

RANAdvisor™

Wireless Network Optimization Platform — Configuration Guide



The RANAdvisor wireless network optimization platform performs RF coverage and service performance measurements for wireless communications networks. The Windows®-based software runs on a PC that interfaces with a Viavi Solutions™ digital RF receiver and with IS-95, cdma2000®, LTE, HSPA, UMTS, GSM, E-GPRS, WiMAX™, and TD-SCDMA phones. The system can be configured to include receivers and user equipment (UE) devices from one or a combination of technologies simultaneously and can control up to four UE devices.

This configuration guide can assist with ordering the correct system configuration for RANAdvisor applications.

Key Benefits

- Easy to use
 - Customizable GUI to view data as needed
 - Optimize efficiency in detecting and isolating problems
- LTE and WCDMA device auto-detection and configuration
- Platform stability improves user productivity
- Project files let users easily share test configurations improving consistency of collected results
- High-accuracy RF measurements reduce measurement uncertainty
- Click'n'Sync visualization simplifies troubleshooting to find problems faster
- Compatible with a broad choice of post-processing tools

Key Features

- Fully scalable solution from receiver or UE device to full combo
- Supports multiple devices on a single laptop
- Indoor and outdoor measurement capability
- Industry-leading data test support
- Fast, accurate receiver measurements
- Open architecture for post-processing
- User-definable events triggers

PC Specifications

Recommended PC hardware specifications:

- Intel® Core i7–2820QM (2.3 GHz) 8 GB RAM
- 250 GB 7200 rpm hard disk drive
- DVD RW drive
- USB 2.0 ports (for license key and multiple hardware support)
- 1280 by 800 resolution

Supported Windows versions:

- Windows 7 32/64-bit (Ultimate or Enterprise)*
- Windows 10 (requires StrataSync license)*

Minimum PC hardware specifications:

- Intel Core™ i5–2520M (2.5 GHz) 4 GB RAM

Configuration Process

Before using this configuration guide, determine the following:

- Which applications will be tested?
- Which software measurements are required?
- Which UE devices and receivers are required?
- Which accessories are required?

This configuration guide is organized to reflect the decision process flow to use when choosing a system.

- Part 1: Technology Software Options
- Part 2: Platform Software Options
- Part 3: Receiver Hardware Options
- Part 4: Mobile Voice Quality and VoIP Testing
- Part 5: VoLTE Testing
- Part 6: Hardware Accessory Options
- Part 7: Support Update Service (SUS) Options
- Part 8: Ordering Examples

* Before starting the E6474A application, turn off the Windows User Account Control (UAC) feature accessible via Start>Control Panel>User Accounts. Installing from an encrypted folder requires first uninstalling all previous versions of the E6474A application.

Part 1: Technology Options

Select which software options match the existing technology and measurement requirements. Review the upgrade section for additional options.

Technology	Measurements	
	Phone	Receiver
cdma2000	101	050
W-CDMA/UMTS ¹	300	050
WiMAX ²	656	655
LTE Qualcomm chipset upgrade	638	645 (FDD), 646 (TDD)
LTE UE base	637	
LTE UE base with Qualcomm chipset	640	645 (FDD), 646 (TDD)
LTE Hi silicon chipset upgrade	634	645 (FDD), 646 (TDD)
LTE - LG chipset upgrade	641	645 (FDD), 646 (TDD)
LTE - Samsung chipset upgrade	642	645 (FDD), 646 (TDD)
LTE - Altair chipset upgrade	643	645 (FDD), 646 (TDD)
LTE - Sequans chipset upgrade	644	
TD-SCDMA	550	
WiFi ³	657	
PC Tel EX/EX+/EX mini receiver support		770
PCTel IBFlex receiver support		771
iPhone measurements ⁵	960	

PCTel

PCTel receiver measurements can be added to RANAdvisor by ordering the E6474A-770 or E6474A-771 licenses. PCTel EX, EX+, and EX-Flex receivers are supported with license E6474A-770. PCTel IBFlex receivers are supported with license E6474A-771.

These licenses enable measurements in all technologies and bands available in a specific PCTel EX or IBFlex hardware configuration. PCTel receiver hardware is technology and band-specific, unlike the W1314 which uses software licenses for technologies only. Customers must ensure that they own or buy the correct PCTel receiver hardware for the specific technology, band, or other measurements they require.

E6474A-050 W1314 Receiver Addition to Phone License

Receiver measurements can be added to any base-technology UE device measurements system with the E6474A-050 Receiver Addition to Phone Measurements license. This option will enable making receiver measurements for any of the base-technology phone measurements that are already licensed. For a phone-based technology like UMTS, which includes GSM, receiver measurements for both technologies will be enabled with the Receiver Addition to Phone Measurements License.

