

Addressing the Challenges of VoLTE Implementation

Anritsu's Rapid Test Designer (RTD) VoLTE-IMS Solution Reduces Costs and Time-to-Market

Chipset vendors and device makers are facing the challenges of complexity and time-to-market pressure when implementing Voice over LTE (VoLTE) capability in their products. This briefing note describes those challenges and explains how Anritsu's Rapid Test Designer (RTD), based around an LTE system simulator can address them.

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The Challenges of VoLTE

Long Term Evolution (LTE)

LTE is the 4th generation of the ETSI global mobile telephony standard, sometimes referred to as “4G”. It is an entirely packet-switched radio access network offering high performance and efficiency. LTE’s high transfer rates and low latency mean that it is capable of supporting high quality voice over IP with Rich Communication Services.

Voice Services

Voice over LTE (VoLTE) [pronounced “Voltee”] refers to a complex combination of technologies that delivers packet switched voice and other multimedia services, including video, over the LTE network. GSMA (www.gsma.com) has defined the IR.92 standard for voice over LTE, which uses a subset of IMS functions.

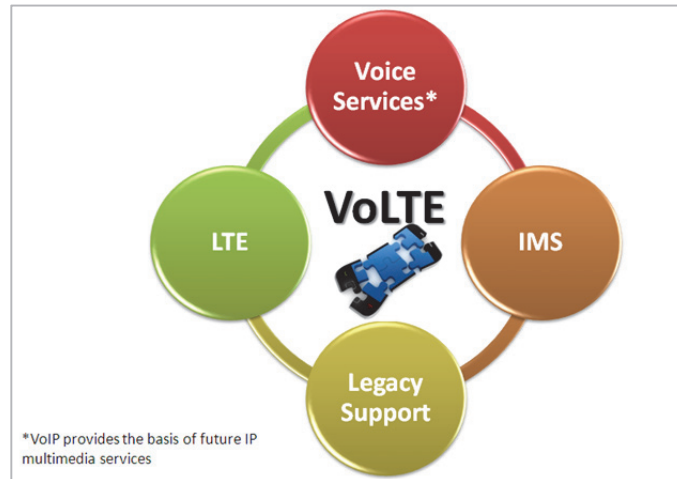
IP Multimedia Subsystem (IMS)

IMS is a standardized platform for the delivery of IP based multimedia services.

Legacy Support

For a seamless user experience, packet switched calls placed on an LTE network will need to transfer to circuit-switched mode in areas with legacy network coverage.

A Complex Combination of Technologies



A successful high quality user experience requires high quality interactions between the voice services, the LTE transport, IMS, and legacy support. It is critical that these interactions are verified and any anomalies are addressed as early in the R&D process as possible.

Options for VoLTE Devices with Legacy Support

Service providers will need to evolve existing circuit-switched voice services to VoLTE as LTE coverage expands.

Several interim solutions are being adopted to deliver voice services alongside LTE data services. Single Radio Voice Call Continuity (SRVCC) is the standard for legacy interoperability that has the most industry support.

| | |
|-------|--|
| VoLTE | <ul style="list-style-type: none"> • IMS-based service designed for all-IP • A starting point for multimedia services • Target for virtually all carriers |
| SRVCC | <ul style="list-style-type: none"> • Single-radio approach • Designed for GSM/UMTS-LTE carriers • e.g. AT&T, T-Mobile USA, Telstra |
| SVLTE | <ul style="list-style-type: none"> • Dual-radio approach • Designed for CDMA-LTE carriers • e.g. VzW, MetroPCS, US Cellular |
| CSFB | <ul style="list-style-type: none"> • A long-term “interim” solution • Limited service evolution • e.g. AT&T, Rogers, SKT, TeliaSonera |

R&D engineers need a solution that provides the flexibility to test all the common scenarios along with the ability to create their own more specialized test cases. The right solution needs full stack control for not just LTE, but also IMS and legacy protocols. Voice and video services are susceptible to network impairments such as packet loss and delay. This means that objective and repeatable measurements of factors affecting the end user experience are critical to success during the protocol development phase.

Urgent Need for VoLTE Testing

Trials of VoLTE with SRVCC will take place during the 2nd half of 2012, and commercial services are expected to ramp up during 2013. This means there is an urgent need for organizations to speed up testing and guarantee the availability of devices when the market is ready.

Implementation Challenges

The overriding challenge for VoLTE device makers is to ensure a high quality user experience that is at least as good as today's circuit-switched services.

