voice, FTP, HTTP, Multi-RAB etc)
- Perform QoS and QoE analyses
- Export performance data to either XCAP (ACCUVER's own post-processing tool for deeper 'root cause' analysis) or other 3rd party tools
- Perform automated tests that are user-configurable
- Reduce OPEX by minimising expenditure on test tools
- Support indoor and outdoor use
- Work with mobile types: Symbian (Nokia N95, N96, N97, 6121, 6720, C5, C7), iPhone (3GS, 4G) and Android

**Benefits**
- Technology independent (GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, LTE etc)
- Cheap, powerful and intuitive to use, with a high return on investment
- Vendor independent
- Extensive realtime data capture, visualisation and analysis
XCAL-P8E

Versatile 3-in-1 Benchmarking Platform

 XCAL-P8E packages drive test, unattended benchmarking and an in-building test solution into a compact, lightweight and powerful tool.

The P8E can support up to eight mobile phones that can be provisioned to benchmark a range of competitors over all key mobile access technologies like 2G, 3G, LTE and WiMax. Thanks to its lightweight chassis, it can also be easily used in walk tests.

Use XCAL-P8E to

- Perform both manual and autonomous competitive network benchmarking and troubleshooting
- Conduct a wide range of application testing and application performance analyses
- Monitor and improve:
  - Web browsing - HTML
  - Mobile messaging - SMS, MMS
  - Downloads and uploads
  - Streaming video and audio - such as streaming and VoIP calls

Benefits

- The P8E guarantees the best possible mobile experience on the network to ensure customer satisfaction
- Coupled with XCAP-Vuse and E2ES, the P8E can also be used in end-to-end network performance assessment and network auditing
- Streamlined network application testing
- Reduced costs - ‘all in one’ platform means that the P8E can be used to perform a variety of tests on one scalable platform
- Increased test accuracy and detail
- Monitoring the most important live services
- Improved time to market for new services
- Perform standard-based Voice MOS Tests
- Smartphone ready

XCAL-P8E System Configuration

The unique feature of Accuver’s benchmarking solutions is that the user can swap out mobile phones so that only the most current and commercially available phones are used in testing. This is absolutely vital because, ultimately, these tests should be as real to life as possible.

Features

- Supports up to eight test mobiles simultaneously
- Supports GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, HSPA+, CDMA2000, EVDO Rev. 0, Rev. A, Rev. B, Wimax and LTE (TDD and FDD)
- Used with a wide range of handsets and CPEs
- Compatible with Bluetooth-MOS cables
- Supports MOS testing with Bluetooth-enabled features and smartphones
- Test scenarios can be downloaded and executed remotely
- Realtime status monitoring
- Realtime upload of test results and KPIs
- Storage of log files in SD Card for faster log transfer
- Runs without external notebook or PC in ‘auto’ mode
- WiFi connectivity for external PC to monitor status/results
- DC-powered by lighter socket in cars or battery pack
- Low power consumption - 5-hour operation with battery pack
- Easy OS upgrade through SD card
- OS backup in secondary storage
- Scalable and extendable platform that can support more than eight simultaneous smartphones

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XCAL-MPM Series

Multi-Port Hub for Voice MOS testing

XCAL-MPM is the smallest and yet most flexible of Accuver’s network benchmarking solutions. The XCAL-MPM series scales from four ports (supporting four simultaneous phones) to eight ports (which supports eight phones). Each port comes with its own individual sound control, allowing independent standard-based voice quality (MOS) testing that can be used for both mobile-to-mobile or mobile-to-landline test scenarios.

The unique feature of this tool is that any phone that supports Bluetooth, can be used for voice quality analysis - proving that high quality, scalable and robust network benchmarking tools need not cost the earth.