Base technologies include:

- GSM/E-GPRS
- UMTS/HSPA
- IS-95
- cdma2000
- 1xEV-DO
- 1xEV-DO Rev A

LTE and WiMAX receiver measurements are not part of the base technologies group and require their own licenses as shown in Table 1.

E6474A-055 W1314 Receiver-Only Measurements

For receiver-only measurements, independent of phones, the E6474A-055 Receiver-Only Measurement license provides all base-technology receiver measurements without the need for corresponding phone licenses. This capability enables receiver-based benchmarking of all technologies in a given region using the appropriate W1314 receiver hardware.

The following lists additional technology expansions that build on the base technology licenses.

Software Upgrade Description	Part Number
UMTS to HSPA+ phone measurement upgrade license ⁴	E6474A-327
cdma2000 to 1xEV-DO phone measurement upgrade (Rev. A) license ⁵	E6474A-137
Upgrade from 1xEV-DO Rev A to 1xEV-DO Rev B	E6474A-138
IS-95 over-the-air base station testing	E6474A-150
cdma2000 over-the-air maintenance tool software upgrade (IS95)	E6474A-151

Each software order includes the following components:

- CD with software (which includes comprehensive training and reference information)
- User's guide
- USB license key (initialized with licenses)

1. UMTS Phone Measurement option includes support for GSM and E-GPRS phone measurements.
2. W1314A receiver only.
3. Supports WiFi device measurements from tethered USB WiFi devices or the internal PC WiFi device.
4. This option includes HSDPA and HSUPA measurements.
5. HSPA, 1xEV-DO, and 1xEV-DO Rev A are all upgrades on base technologies. Please refer to "Part 8: Ordering."
6. Requires customer to provide their own engineering-enabled iPhone.

Part 2: Platform Software Options

Select the option that matches system needs.

License Description	Option Number
Multiple phone license ⁷	010
MapX mapping software license	040 ⁸
Wireless application measurement software	740
Video streaming plus non-reference video MoS	744

7. Allows the use of more than one phone simultaneously for measurement collection.

8. MapX is required to support mapping features. Both indoor and outdoor mapping are included with this option.

Data and Application Test Software Options

The platform software can perform a variety of data and application tests. This table shows tests included with the standard phone-based software options and those that require additional licenses to enable them.

Tests	E6474A Base Tests	E6474A Option 740 (WAMS)	Notes
AT_Command	Yes		
Call_Control	Yes		
Command_Line	Yes		
Wait_Timer	Yes		
Dialup	Yes		
Disconnect	Yes		
PING	Yes		
Trace Route	Yes		
FTP IPv4/6_2	Yes		Supports multi-segment and FTP-S
SMS_2	Yes		
Video_Connectivity_2	Yes		
iPERF	Yes		
PLMN network search and selection	Yes		LG LTE UE devices
Connect (LG LTE)	Yes		LG LTE devices only
Disconnect (LG LTE)	Yes		LG LTE devices only
Connect (Samsung)	Yes		Samsung LTE devices only
Disconnect (Samsung)	Yes		Samsung LTE devices only

Tests	E6474A Base Tests	E6474A Option 740 (WAMS)	Notes
Connect (Qualcomm)	Yes		
Disconnect (Qualcomm)	Yes		
WiMAX network entry	Yes		WiMAX devices only
WiMAX network exit	Yes		WiMAX devices only
WAP		Yes	
E-Mail	Yes		
HTTP upload/download	Yes		
HTTP web browsing	Yes		
MMS_2		Yes	
Video_Streaming_with_MoS			Order Option 744 license with_MoS

Keyless Software Licensing

Server-based keyless software licensing is offered as an alternative to the default hardware key-based licensing. Keyless licensing provides the ability to maintain a pool of measurement licenses on a server and then distributes those licenses to client drive test PCs using a check-out process. Typically one server application is required per customer. This licensing option is aimed at customers managing more than 20 RANAdvisor systems.

Customers must supply a licensed server that meets these minimum specifications:

- Intel® Core™ i5–2520M (2.5 GHz) 4 GB RAM
- At least 10 GB free disk space on a 250 GB 7200 rpm hard disk drive
- DVD±RW drive
- USB ports (for license key and multiple hardware)

License Description	Part Number
Software licensing server application	E6474A-081
Software licensing option delivery	E6474A-080
Hardware key to software license exchange	E6474A-083

An E6474A-083 purchase is required for every E6474A measurement license to be transferred from hardware dongles to server licenses.