The technical challenges include -

- **Many new protocols**

The SIP signaling between the device and the IMS core network must be verified, along with other IMS protocols such as IPv6, SigComp, IPSec and P-Headers.

- **Integration of the LTE protocol stack with the IMS control layer**

The end-to-end IMS signalling must be tested over the LTE radio access network.

- **Mobility between PS and legacy CS networks**

Single Radio Voice Call Continuity (SRVCC) should operate with no discernible effect on the user's experience.

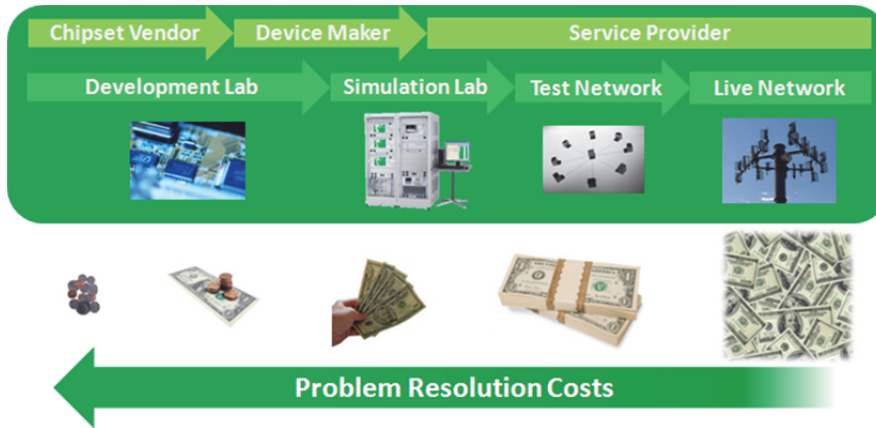
- **Complying with standards to ensure global interoperability**

Implementation will need to comply with the GSMA specifications.

- **Complying with regulatory requirements such as emergency calls**

Emergency calls over IMS in LTE-only coverage areas, with positioning information.

Early Fixes Avoid Costs



Studies have shown that finding and fixing a software problem after delivery is often 100 times more expensive than finding and fixing it during the requirements and design phase. Problems found by consumers can be catastrophic for a brand. This means that world-class organisations are performing as much testing as possible using equipment that can simulate the real-world RF environment in the development lab. The good news is that VoLTE can now be exhaustively tested in this kind of environment.



Market-Leading VoLTE Test Solution

The RTD VoLTE-IMS solution provides an integrated solution of Anritsu's Rapid Test Designer (RTD) and the Radvision PROLAB IMS test solution. Both of these solutions have been used by the leading chipset manufacturers. This is the only solution that integrates these two marketing leading platforms.

A Unique Partnership

Anritsu's RTD is the long-established tool of choice for radio protocol development test. Radvision's PROLAB is the dominant IMS test solution world-wide.

Together, the combination of these best-in-class products offers complete end-to-end VoLTE-IMS testing with full automated control from the RTD test creation and execution environment. Our companies deliver the only integrated, single-supplier solution on the market.

RTD offers speed and flexibility

RTD is the easiest way to address the issues that are encountered during device development and measure device performance. It does not require programming expertise and has reduced the time to market for the world-class organisations that use it for test script creation, execution and analysis. Its flexible test creation environment allows test designers to open multiple tests and reusable procedures simultaneously.

Comprehensive Test Capability

Radvision's ProLab adds comprehensive IMS test capability for VoLTE (and beyond) to RTD:

IMS Core Emulation

A server to simulate various network topologies and entities on a VoIP network.

SIP servers, IMS Servers (I-CSCF, S-CSCF, P-CSCF) as well as Gatekeepers can be emulated.

UE Emulation

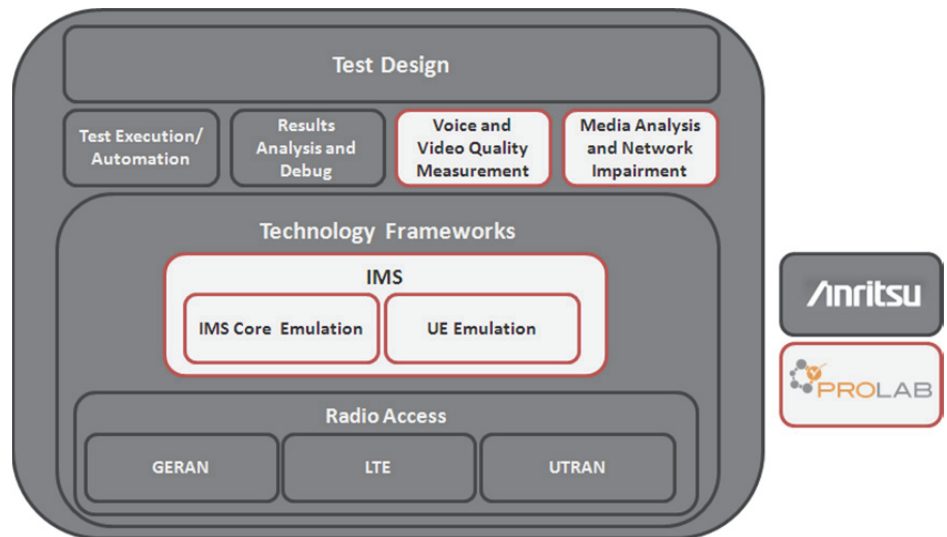
Advanced UE emulation generates signaling and media traffic to the device under test