Use XCAL-MPM Series to

- Perform network benchmarking tests using up to eight mobile phones
- Voice QoS - carry out standards-based voice MOS tests
- Smartphone-based voice QoS - use any smartphone that has Bluetooth

Benefits

- Cost-effective solution for competitive network benchmarking and assessment
- Highly portable and lightweight
- Flexible choice of test handsets
- AC or DC powered
- Supports wide range of handsets and CPEs
- Auto-configuration with XCAL
- Standards-based MOS measurement
- Supports both mobile-to-mobile and mobile-to-landline test scenarios
- Compatible with Bluetooth-MOS cables (XCAL-MPM EF)
- Supports MOS testing with Bluetooth-enabled features and smartphones

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<table>
<thead>
<tr>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td><strong>Section</strong></td>
</tr>
<tr>
<td>Phone interface port</td>
</tr>
<tr>
<td>Power output</td>
</tr>
<tr>
<td>Audio</td>
</tr>
<tr>
<td>Serial Port</td>
</tr>
<tr>
<td>HOST PC Interface</td>
</tr>
<tr>
<td>External USB Ports</td>
</tr>
<tr>
<td>Input Power</td>
</tr>
<tr>
<td>Power Consumption</td>
</tr>
<tr>
<td>Size</td>
</tr>
</tbody>
</table>
**XCAL-MO**

**Network benchmarking made easy**

XCAL-MO is a hardware platform proven to significantly improve your operational efficiency. Users can connect up to 20 handsets to XCAL-MO, which then automatically calls the network. The subsequent data can be recorded and displayed - and used to calibrate and optimise overall network performance.

**Use XCAL-MO to**
- Perform network benchmark tests to improve service reliability
- Benchmark individual service performance across competing operators
- Automate call scenarios for indoor and outdoor testing

**Benefits**
- Modular and scalable architecture that allows for future expansion
- Monitors service performance of either one or multiple networks
- Supports all major technologies and handsets/CPEs
- Easy to use and configure
- A range of service types (voice, video, emails etc) can be made to run automatically
- Fully compatible with XCAP for feature-rich post-processing of data, root-cause analysis and reporting

**Features**
- Auto Call (automated test scripts and scheduling)
- Realtime mapping for powerful geospatial visualisation
- Simultaneously records all RAN information and parameter values from connected devices
- Key measuring points include:
  - RAN data (CINR, EcIo / Tx power / Rx power etc)
  - Physical/MAC layer information
  - Layer 3 messages (and MAC management messages) and higher layer protocol messages including TCP/IP messages

**Key Parameters and Features**

**Layer 1 Information**
- DL/UL Coverage-related parameters (ie. RSSI, UE/CPE transmission power, DL CINR etc) for each RAT (Radio Access Technology)
- Serving Cell Information for each RAT

**Layer 2 Information**
- BLER (FER), ARQ (HARQ) for each RAT
- Resource management and scheduling information for each RAT
- MAC signalling messages for each RAT

**Layer 3 Information**
- Layer 3 signalling messages for each RAT

**NAS Layer Information**
- Higher layer information (ie. NAS in 3GPP)

**Scanner Information**
- Interface with scanning receiver devices for each RAT

**TCP/IP/Application Information**
- TCP/IP packet capturing and decoding
- Application layer KPI (throughput, network QoS, video quality, voice quality etc)

**Call statistics**
- Session drop rate
- Session failure rate

**Technology**
- LTE (FDD & TDD)/WIMAX (802.16d/e)/UMTS/HSPA
- HSUPA+DC-HSDPA/CDMA/EVDO Rev.A/B/GSM
- GPRS/EDGE

**Devices**
- Up to 20 devices: LTE & WIMAX CPE, UMTS etc

**GPS**
- Built-in GPS (NM/EOC183)

**Voice MOS**
- ITU-T P.862/P.862.1 (PESQ)

**Video MOS**
- PEVQ/MOS

**Message Decoding**
- L3 Message, MAC Management message, TCP/IP/RTP/RTSP/H.264/SP etc

**Power Supply**
- 110/220-240VAC; 16VDC

**Interface**
- PIU (Molex), PCMCIA, Ethernet (RJ45), USB

**Measurement**
- 3GPP/3GPP2/TU-T RF parameter; KPI measurement, Call statistics; GPS position

**Call Test**
- Voice (MOS), Video Telephony
- (MOS), FTP, HTTP, Ping, Email, VoIP, SMS, MMS, WAP, UDP, Iperf

**Physical Dimensions**
- (236 x 133 x 256 (WxHxD mm)) 5.5(kg)

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MTS is a multiple Mobile/PCMCIA terminal-based data collection tool which supports a variety of wireless technologies. It is specifically designed to perform load and capacity testing and allows users to troubleshoot, maintain, optimise and benchmark wireless voice/data systems and networks. Its GUI enables different types of connections, which means it is ultra-compatible.

This revolutionary tool also provides users comprehensive and customisable graph, message filtering and voice alarms - so that you can monitor and identify problems in realtime.

### Use XCAL-MTS to
- Support PCMCIA & USB type terminals (PCMCIA type UE/CPEs - USB type UE/CPEs)
- Provide Diagnostic Monitoring (RF) data, PPP data logging function
- Support various types of Autocall functions (Network Entry Test- FTP/HTTP/Ping Test)
- Show RF information, terminal status and each application’s QoS information - RF information: Serving Cell Info, CINR, Rx Power, Tx Power, DL/UL Rate
- QoS: FTP/HTTP (Throughput etc), Ping (RTT, Packet Loss Rate, etc), PPP (PPP access rate etc) - same bullet point and yes, it should be in brackets
- Supports up to 50 LTE terminals in one rack and in the in case of 2G & 3G terminals, the capacity can be increased to 200 terminals
- Measure and verify the capacity of the wireless-network system and quality.

### Benefits
- Modular and scalable architecture that allows for future expansion
- Monitors service performance of either one or multiple networks
- Supports all major technologies and handsets/CPEs
- Easy to use and configure
- A range of service types (voice, video, emails etc) can be made to run automatically
- Fully compatible with XCAP for feature-rich post-processing of data, root-cause analysis and reporting
- Supports more handsets
- Can be extended as a load generation system from 10 upwards

### Specification

<table>
<thead>
<tr>
<th>General Specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>483 x 133 x 256 (W x H x D mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>15 (kg)</td>
</tr>
<tr>
<td>No of slots</td>
<td>10 EA</td>
</tr>
<tr>
<td>Slot Type</td>
<td>PIU-CE</td>
</tr>
<tr>
<td>No of devices tested</td>
<td>4 USB/UART/Audio I/O Port</td>
</tr>
<tr>
<td></td>
<td>2USB/UART/Audio I/O Port 1R/45 and 1PCI Express for PCMCIA</td>
</tr>
<tr>
<td>Embedded CPU B/D</td>
<td>Core2Duo 2.16GHz</td>
</tr>
<tr>
<td>RAM</td>
<td>2GB DDR</td>
</tr>
<tr>
<td>DC Input</td>
<td>DC48V</td>
</tr>
<tr>
<td>Power consumption</td>
<td>250W (typ), 500W (max)</td>
</tr>
<tr>
<td></td>
<td>150W(typ), 300W (max)</td>
</tr>
<tr>
<td>Operating Environment</td>
<td>Temperature: -5-65ºC</td>
</tr>
<tr>
<td></td>
<td>Humidity: 0-80%RH</td>
</tr>
<tr>
<td></td>
<td>Vibration: 20 (X-Y-Z each axis)</td>
</tr>
</tbody>
</table>

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XCAP is a powerful and highly configurable analysis platform that allows you to mine, analyse and report data gathered in XCAL. Available as both a stand-alone platform and an enterprise-grade client-server solution, it supports all wireless standards and major third party data formats.

XCAP minimises OPEX by automating the whole network post-processing and troubleshooting workflow. Because it’s designed by engineers for engineers, it comes loaded with a comprehensive list of standard-specific KPIs, is easy to use, configure and maintain and is continually evolved to capture user feedback and major feature upgrades.

Use XCAP to
• Quickly troubleshoot and conduct root-cause analysis of wireless networks - including massive volumes of drive test data
• Provide detailed reports on service-specific and overall network performance
• Benchmark radio and application level metrics
• Build and present KPI reports across the enterprise
• Analyse trends and perform complex statistical analysis
• Visualise service and network-level performance geospatially.

Benefits
• Scalable, stable platform - either stand-alone or client-server configuration
• Robust data management system for managing and mining massive volumes of data quickly and easily
• Technology independent and first to market for new technologies
• Supporting every major new wireless technology: GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA, CDMA2000, EVDO Rev.0, Rev.A, Rev.B, TD-SCDMA, DVB-H, WiMAX and LTE
• Minimises OPEX through process automation
• Easy to use, install and configure - and cheap to maintain
• Highly customisable, stable and robust
• User modifications (eg. new features/functions) are encouraged and delivered through annual maintenance

Together with XCAL, XCAP offers unparalleled sophistication and simplicity in improving your network performance.

