

## Echo One and Echo Lite – Technical Overview

# Advanced mobile network measurement solution

Enhancell Echo mobile network measuring tools run directly on your handset. They are designed for PC-less drive and walk surveys.

With Echo you do not need custom test devices and firmware. This means that you can be assured to see the network exactly as your customers see it.

Having Echo run on commercial phones not only saves you from spending on expensive custom hardware but also allows you to easily transfer licenses from one phone to another.

Automatic software updates guarantee that you are always running the latest software.



## Echo One and Echo Lite

Echo One and Echo Lite are extremely versatile hand-held cellular protocol measurement tools. Echo One and Lite can operate on several commercial Android and Harmony OS handsets\*. Echo One and Lite allow the user to perform the most thorough hand-held measurements in the industry.

Echo One and Echo Lite are software-only products, and their licensing is delivered via the Cloud service. This cloud-based solution is completely independent of physical production chains. Thus, the deliveries and manufacturing capabilities are stable, swift, and flexible.

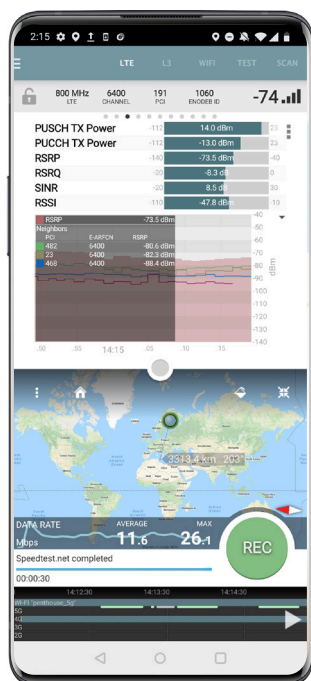
\*Capabilities vary between various phone models, please contact Enhancell sales for more information.

## Full 5G support

Echo One supports measurement for a wide range of 5G parameters ensuring the full advantages of 5G measurement for the users. 4G licenses are upgradeable to 5G making it convenient and cost-effective for existing customers. New customers can enjoy the 5G license benefits on most 5G supported Android and Harmony OS handsets and regardless of the post-processing tools they use.

## Phone independent

Echo One and Echo Lite applications supports Android 4.3 and newer and Qualcomm chipsets, and Harmony OS and HiSilicon chipsets. In addition, Echo One does not require a custom ROM, only a free-of-charge community root. Echo Lite does not require rooting. Thus, Echo One and Lite support a large variety of off-the-shelf phones and the user has an immediate support for new phones. Echo One and Lite support measurement for technologies including GSM, CDMA, EVDO, WCDMA, HSDPA, HSUPA, HSPA+, LTE/LTE-A, 5G, Wi-Fi and Bluetooth.



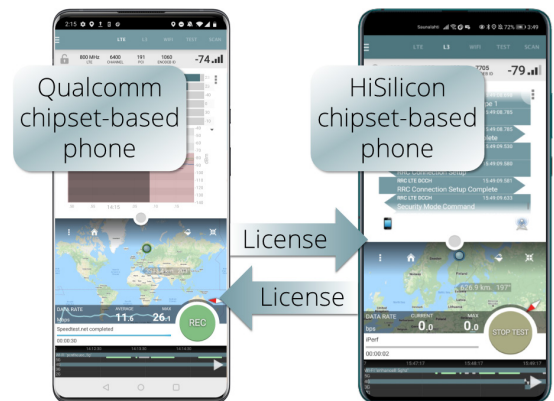
## Key benefits

### Unparalleled flexibility on license

Echo offers unparalleled flexibility and cost-effectiveness with licenses: all technology functions are included by default and the license transfer is standard from handset to handset.

We support multiple chipset vendors with one universal license. This gives our customers unparalleled advantage when it comes to selecting or upgrading their test devices: no additional costs for a new license! The same license can even be used in phones with different chipsets.