Voice Quality Measurement

Mean Opinion Score (MOS) and Perceptual Evaluation of Speech

Video Quality Measurement

No-Reference and Full-Reference methods for measuring video quality.



Addressing User Experience Challenges

RTD can verify the performance of critical real-time services with its real time audio and video quality measurement capability. Call quality is also addressed through built in media test cases and network impairment simulation, allowing the user to insert multiple errors into the application data stream.

Addressing Technology Challenges

End-to-end IMS signalling over an LTE transport mechanism addresses the challenges posed by integration of the LTE protocol stack with the IMS control layer and all its various protocols. Multiple eNodeBs can be simulated, and a wide range of LTE connections can be set up with the device under test.

RTD's support for multiple access technologies allows for testing SRVCC and the interim mechanisms for legacy network support.

An extensive library of built in IMS test cases enables standards compliance testing. The solution is ready for testing Rich Communications Suite (RCS) functions such as presence, instant messaging, file transfer, address book, XML Document Management (XDM).

Summary

Laboratory simulation of the complete end-to-end user experience for voice and multimedia services over the LTE transport mechanism finds implementation problems earlier and save costs. Meeting this challenge early in the development cycle will enable the industry to meet aggressive time-to-market expectations for VoLTE-capable devices.

Anritsu's RTD can dramatically reduce testing time with its easy to use flow chart interface requiring no programming expertise. The Anritsu RTD provides total control from a single environment giving it the ability to be automated for unattended operation. The Anritsu RTD makes it easy to get started with a built in library of test cases.

It is the only turnkey solution that combines extensive media testing functions with LTE radio testing, legacy technology support and IMS client and server emulation.

- **United States**

Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

- **Canada**

Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

- **Brazil**

Anritsu Eletrônica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

- **Mexico**

Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

- **United Kingdom**

Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

- **France**

Anritsu S.A.
12 avenue du Québec, Bâtiment Iris 1- Siic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

- **Germany**

Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

- **Italy**

Anritsu S.r.l.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

- **Sweden**

Anritsu AB
Borgarfjordsgatan 13A, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

- **Finland**

Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

- **Denmark**

Anritsu A/S (Service Assurance)
Anritsu AB (Test & Measurement)
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

- **Russia**

Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Russia, 125009, Moscow
Phone: +7-495-363-1694
Fax: +7-495-935-8962

- **United Arab Emirates**

Anritsu EMEA Ltd.
Dubai Liaison Office
P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suit 701, 7th Floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

- **Singapore**

Anritsu Pte. Ltd.
60 Alexandra Terrace, #02-08, The Comtech (Lobby A)
Singapore 118502
Phone: +65-6282-2400
Fax: +65-6282-2533

- **India**

Anritsu Pte. Ltd.
India Branch Office
3rd Floor, Shri Lakshminarayan Niwas, #2726, 80 ft Road,
HAL 3rd Stage, Bangalore - 560 075, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

- **P.R. China (Shanghai)**

Anritsu (China) Co., Ltd.
Room 1715, Tower A CITY CENTER of Shanghai,
No.100 Zunyi Road, Chang Ning District,
Shanghai 200051, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

- **P.R. China (Hong Kong)**

Anritsu Company Ltd.
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

- **Japan**

Anritsu Corporation
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-1221
Fax: +81-46-296-1238

- **Korea**

Anritsu Corporation, Ltd.
502, 5FL H-Square N B/D, 681
Sampyeong-dong, Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-400 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

- **Australia**

Anritsu Pty. Ltd.
Unit 21/270 Ferntree Gully Road, Notting Hill,
Victoria 3168, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

- **Taiwan**

Anritsu Company Inc.
7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

Please Contact: