

VoLTE Lab

Complete test suite for Voice-over-LTE

VoLTE Lab is a complete test suite for Voice-over-LTE, that includes the LTE LabKit, the Yate MiniCore and two iPhone 6s. It is fully configured and intended for use as a VoLTE test bed and learning environment.



With VoLTE Lab you can have a deep view into the internals of VoLTE technology, with Wireshark.

You can run Wireshark on the LTE Phy radio interface.

You can run Wireshark on S1-MME and S1-U interfaces and also on the S6a interface.

Components

- ✓ **iPhone 6s:** UEs with a very good VoLTE implementation.
- ✓ **Yate MiniCore:** a software-defined compact core network for LTE/IMS and GSM/GPRS.
- ✓ **LTE LabKit:** a highly configurable test eNodeB/BTS with three GSM and one eNB modes.

Features and benefits

- ✓ Wireshark enabled
- ✓ Fully configured, fully functional VoLTE test suite
- ✓ Built on general purpose hardware
- ✓ Running Yate / YateBTS / YateENB software on Linux
- ✓ Three management interfaces (SSH, HTTP-local and remote)
- ✓ Easy to order, worldwide delivery
- ✓ Easy licensing system

MiniCore

YateHSS/HLR & YateUCN in a box for testing & research

MiniCore combines our YateHSS/HLR, YateUCN and YateSMSC in a small package.



Components

The MiniCore is a small factor PC computer that has preinstalled the following software components:

- ✓ **YateUCN** (MSC/VLR, GMSC, gsmSCF, MME/SGW/SGSN, PGW/GGSN, IMS CSCF)
- ✓ **YateHLR/HSS** (AuC, HLR, HSS, Subscriber management)
- ✓ **YateSMSC** (SMS store-and-forward, routing, home routed SMS)
- ✓ **YateSTP** (routing of SS7 messages by Point Code or Global Title)
- ✓ **YateDRA** (routing of Diameter messages by host, realm, application)
- ✓ **YateMMI** (Web management interface)

On demand additional components can be installed on the same hardware.

Features

- ✓ Setup/edit mobile network and component preferences via **MMI management interface**
- ✓ **Minimal monitoring of each network component**, additional YateBTS monitoring possible
- ✓ **Wireshark capture** of communication between components including decrypted IMS traffic
- ✓ **JSON API integration** with any SIM management and CRM systems
- ✓ **JSON and REST API** for sending SMS
- ✓ Can use both **SIGTRAN/SS7 and Diameter** for signaling
- ✓ **Supports both IPv4 and IPv6**
- ✓ **Works both stand alone and with external components**

Communication interfaces

- ✓ **C interface** (MAP, HLR <-> GMSC)
- ✓ **D interface** (MAP, HLR <-> VLR)
- ✓ **E interface** (MAP, MSC <-> MSC)
- ✓ **F interface** (MAP, MSC <-> EIR)
- ✓ **J interface** (MAP, HSS <-> gsmSCF for USSD)
- ✓ **Gr interface** (MAP, HLR <-> GMSC)
- ✓ **Gc interface** (GTP or MAP, GGSN <-> HSS, optional)
- ✓ **S6a/S6d** (Diameter, MME/SGSN <-> HSS)
- ✓ **S13** (Diameter <-> VLR)
- ✓ **S1 interface** (S1AP & GTP-U, YateENB <-> EPC)
- ✓ **Gn/Gp interface** (GTPv1, SGSN and GGSN)
- ✓ **S5/S8 interface** (GTPv2, SGW and PGW)
- ✓ **Gi/SGi interface** (IP, connects to Public Data Network)

Communication protocols

MAP/SS7/SIGTRAN	<ul style="list-style-type: none"> - M2PA or M3UA-ASP over SIGTRAN, SCTP (CRC32) - ITU TCAP, ETSI MAP v3 - ITU or ANSI SCCP and SS7 MTP - E.164, E.212 (ANSI), E.214 (ITU), TT or PC SCCP addressing - Can connect to multiple STP/GW - CAMEL phase 2
Diameter	<ul style="list-style-type: none"> - 3GPP Applications S6a/S6d, Cx/Dx - SCTP or TCP transport - Can establish or listen for connections - Can connect to multiple Routing Agents
HTTP	<ul style="list-style-type: none"> - JSON API server for configuration and subscriber management - JSON API for monitoring and information retrieval - REST API client for visited network change notification - JSON and REST API for sending SMS
SNMP	<ul style="list-style-type: none"> - SNMP v2 or v3 for information retrieval - Traps sending for alarms
Telnet	<ul style="list-style-type: none"> - Management CLI for each component - Optional SSL and password protection
Voice interconnect	<ul style="list-style-type: none"> - SIP and RTP - G711, GSM and AMR codecs
SIP	<ul style="list-style-type: none"> - Supported standards (RFC3261) - Registrar function - B2BUA for calls - RTP (RFC3550) with sideband DTMF (RFC2833) - SMS and USSD over IP
SMPP	<ul style="list-style-type: none"> - Standard version 3.3 - Supports bidirectional communication
RADIUS	<ul style="list-style-type: none"> - Authorization of voice calls, data sessions and short messages - Postpaid accounting for voice, data and SMS - Prepaid support by re-authorization - Support for 3GPP, Cisco VoIP VSA and Cisco ISG VSA dictionaries
SMS	<ul style="list-style-type: none"> - Format: SMS PDU (MO and MT) - MAP/SS7 transport (T-PDU format) - SIP MESSAGE transport (SMS over IP, R-PDU format)
CDR	<ul style="list-style-type: none"> - Flexible file format (default .tsv files) with customizable table headers - Automatic file rotation - Optional file transfer: FTP, SFTP - JSON HTTP push API - RADIUS with 3GPP and Cisco dictionaries



