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Enhancell Echo – 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 Lite are extremely versatile hand-held cellular protocol measurement tools. Echo One and Lite can operate on several commercial handsets*. Echo One and Lite allow the User to perform the most thorough hand-held measurements in the industry.

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

Echo Plus

Echo Plus introduces new methods of enabling users conducting surveys and optimizing equipment. It enables the user to control several different Echo devices simultaneously in real time. Only one set of measurement configurations is needed which adds to the efficiency of performing measurements. Echo Plus includes features such as Remote Start and Logging, Location Ping, Cloud based logging, and Transferable Licensing.

Echo Studio

Echo Studio is a measurement and analyzing tool which offers quick and easy way to produce reports and visualizations of the measurement test results. Synchronization to Cloud enables instantaneous report production of measurements performed remotely with other Echo devices. Echo devices can also be remotely controlled with Studio.

Echo Cloud

Echo Cloud is an online service included in all Echo products. In addition to providing storage and automatic syncing of device settings and log files, Cloud can control devices similarly to Echo Plus and Echo Studio. It provides an easy-to-use UI for creating and managing device configurations, tests, results and maps, which can all be synchronized with Echo devices.

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! 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.

Full 5G support

In addition to 4G and other established technologies, Echo product line 3.0 supports measurements for a wide range of 5G parameters ensuring the full advantages of 5G measurement for our customers. 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.

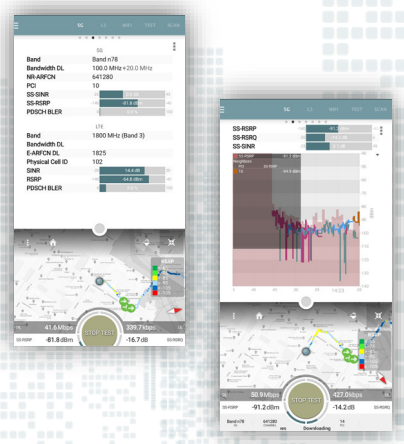
Lossless log file

Echo One and Echo Plus utilize lossless log file where all the data is saved to a file without any filtering or processing. This, in turn, allows conversion from Echo files to various other formats. In addition, lossless log ensures that we always save all the data allowing us to add decodes for new parameters without having to re-drive the log file.

True vendor independence

With extensive log file export functionality, we can export log files to various formats such as; JSON, Nemo (nmf), Wireshark (pcap), Google earth (kml) and user-defined csv formats. This gives us unparalleled flexibility for the post-processing of the data. Native file import is possible with major post-processing tool vendors such as ACTIX and Gladiator.

Flexible and easy to use UI



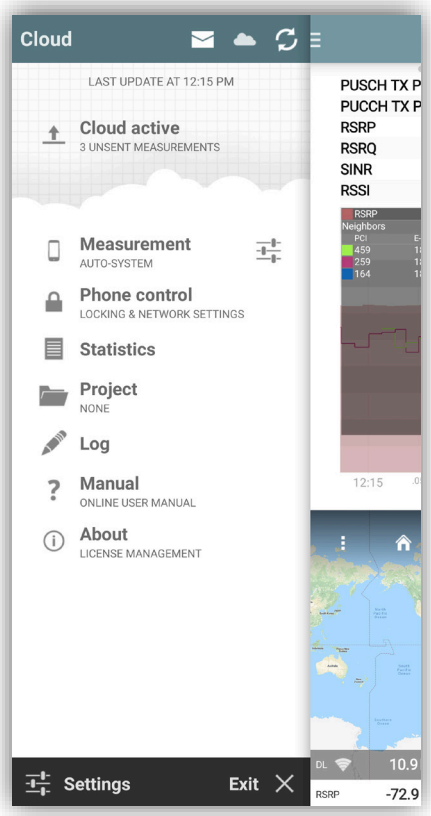
With the split screen design, the user can view the map and the measurements at the same time. With built-in standard views and fully customizable user views, Echo allows you to easily view all the data you need at one glance.