Contact Viavi to discuss how to transfer your hardware dongle licenses.

Part 3: Receiver Hardware Options

The Viavi multitechnology and multiband receivers support up to eight RF bands in a single compact package. The combination of uplink and downlink bands depends upon the configuration chosen. All standard receivers include an integral high-sensitivity 50-channel GPS. The receivers are listed by option number and by technology with supported bands.

Please refer to the W1314B/L receiver data sheet for configuration information.

Ordering notes:

- Viavi receivers require related receiver measurement software as described in the Software Options section.
- Viavi receivers include an internal 50-channel GPS receiver although an alternative external GPS unit can be used if preferred.

Each receiver includes these components:

- Magnetic-mount RF antenna for the corresponding frequency band
- Adaptor for RF antenna connection to receiver
- USB cable for connection to PC
- AC/DC power supply
- DC power cord — cigarette lighter type
- Mounting kit — mounting plate and screws for mounting receiver in a vehicle

RANAdvisor Backpack

The Viavi custom-designed convenient, rugged backpack solution can accommodate a receiver and phones to enable testing in any environment that is inaccessible for a vehicle.

The backpack solution accommodates a receiver and up to six mobile devices and batteries.

Backpack Descriptions	Part Number
RANAdvisor backpack with built-in USB hub and battery-charging power harness <ul style="list-style-type: none">• Space for 2 batteries (optional extra, see below)• Charger (optional extra, see below)• Up to 6 UE devices (not supplied)	E6473B-930
RANAdvisor battery pack for backpack	E6473B-925
RANAdvisor battery charger for backpack Optional extra. Only required if charging batteries externally from backpack. Useful when having more than 2 batteries.	E6473B-926
Upgrade legacy option 920 backpack to new E6473B-930 backpack charging harness	E6473B-927
RANAdvisor backpack without USB hub or cabling	E6473B-921

Indoor Solution — Timing Module Only (Option 073)

This hardware option includes:

- One timing module (1PP2S output)
- Cables and connections

The timing module provides a 1PP2S signal for the receiver measurements, which is useful for CDMA measurements that need a timing lock.

Part 4: Mobile Voice Quality and VoIP Testing Options

The system supports Mobile-to-PSTN and mobile-to-mobile voice-quality measurements and provides PESQ-LQO and POLQA mean opinion score (MOS) ratings. The mobile-to-PSTN measurement requires both mobile-side and office-side hardware in addition to the base drive-test system, requiring the purchase of at least one mobile unit, one office unit, and cables.

Mobile-to-mobile measurements require the use of the Maya USB+ sound module unless the device supports on-device POLQA (see the Voice Quality Mobile Unit table below).

The B9990A-200 and B9990A-230 options both include a Maya USB+ sound module that can be used to connect up to four mobiles to the RANAdvisor measurement laptop. Each phone to be connected requires the purchase of an audio cable to connect the phone to the USB sound module. These cables are available as E6473B-885.

POLQA is the next-generation voice-quality testing technology for fixed, mobile, and IP-based networks. The International Telecommunication Union (ITU-T) standardized POLQA as new Recommendation P.863 to be applied for voice-quality analysis of HD voice, 3G, and 4G/LTE networks.

On-device POLQA MOS measurements — Some newer Android mobiles simplify POLQA MOS testing by removing the need for external sound card hardware. Viavi licenses POLQA measurement functionality in two ways: for use with or without an external sound card. Please consult Viavi for the latest list of devices that support this testing option.

QCHAT is a specific technology for PTT.

Voice Quality Mobile Unit

Description	Part Number
For Use with an External Sound Card	
PESQ single-phone voice MOS test	B9990A-200
PESQ multi-phone voice MOS test upgrade license	B9990A-300
POLQA license for 2-phone measurements	B9990A-230
POLQA upgrade from 2 to 4 phones	B9990A-231
POLQA upgrade from 4 to 6 phones	B9990A-232
POLQA upgrade from 6 to 8 phones	B9990A-233
For Use without an External Sound Card (on-device)	
POLQA for up to two devices	B9990A-210
POLQA upgrade from 2 to 4 devices	B9990A-212
POLQA upgrade from 4 to 6 devices	B9990A-214
Push-to-Talk Voice Testing	
QCHAT measurement license	B9990A-505

The office-side hardware consists of a pre-configured computer unit with a modem/sound card that can support up to eight analog phone lines. The PESQ office unit is available in two options for up to 4 or 8 lines. The POLQA office unit is available as a single option for up to 8 lines. The office unit cannot be used with B9990A-210 on-device POLQA measurements which only operate between two mobile devices connected to the same laptop.