Echo's cloud-based licensing guarantees the user full control over license transfers, and a real-time view of license usage. To add to the flexibility, both perpetual and rental licenses are available.

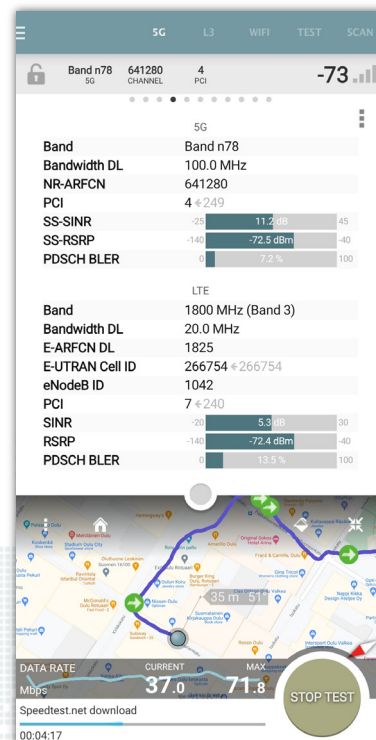
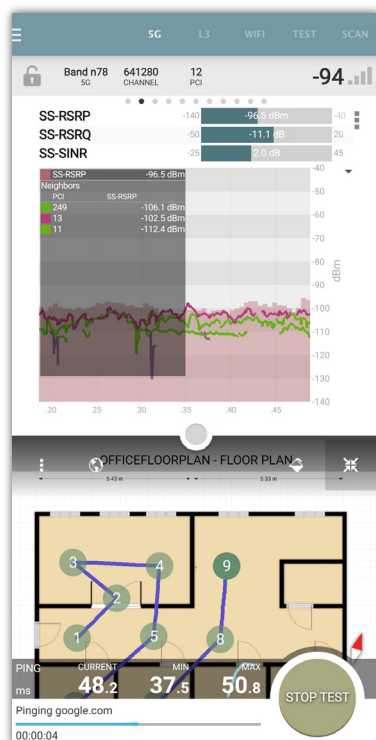


### Indoor and outdoor maps

Echo One and Echo Lite include support for indoor and outdoor mapping and an offline mode map data caching for outdoor maps.

Echo One and Echo Lite support digital images and photos of the floor plan taken with the device as indoor maps. Indoor floor plans include markers and geodetic coordinates (support e.g. for iBwave format). This enables geocoding indoor floor plans on top of Google Maps.

Echo One and Echo Lite support Google Maps, OpenStreetMap and ÖPNVKarte as outdoor maps. The positioning of a measurement is based on GPS location. Echo One and Echo Lite support both internal GPS and external GPS via Bluetooth. The drive route can be visualized on a map as color-coded parameter values in real time.





## OTT application testing

Echo One and Echo Lite support several built-in application testing options. Echo enables the user to test a wide range of applications individually and with scripts.

Advanced scripting allows fully customizable test scenarios, including parallel scripting to fulfill any testing methodology required.