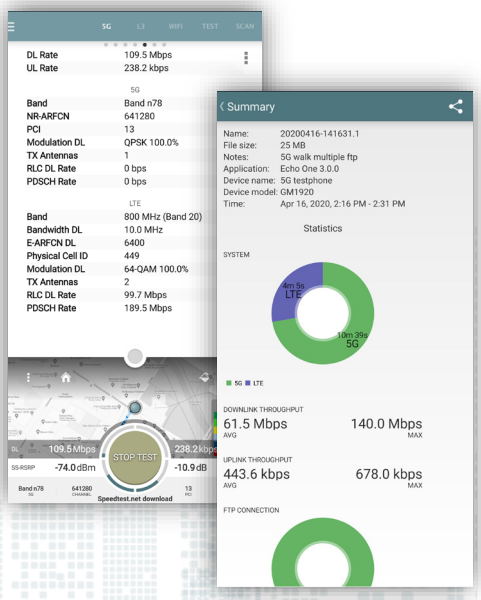
Phone independent

Both Echo One and Echo Plus will run on Qualcomm chipset-based Android terminals and on HiSilicon chipset-based Harmony OS terminals. No special firmware is needed. This gives the end-user full flexibility to purchase any phones on the market and run the measurements with the same firmware as the actual end-user. This, coupled with the flexible license transfer, gives the end-users complete control over their tool. New phone features are recorded to the log file immediately without time-consuming and expensive R&D integration.

Key Features

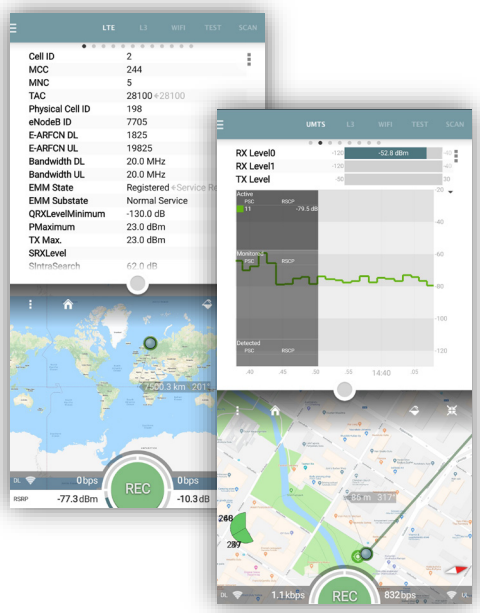
- Android and Harmony OS supported application supporting Android 4.3 and newer, and Harmony OS
- Supports GSM, CDMA, EVDO, WCDMA, HSDPA, HSUPA, HSPA+, LTE/LTE-A, 5G, Wi-Fi and Bluetooth measurement
- Support for Echo Cloud
    - Settings configuration from Cloud
    - License management
    - Automatic log file transfer to Cloud
    - Test and Script synchronization with Cloud
    - Indoor map synchronization with Cloud
- Idle and Active testing using manual or scripted mode for voice call, voice quality, FTP and HTTP data transfers, iPerf, HTML browsing, YouTube video streaming testing, Facebook action testing, SMS testing, and ping testing
- Manual and Scripted tests can be created and modified with built-in script editor in Echo or in Cloud. When tests are edited in Cloud, they are automatically synchronized to devices
- Support for POLQA 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
- Scripts can be created and modified with built-in script editor
- Real-time statistics view for monitoring test progress
- Signaling decoder for L3 and RCC signaling messages. Allowing signaling decode in real-time. Supports the following view types: line, bar, gauge graphs, and text views
- Layer3: updated RCC 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
- 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
- Support for both internal GPS and external GPS via Bluetooth
- Instant Report after data collection allowing easy sharing of report in PDF format
- Support for PCTel IBflex®, PCTel HBflex®, DRT 4311B and EPIQ scanners, and RF Explorer. Scanners can be connected via Bluetooth and RF Explorer via USB OTG cable
- Full support for 5G scanner measurements using PCTel scanners





Real-time user interface

- Split view allows viewing of Map and key parameters at one glance
- Signaling view allowing filter/color code and message decode
- User-definable data views
- Test execution view
- Wi-Fi and BlueTooth measurements



OTT application testing

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

Voice call testing

Voice call tests are automated phone calls which can be set to measure voice call quality or to mark indicators such as dialing, connects, disconnects, and failed attempts.