Hardware Interfaces

- ✓ Dual Gigabyte ethernet
- ✓ DVI and HDMI video*
- ✓ USB for mouse and keyboard
- ✓ 12V Power supply, 100-240V AC, 50-60Hz (included)

LTE LabKit™

LTE/GSM test equipment

LTE LabKit with the free Hosted Core service provides the full functionality of an LTE/IMS and GSM/GPRS network.



It is intended for mobile network operators laboratory use, IoT and M2M application development, mobile phone vendors, and researchers.

The LTE LabKit allows the easy and stable development of experiments and test procedures with the YateENB.

Components

The LTE LabKit is a small factor PC computer that has preinstalled the following software components:

- ✓ **YateENB** (eNodeB)
- ✓ **YateBTS** (BTS)
- ✓ **YateLMI** (Web management interface)



Communication interfaces

- ✓ **S1-MME Interface** (S1AP, YateENB <-> MME)
- ✓ **S1u** (GTP, YateENB <-> EPC)
- ✓ **SIP, RTP** (YateBTS <-> VLR)
- ✓ **Gi** (YateBTS in nipc mode) and **SGi Interface** (IP, connects to Public Data Network)
- ✓ **SIP** connects to YateUCN/MiniCore

Features

- ✓ **Wireshark monitoring** traffic inside EnodeB (S1AP, GTPu) interfaces.
- ✓ **LTE enb** (LTE EnodeB connected to a MME/MiniCore/HostedCore)
 - LTE Release 12, FDD (Radio Interface)
 - LTE Release 12, TDD
- ✓ **Capability to switch between working modes:** GSM nipc, GSM roaming, GSM dataroom, LTE enb
- ✓ **Supports both IPv4 and IPv6** connection
- ✓ **GPRS with Local breakout** (MS receive data services using their LabKit internet connection)
- ✓ **Outbound connection** through SIP/IAX in NiPC mode
- ✓ **GSM NiPC mode** (GSM Network in a PC)
 - Add/Edit individually subscribers via LMI
 - 2G authentication BTS
 - MS (Mobile Stations)
 - Subscribers acceptance based on regular expression that matches the IMSI
 - Option to see in real time: online subscribers, accepted subscribers or rejected subscribers by the BTS
 - Call detailed records for each subscriber
- ✓ **GSM roaming mode** (GSM BTS connected to YateUCN/HostedCore for voice/sms services)
 - Register/Calls/SMS are send to YateUCN/MiniCore/HostedCore

LTE specifications

Radio interface LTE Release 12 FDD, LTE Release 12 TDD

Available bands filters and antennas provided for bands 5 and 8 can operate any FDD band up to 3.8 GHz

Operating bandwidth 1.4, 2, 5, 10, 15, 20 MHz

MAC specs localized or distributed VRBs, proportional fairness scheduling

Maximum connected UEs no fixed limit

Antenna configuration 1x1 (SISO)

Network interface IPv4; IPv6

Network protocols IP

Output power up to 70mW (18 dBm)

Communication protocols

GTP-U or S1u interface

S1AP Signalling for LTE enb mode

HTTP - JSON API server for configuration and subscriber management
- JSON API for monitoring and information retrieval
- JSON and REST API for sending SMS

OpenVPN Securely connects LabKit to YateUCN/MiniCore/HostedCore through a direct connection.

SNMP - SNMP v2 or v3 for information retrieval
- Traps sending for alarms

Telnet - Management CLI
- Optional SSL and password protection

Voice - SIP and RTP
- G711, GSM and AMR codecs

SIP - Supported standards (RFC3261)
- B2BUA for calls
- RTP (RFC3550) with sideband DTMF (RFC2833)
- SMS and USSD over IP

SMS - BTS → RAN: Format: SMS PDU (MO and MT)
- BTS → Core: SIP MESSAGE transport (SMS over IP, R-PDU format)

CDR - Flexible file format
- Automatic file rotation
- Optional file transfer: FTP, SFTP

Hardware Interfaces



- ✓ Dual Gigabyte ethernet
- ✓ DVI and HDMI video*
- ✓ USB for mouse and keyboard
- ✓ 12V Power supply, 100-240V AC, 50-60Hz (included)

***Note:**

Due to radio interference, we strongly recommend to use DVI/HDMI connectors only for the initial setup

What you get

- ✓ 1 LabKit (mini-ITX PC + bladeRF + software)
- ✓ 1 LabKit power adapter
- ✓ 2 antennas for 850/900/1800/1900 MHz operation
- ✓ filters for LTE Band 5 (GSM 850) and LTE Band 8 (EGSM 900)
- ✓ 2 smartphones and chargers
- ✓ 10 SIM cards
- ✓ USB Wifi Adapter