## Support for scanners

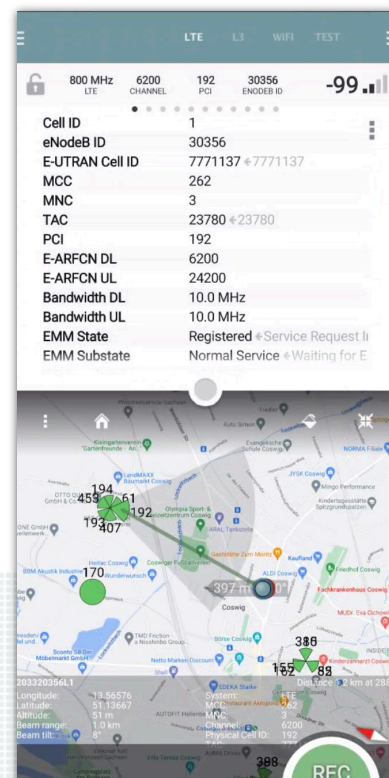
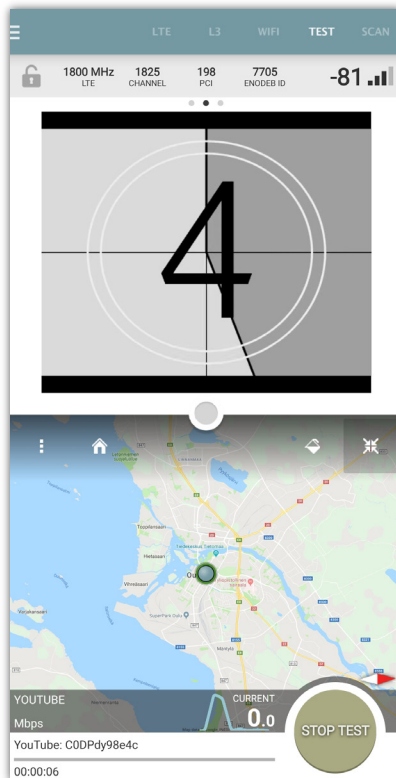
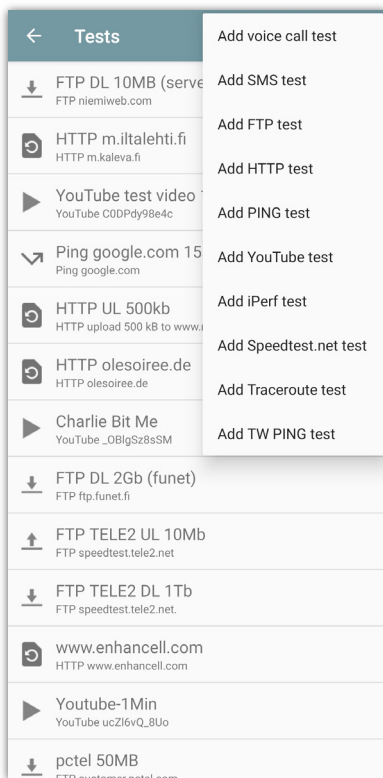
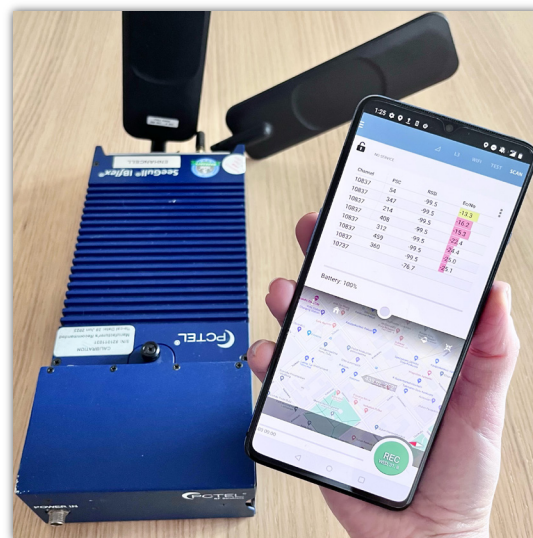
Echo One and Echo Lite supports PCTel IBflex®, PCTel HBflex®, PCTel Gflex® and DRT 431B scanners, as well as RF Explorer. Scanners can be connected via Bluetooth and RF Explorer via USB OTG cable to the phone. All scanning results are displayed on the connected phone.

## Cell file support

Echo One and Echo Lite support cell file and line to server directly on the phone. This enables the identification of the sector and position of the site under test.