Voice call tests can be configured via an Echo device or Cloud. They can be executed both individually and as a part of a script test.

Voice quality testing (optional)

Voice quality can be tested with POLQA setting in a voice call test. POLQA configures the voice call quality test settings and gives narrow band (NB) and super wide band (SWB) options for the test.

IMS call testing

Echo offers support to several different Voice over LTE (VoLTE) and voice over Wi-Fi (VoWiFi) measurements. Record Session Initiation Protocol (SIP) signaling in real-time and analyze Real-Time Transport Protocol (RTP) data statistics like RTP jitter and packet loss. Further, Echo supports call statistics including call setup time, call success rates, call failures, and Single Radio Voice Call Continuity (SRVCC) statistics.

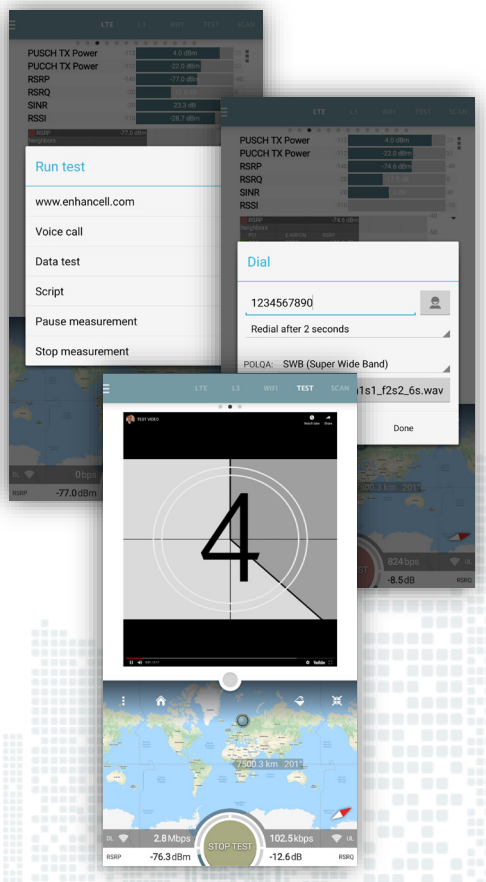
Data testing

Data tests perform a single data transfer action. A data test can be run both individually and during a signal data recording.

There are several different data test types including FTP test, HTTP test, ping test, YouTube test, SMS test, iPerf test, Speedtest.net test and Traceroute test.

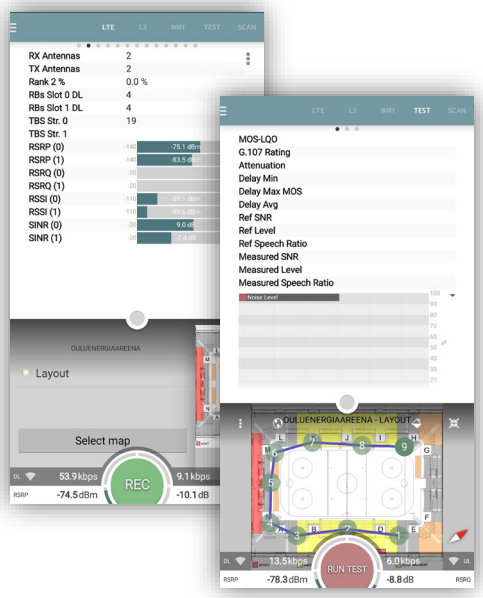
YouTube testing

With Echo it is possible to stream videos from YouTube and monitor the throughput and buffering values, as well as the start, stop, and failure events of the video transfer. The ongoing test can be viewed real-time in the test application view.