Key Features
• Data import/export function - capable of importing data by CSV file format for post-processing data gained other than XCAL series. Data can also be output to Excel, CSV, MIF, Google Map or text formats
• Replay function - replays data in the graphs, maps, tables and messages windows in the same way as the actual logging
• Multi-window synchronisation function - when multiple windows are open and if an area of data is assigned in one window, other windows display the same time zone, which facilitates multidimensional post-processing of data
• Neighbour List post-processing function (CDMA2000, WCDMA, WiMAX, LTE) - enabling the post-processing of shorts and overs for system-recorded Neighbour List by comparing data between scanner and handset
• Data filtering - abstracts data that satisfies specified conditions
• Pilot Pollution post-processing function (CDMA2000, WCDMA, WiMAX, LTE) - abstracts polluted areas

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XCAP-Vuze

Server-Based Network Analysis and Enterprise Reporting

XCAP-Vuze is a web-based server version of XCAP, meaning that all your enterprise network measurement data can be centrally stored, intelligently mined and viewed by a range of users simultaneously (e.g. drive test data from either XCAL or other 3rd party tools; indoor walk tests, actual mobile traffic, customer-centric data etc). In addition, you can overlay data with other network service data to identify key network performance metrics and bottlenecks - either geospatially or via the web.

Use XCAP Vuze to

- Generate management reports on network quality and performance
- Ensure network assets perform in line with expectation e.g. base station performance for VIPs etc.
- Visualise network performance improvements over time that arise from tuning activity
- Load data automatically upon arrival of new log files
- Diagnose Layer 3 messages and RF parameters automatically
- Provide area sampling that can be defined by the user
- Analyse in-building data
- Support CDMA/EVDO/WCDMA(R99)/HSDPA/HSUPA/HSPA/EDGEM/MAX/LTE

Benefits

- Delivers a common view of network performance across the enterprise (marketing, customer service, operations, maintenance and radio access network etc)
- Shares data among engineers easily, as a large quantity of measurement data is uploaded into one central server
- Consistent and accurate reporting of asset performance
- Manages area-specific data logically and efficiently (by team, cluster, region or country-wide)
- Powerful trending analysis - by network type (2g, 3g, LTE) and/or region; binning-based KPI and statistics
- Consistent view of network benchmarking results against the competition
- Detailed cell-level analysis and reporting
- 3D mapping and geospatial visualisation.

Information can easily be managed and shared throughout the enterprise and used for different purposes, by everyone from managers to field engineers. Like all Accuver tools, XCAP-Vuze is intuitive to use and doesn’t require any knowledge of database management.

Powerful visualisation and reporting

- XCAP-Vuze stratifies network quality (eg. KPIs) by area (landmark, town, city, country or a combination of these) to enable drill-down analysis at a granular level, from 5m to country-wide.
- Users can either customise their own reports or use a raft of in-built reports.

Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Minimum</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>CPU 64bit Quad core</td>
<td>CPU 64bit Quad core</td>
</tr>
<tr>
<td>RAM</td>
<td>8GB</td>
<td>16GB</td>
</tr>
<tr>
<td>HDD</td>
<td>500GB</td>
<td>More than 2TB</td>
</tr>
</tbody>
</table>

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XCAL-Auto

Auto Data Collection System

XCAL-Auto is an unattended, remote controlled system that automates subscriber-based data collection. It supports almost all smartphones and tablets available on the market today, giving you a real life view of what subscribers actually see and hear in the network (including the use of all major applications like web-surfing etc).

With the XCAL-Auto system a number of products can seamlessly gel to form an enterprise-level, subscriber-centric QoS solution. Simply by installing various kinds of clients such as XCAL, XCAL-P8E and XCAL-Mobile (iPhone, Android based phone etc.) in any vehicle, XCAL-Auto automatically collects data over the air and stores it in a central server. The clients can be easily controlled and configured to perform a huge variety of test calls.

Use XCAL Auto to

- Automatically collect network data over all wireless technologies - 2G, 3G and LTE
- Perform MOS analysis for voice and video using smartphones
- Understand exactly how subscribers see network performance using the phones they use
- Collect competitive benchmarking data for monitoring network performance, QoS and troubleshooting
- Pin-point and pre-empt network bottlenecks
- Effectively manage opex

Benefits

- Massively reduces the cost of collecting network performance data
- Use all the latest smartphones and tablets in QoS-related analysis
- Measure several mobiles simultaneously, assigning different call scenarios to each mobile
- Alert events, messages and RF parameters with audible alarms
- Automatically upload and monitor measured data in realtime in the control server
- Consistent enterprise-wide reporting
- In-building analysis
- Highly configurable, easy to use and set up
- Realtime parameter displays
- Realtime communication history between the server and remote unit.

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Comparison

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Normal Measurement Tool</th>
<th>XCAL-Auto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Requires Complicated set-up process such as Port Setting, Phone Setting, Log Mask, Auto call Settings</td>
<td>Set test from server - remotely Perform turn-on and off by test driver</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Unreliable statistics is a common problem due to complex set-up process</td>
<td>High reliability for statistics as server manages and corrects test conditions and settings</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Install extra functions and patch manually, often at extra cost</td>
<td>Manage new version in real-time at server - offered as a fully process-aligned platform</td>
</tr>
<tr>
<td>Education</td>
<td>Requires significant training and labour costs for nationwide testing</td>
<td>Easy to set-up, configure and use Highly stable and robust</td>
</tr>
<tr>
<td>Reliability</td>
<td>Impossible to expect restoration for problems such as programme, mobile or GPS errors in test site</td>
<td>Provide automatic programme restoration function, server communicates and restores errors</td>
</tr>
</tbody>
</table>
With E2ES, network operators can now measure and analyse the E2E (end-to-end) performance of their LTE networks in one integrated platform. By collecting realtime information from a variety of network elements (realtime S1, Gn, Gi message flows etc), E2ES filters, correlates, assembles and structures the data to provide an accurate picture of your network performance.

The E2ES system is used to capture key network data and signalling messages in various nodes e.g. X2, S1-Mme, S11, S1U, S5, S8, SGi etc. This network data can then be correlated with air interface data (from XCAL, P8E etc.) to provide a complete picture of end 2 end (end-to-end) service performance.

**E2E outcomes - Performance Management**

<table>
<thead>
<tr>
<th>Function</th>
<th>Detail</th>
<th>Note</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network General</td>
<td>Call KPI Trend</td>
<td>Nationwide/local</td>
<td></td>
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<tr>
<td>Surveillance</td>
<td></td>
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<tr>
<td>KPI Monitoring</td>
<td>Call KPI</td>
<td>Attempts, Success, Drop</td>
<td></td>
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<tr>
<td>Fail Alarm</td>
<td>Fail Detect in Call Flow</td>
<td></td>
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<tr>
<td>Call Type monitoring</td>
<td>Attach / Service Request (MO/MT)</td>
<td>Node between systems</td>
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<td></td>
<td>Paging / Detach / Tracking Area Update / Dedicated Bearer etc…</td>
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<tr>
<td>Data Traffic</td>
<td>SL-U Data TrafficRx/Tx</td>
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<td></td>
<td>SGi Throughput(Downlink/Uplink)</td>
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<tr>
<td>Data Service</td>
<td>HTTP / TCP / DNS / VoLTE</td>
<td>additional Vendor specific</td>
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<td></td>
<td>Streaming etc.</td>
<td>Data Service</td>
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<tr>
<td>Handover</td>
<td>X2 Handover, SI Handover</td>
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<tr>
<td>Traffic</td>
<td>HTTP / TCP / UDP / Etc</td>
<td>A normal / Specific Service</td>
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<td></td>
<td>Smart phone Applications</td>
<td>App. YouTube, Google, Apple...</td>
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<td></td>
<td>Portal Site</td>
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<tr>
<td>A specific service</td>
<td>Top 50 Trend Surveillance</td>
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<tr>
<td>DNS Query –Answer</td>
<td>KPI</td>
<td>Attempt, Success, Res Time, Etc...</td>
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<td>Top Query Time / Top Source</td>
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<tr>
<td>Data Trace (Real-time)</td>
<td>Data &amp; Signaling Real-time Trace</td>
<td>By IMSI, Mobile IP</td>
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</tbody>
</table>