## GPS

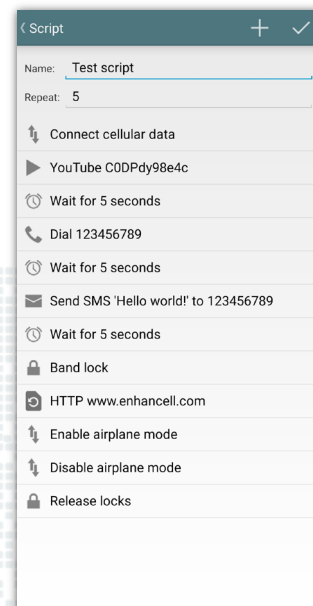
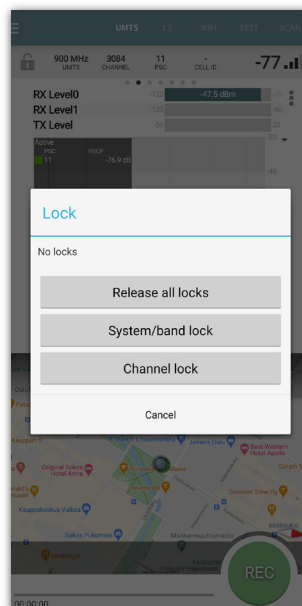
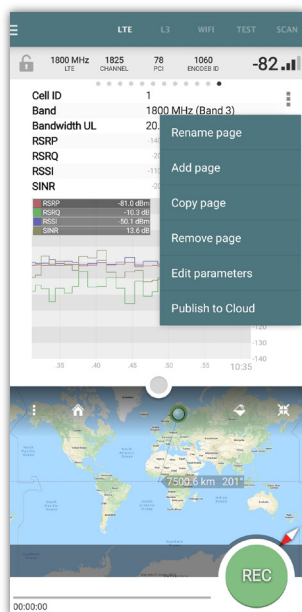
Echo One can use the phone's internal or external GPS receiver via Bluetooth or USB. GPS location accuracy is recorded to the log file along with the location and can be reviewed when analyzing log files. Typical smartphone can reach an accuracy of five meters under a strong GPS signal.



## Key Features\*

- Android and Harmony OS supported application supporting Android 4.3 and newer, and Harmony OS
- Supports GSM, CDMA, EVDO, WCDMA, HSDPA, HSUPA, HSPA+, LTE/LTE-A, 5G, Wi-Fi and Bluetooth measurement
- Support for Echo Cloud
  - Settings configuration from Cloud
  - License management
  - Automatic log file transfer to Cloud
  - Test and Script synchronization with Cloud
  - Measurement, Script, and Reboot Scheduler
  - Indoor map synchronization with Cloud
  - Customized view sharing via Cloud
- Idle and Active testing using manual or scripted mode for voice call, voice quality, FTP, SFTP and HTTP data transfers, iPerf, HTML browsing, YouTube video streaming testing, SMS testing, traceroute testing, ping testing, and two-way ping (TWAMP) testing
- Manual and Scripted tests can be created and modified with built-in script editor in Echo, or in Cloud, from which tests are automatically synchronized to devices
- Option to set scripted tests in parallel
- Support for Google ViSQOL: an objective speech quality model for voice quality testing
- Support for POLQA v3 voice quality testing real-time MOS calculation (optional)
- System lock, band lock, LTE cell lock, and carrier lock (UMTS). (Device-dependent feature.)
- Improved locking function allowing phone forcing without rebooting the device and improved UI for selecting locking
- Phone locking controlled from Echo Plus and Echo Studio. Indicator displaying locking status of the phone
- Remote control via Cloud for automated/remote test execution
- Real-time statistics view for monitoring test progress
- Signaling decoder for L3 and RRC signaling messages for signaling decode in real-time. Supports the following view types: line, bar, gauge graphs, and text views
- Layer3: updated RRC decoder for the release 15 with full support for 5G signaling decoding
- User-defined views allowing parameter display in the following view types: line, bar, and text views
- Real-time network information display
- Real-time data and test progress information display
- Timeline to replay and pause measurement displays while making measurements and to view test progress in relation to time
- Control button with customizable location ensures ergonomic fit for both right- and left-handed users
- Support for indoor and outdoor mapping. Including offline mode map data caching for outdoor maps
- Indoor floor plans with markers and geodetic coordinates (support e.g. for iBwave format). Enables geocoding indoor floor plans on top of Google Maps
- Automatic deletion of 30-day idle indoor maps
- Support for internal and external GPS via Bluetooth
- Support for PCTel IBflex®, HBflex®, PCTel Gflex®, DRT 4311B and EPIQ scanners, and RF Explorer. Connected via Bluetooth and RF Explorer via USB OTG cable
- Full support for 5G scanner measurements using PCTel scanners
- Support for IPv4 and IPv6
- Packet loss measurement can be added to VoLTE calls, UDP data test, and TWAMP data test

\*Echo Lite has limited features in comparison to Echo One. See the feature comparison list at the end of this document for more information.



## Echo Cloud

Echo One and Echo Lite include the Cloud feature which gives you unparalleled control of your Echo devices from a remote location. Cloud enables:

- Store your log files automatically after recording
- Access measurements easily
- Download your measurements in a multitude of formats
- Configure and reboot Echo devices remotely
- Manage users and licenses
- Two-factor authentication for extra security
- Option to have dedicated private Cloud server in customer's desired geolocation\*
- Real-time measurement and test execution control and real-time view of the measurement and key KPIs in Cloud UI

Create and tweak your tests in Cloud. You can access them whenever you want – you can even send test configurations directly to your Echo handheld device.

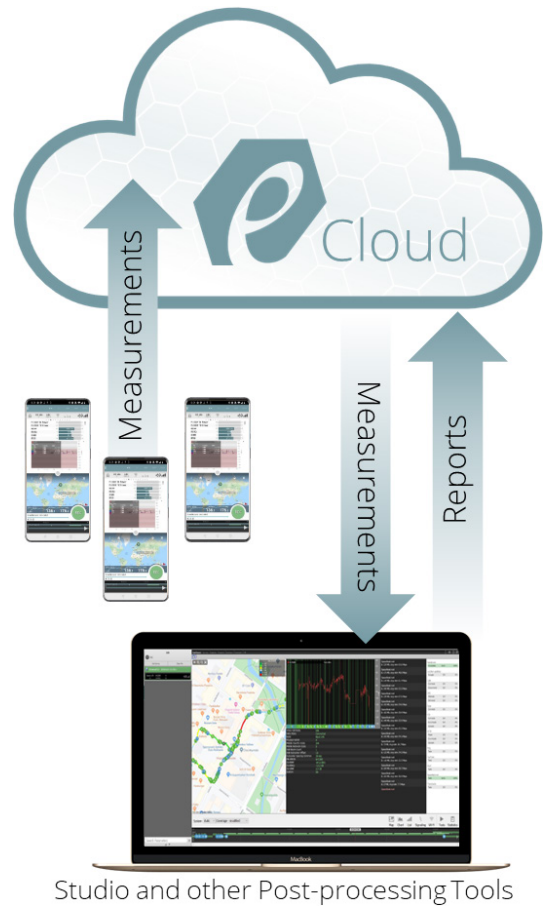
\*For more details on the private Cloud server pricing, please contact Enhancell sales.

## Echo Advantages

- Fully automated update via Cloud ensures that your software is always up to date
- Unique subscription-based pricing allows you to only pay for the licenses you need when you need them.
- Remote configuration via Cloud allows easy control of your Echo fleet
- Log file storage and export in Cloud allows you to make the most out of your data

## Data post-processing

Measurement data can be exported directly from Echo devices to Cloud when they are connected. The data can be exported further from Cloud to Echo Studio or any other compliant 3<sup>rd</sup> party data post-processing software.