IP packet capture

Application level data can be captured with Echo from cellular data and from Bluetooth as well. When running packet capture the log file size will increase drastically as all the IP data is saved to a log file.



Indoor testing

Echo supports digital images and photos of the floor plan taken with the device as indoor maps.

The geodetic positioning of the measurements is based on waypoints. The waypoints are used to draw the measurement route on the map while moving accordingly in the physical indoor space.

All location-based measurements can be combined with voice call, data and script tests. The KPIs of the tests will be shown on the measurement route.

Support for iBWave maps

The iBWave map format is supported in Echo.

Map import from Cloud

Indoor maps can be imported from Cloud to an Echo device when the device is connected to Cloud.

Map import in handset

Indoor maps can be imported to Echo by downloading them from Cloud, taking a picture with the device's camera, or loading them from an SD card.

Outdoor testing

Echo supports Google Maps and OpenStreetMap as outdoor maps.

The positioning of a measurement is based on GPS location. The drive route can be visualized on a map as color-coded parameter values in real-time. Map data can also be overlaid with base station data.

Support for online maps

Echo supports Google Maps and OpenStreetMap to be used in outdoor testing.

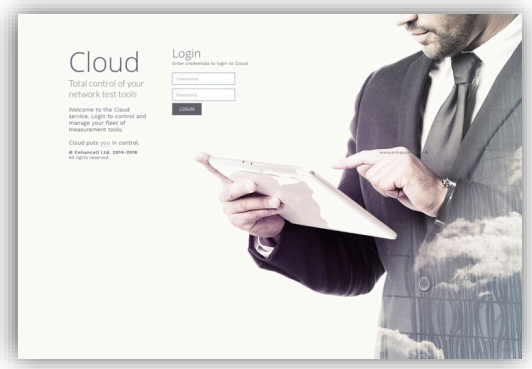
Support for offline maps

Echo supports local caching of map tiles allowing full offline operation using Google Maps and OpenStreetMap.

Support for scanners

Echo supports PCTel IBflex®, PCTel HBflex® and DRT 4311B scanners, as well as RF Explorer. Scanners can be connected via Bluetooth and RF Explorer via USB OTG cable.

Echo Cloud



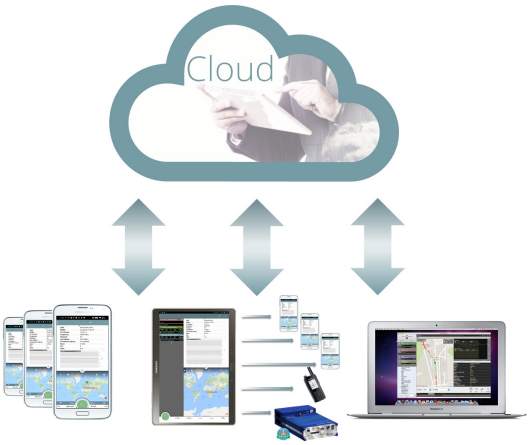
Echo includes the Cloud feature which gives you unparalleled control of your Echo devices from a remote location.

- Store your log files automatically after recording
- Access measurements easily
- Download your measurements in a multitude of formats
- Configure Echo devices remotely
- Two-factor authentication for extra security
- Option to have dedicated private Cloud server in customer's desired geolocation*

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 to Cloud when they are connected. The data can be exported further from Cloud to Echo Studio or any other compliant 3rd party data post-processing software.

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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 (POLQA)	X	X
FTP (UL/DL)	X	X
SMS	X	X
HTTP Browser	X	X
HTTP File Ul/DL	X	X
PING	X	X
YouTube	X	X
Facebook	X	X
iPerf TCP/UPD (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	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

*Limited set of RF paramters 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 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
Nemo	X	X
CSV	X	X
Qualcomm	X	X
ESRI Shape	X	X
Google Earth KLM	X	X
PCAP	X	X

Feature Map Support	Echo One	Echo Lite
Indoor Map	X	X
iBwave Support	X	X
Multiple Outdoor Map Provider	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