**Use E2E to**

- Monitor end-to-end network performance for LTE network
- Perform synchronised analysis of the air interface, core and IP network e.g. to highlight where data packets were lost and find a reason and solution
- Reduce the cost of managing trouble tickets
- Improve throughput
- Localise network problems geographically
- Have a scalable platform and proven technology
- Minimise OPEX
- Reduce the need for drive testing

**For LTE**

- Perform KPI analysis and mobile equipment user data protocol analysis
- Monitor and analyse both user-plane and control-plane information for each node (Uu, S1-MME, S1-U, X2-C, X2-U, SGi)
- Core network protocol analysis (S1, X2, SGi)
- Application server (Web, FTP, UDP) protocol analysis
- Measurement of transmission delays for each packet interval
- Measurement of data re-transmission and throughput
- Integrated analysis on the same time axis

**Key Features**

- Synchronised end-to-end testing and network analysis based on call flow - smartphone, S1, SGi etc
- L1, L2, L3, NAS, TCP, UDP, IP and APP protocol message analysis
- Rich analysis features such as end-to-end call trace and analysis, packet loss and root cause, application analysis (FTP, HTTP etc), root cause protocol analysis; realtime User Trace Flow Charts
- Packet viewer for higher-level protocol messages - Ethernet, IP, SCTP, UDP, GTP, HTTP, FTP etc
- Powerful geospatial visualisation, reporting and analysis
- Continuous network monitoring for each node, with alarm functions for troubleshooting and corrective action
- Sophisticated statistical reporting
- Easy to deploy and use (portable, ‘plug and play’ version of E2ES is also available)
- Future-proof and scalable

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We understand that it’s crucial for our customers to innovate constantly, bringing end users high quality, new functionality and competitive costs.

That’s why we act as a reliable partner in evolving products and services, with a seamless blend of product design, software development and support, and integration of hardware.

In harmony with your team, we can:

- Tailor software to fit your needs - from low-level chipset integration to drive test platforms
- Change visuals of 3rd party applications
- Configure products as necessary
- Develop bespoke time-saving automation solutions
- Develop additional product functionality or capabilities
- Interface to other BSS/OSS platforms

Clients rely on Accuver for deep domain expertise in technologies such as LTE, WiMAX and femtocells. We also bring service domain expertise, from low-level ASIC and DSP development, through to enterprise and carrier-grade platforms. As well as meeting your functional requirements, we stay at the forefront of industry trends, offering insights into shifting expectations, user experience and behaviour.

**Swift, efficient results**

Time is of the essence in the mobile communications industry and we can accelerate your product development through flexible license frameworks. By building products on a common, scalable platform and applying state-of-the-art software engineering practices, we can meet your needs within a very short development cycle and maintain usability and accuracy.

We’ve worked with clients to create some of the most innovative products in the industry, such as the first commercially available drive test tools for LTE, and true E2E LTE system optimisation tools. To speak to us about customisation options, please contact your nearest Accuver regional office. Contact details can be found on the reverse of this brochure.

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Solving problems, informing decisions

Our consultants can work with your business to help you to meet technology, engineering and infrastructure challenges with KPI commitment. Take advantage of our highly regarded team, who have a deep understanding of the most recent tools and methodologies.

Sharing our expertise

With applied training and bespoke workshops, we can transfer our skills and help you to deal with the challenges ahead. The emphasis is not just on ‘how to’ but ‘why’ and ‘what if’, looking at real-life case studies, common issues and hot topics in a practical environment.

Guaranteed performance and impact

We want you to feel as confident as we are in the elegance and quality of our solutions. To ensure you do, we have created our own set of rigorous quality processes. You can be sure your investment will be well protected and your equipment will be available and fully functional.

Shaping the next generation

Accuver thrives on R&D and we are proud of our track record in industry innovation. Our development team includes respected researchers with considerable insight into the latest issues in networks, devices and services. Work with us to pioneer new and ground-breaking solutions.

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