## Contact

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## Echo One and Echo Lite features

Feature	Echo One	Echo Lite
Multi-protocol Survey	X	X
System/Band Lock All Protocols	X	
Channel Locking	X	
Layer 3 Logging	X	
Live Layer 3	X	
Licensing on Phone	X	X
Indoor Mapping	X	X
Scripting & Measurement Testing Data/Voice	X	X
Bluetooth Survey	X	X
802.11 Survey	X	X
Remote License Management	X	X
Third-party Analysis Tools Data Logging Export*	X	X
Logging to Cloud (Push/Remote Pull Logging)	X	X
Licensing in Cloud (Moveable Licenses)	X	X
Remote Device Control	X	X
Remote Location	X	X

\*Third-party log file formats include Qualcomm DLF, ZK-SAM, NEMO NMF, PCAP, CUSTOM CSV, Google Earth KML, and ESRI Shape.

Feature Tests	Echo One	Echo Lite
Voice Call (MOC)	X	X
Voice Call (MTC)	X	X
VoLTE	X	X
VoWiFi	X	X
MOS-LQO (ViSQOL)	X	X
MOS (POLQA v3)	X	X
FTP (UL/DL)	X	X
SFTP (UL/DL)	X	X
SMS	X	X
HTTP Browser	X	X
HTTP File UL/DL	X	X
PING	X	X
TW PING (TWAMP)	X	X
YouTube	X	X
iPerf TCP/UDP (UL/DL)	X	X
Manual Script Testing	X	X
Automatic Script Testing	X	X
Wi-Fi	X	X
Ookla Speedtest.net UL/DL/Ping	X	X
Traceroute Test	X	X

Feature Technologies	Echo One	Echo Lite
GSM	X	X
UMTS	X	X
EVDO	X	X
LTE (TDD/FDD)	X	X
Wi-Fi	X	X
Bluetooth	X	X
5G (NSA/SA)	X	X

Feature Forcing	Echo One	Echo Lite
Technology	X	
Band	X	
Channel	X	
Cell	X	

Feature User Interface	Echo One	Echo Lite
Real time display of RF Parameter	X	X*
L3 Signaling with decode	X	
Customizable UI	X	X
Test Status Display	X	X
Timeline	X	X

\*Limited set of RF parameters available

Feature Cloud Integration	Echo One	Echo Lite
Cloud by Default	X	X
License Management	X	X
Device Remote Control	X	X
Device Remote Monitoring	X	X
Script Handling	X	X
Measurement Control	X	X
Measurement, Script, and Reboot Scheduler	X	X
Measurement view sharing	X	X
Measurement File Management	X	X
Device Configuration	X	X
Cell File Management	X	X
Indoor Map management	X	X
Scanner Configuration	X	X
File Export Configuration	X	X

Feature Supported Measurement File Format	Echo One	Echo Lite
Echo	X	X
Qualcomm	X	X
ZK-SAM	X	X
Nemo	X	X
PCAP	X	X
GNS	X	X
Wi-Fi and BlueTooth survey CSV	X	X
CSV	X	X
Google Earth KLM	X	X
ESRI Shape	X	X

Feature Map Support	Echo One	Echo Lite
Indoor Map	X	X
iBwave Support	X	X
Multiple Outdoor Map Providers	X	X
Route planning	X	X



Feature Phone Rooting	Echo One	Echo Lite
Standard Android Root (Free of Charge)	X	
No Rooting Required		X

Feature Remote Control	Echo One	Echo Lite
Measurement Control	X	X
Script Management	X	X
Device Monitoring	X	X

Feature License Model	Echo One	Echo Lite
Buy to Own (Permanent)	X	X
Day Pass	X	X
Month Pass	X	X

Feature Chipset Support	Echo One	Echo Lite
Qualcomm	X	X
HiSilicon (Huawei)	X	X
Samsung	In Implementation	X
Other Chipsets	On Demand	X

Feature Scanner Support	Echo One	Echo Lite
DRT	X	X
PCTel	X	X
EPIQ	X	X
RF Explorer	X	X