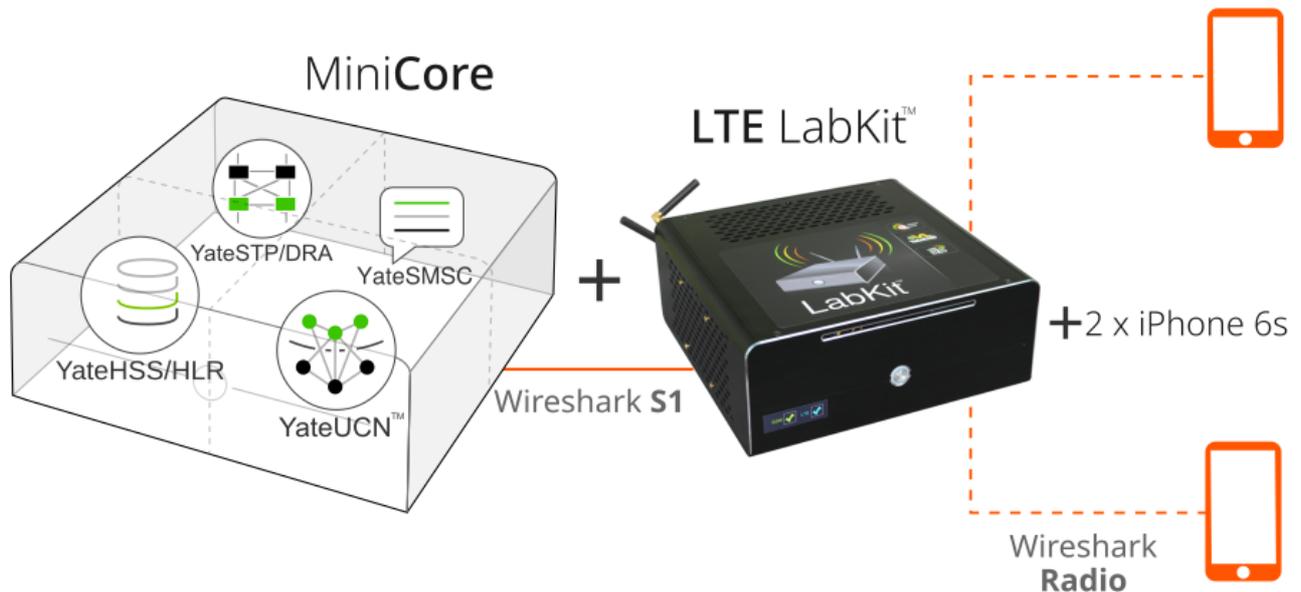


## VoLTE Lab

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.

VoLTE Lab allows the detailed assessment of the involved technology, and is able to clarify your needs in terms of higher scale VoLTE acquisition.



### Features

- 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
- Affordable price.

### Components

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

# The LTE LabKit

## 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	Signaling for LTE eNB mode
HTTP	<ul style="list-style-type: none"> <li>- JSON API server for configuration and subscriber management</li> <li>- JSON API for monitoring and information retrieval</li> <li>- JSON and REST API for sending SMS</li> </ul>
OpenVPN	Securely connects LabKit to YateUCN/MiniCore/HostedCore through a direct connection.
SNMP	<ul style="list-style-type: none"> <li>- SNMP v2 or v3 for information retrieval</li> <li>- Traps sending for alarms</li> </ul>
Telnet	<ul style="list-style-type: none"> <li>- Management CLI</li> <li>- Optional SSL and password protection</li> </ul>
Voice	<ul style="list-style-type: none"> <li>- SIP and RTP</li> <li>- G711, GSM and AMR codecs</li> </ul>
SIP	<ul style="list-style-type: none"> <li>- Supported standards (RFC3261)</li> <li>- B2BUA for calls</li> <li>- RTP (RFC3550) with sideband DTMF (RFC2833)</li> <li>- SMS and USSD over IP</li> </ul>

- 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

## 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

## Hardware Interfaces

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

# The Yate MiniCore

## Communication protocols

- MAP/SS7/SIGTRAN**
- 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**
- 3GPP Applications S6a/S6d, Cx/Dx
  - SCTP or TCP transport
  - Can establish or listen for connections
  - Can connect to multiple Routing Agents

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

- Telnet**
- Management CLI for each component
  - Optional SSL and password protection

**Voice interconnect**

- SIP and RTP
- G711, GSM and AMR codecs

**SIP**

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

**SMPP**

- Standard version 3.3
- Supports bidirectional communication

**RADIUS**

- 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**

- Format: SMS PDU (MO and MT)
- MAP/SS7 transport (T-PDU format)
- SIP MESSAGE transport (SMS over IP, R-PDU format)

**CDR**

- Flexible file format
- Automatic file rotation
- Optional file transfer: FTP, SFTP
- JSON HTTP push API
- RADIUS with 3GPP and Cisco dictionaries

## 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, SGSN ↔ HSS)
- Gc Interface (GTP or MAP, GGSN ↔ HSS, optional)
- S6a/S6d (Diameter, MME/SGSN ↔ HSS)
- S13 (Diameter, MME/SGSN -> EIR)
- SIP, RTP (YateBTS ↔ 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)

## Hardware Interfaces

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

## About us

Yate and YateBTS are created and operated by a group of Romanian and American companies, including Null Team, SS7ware and Legba. Legba, Inc. provides innovative infrastructure for mobile operators. SS7ware Inc. provides 2.5G/4G mobile networks. The company is a subsidiary of Null Team.

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