Voice Quality Office Unit

Description	Part Number
PESQ voice quality office unit (4 lines)	B9990A-400
PESQ voice quality office unit (8 lines)	B9990A-430
POLQA voice quality office unit (8 lines)	B9990A-440
PESQ to POLQA voice quality office unit software upgrade	B9990A-441

Voice Quality Mobile-Side Connecting Cables

Description	Part Number
3.5 mm TRS to RCA audio cable (one cable required per phone)	E6473B-885

Part 5: VoLTE Testing

E6474-746 VoLTE Voice

RANAdvisor supports VoLTE testing between two supported VoLTE handsets. The VoLTE license provides IMS and RTP statistics. Audio MOS measurements require the appropriate number of POLQA licenses.

E6474A-747 VoLTE Video Calling

RANAdvisor supports VoLTE video calling between two supported VoLTE video-capable handsets.

The VoLTE video license provides IMS and RTP statistics for VoLTE video calls. Audio MOS can be evaluated with an additional POLQA license.

Measurements	Benefit
Call statistics	Confirm your network's call performance meets or exceeds setup and stability goals
R-Factor MOS	Identify call quality problems using a combination of packet loss and delay measurements (ITU-T G.107)
POLQA MOS	Evaluate user-perception call quality against ITU standards
RTP statistics	Quickly identify the impact that delay and jitter have on delivering high-quality voice services

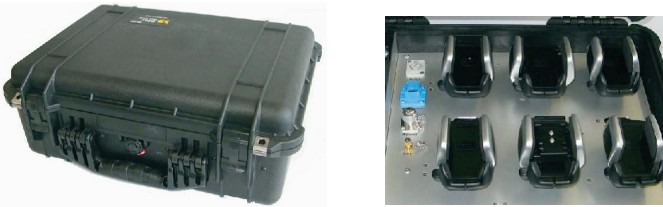
Supported KPIs

IMS Signaling	VoLTE Call Control	RTP Metrics	User Experience
SIP message log	CM call ID	Sequence number (packets)	POLQA Voice MOS
SDP presence	Call success/failure	RTP packet loss rate	R-Factor/MOS
	Call duration/hold	RTP packet jitter	Audio/video sync (with VoLTE video license)
	Call drop	RTP packet delay variation	
	Codec type	RTP packet one-way delay	
		SSRC	
		Codec bit rate	

Part 6: Hardware Accessory Options

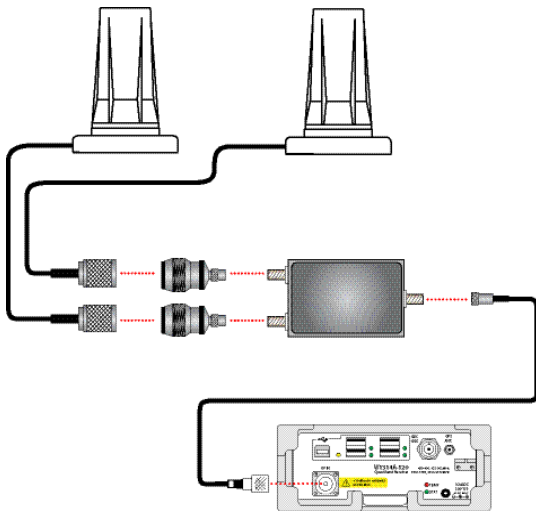
Select the hardware accessories needed for your system. Hardware accessory options are compatible with both the W1314B and W1314L receivers.

Description	Part Number
Platform Accessories	
Receiver and phone system carrying case	E6473B-915



Description	Part Number
Antenna Parts	
Mobile magnetic mount multiband antenna (700 to 2700 MHz)	W1314-80023
Mobile magnetic mount multiband antenna (2.3 to 6 GHz)	W1314-80024
Combiner unit	W1314-80025
Connector adapter - SMA male to N-Type female	W1314-80026
Cable (SMA male to N-Type)	W1314-80027

GPS Option	
Globalsat BU 353 NMEA GPS	E6473B-035



Part 7: Software and Software Update Service (SUS)

The RANAdvisor software requires a SUS license to operate. Without an SUS license, only replay is possible and users cannot upgrade software or receive technical support.

SUS Options

Description	Part Number
1-year standard	E6474A-060
1-year corporate (for greater than 50 systems)	E6474A-061
3-year standard	E6474A-063
3-year corporate (for greater than 50 systems)	E6474A-064
5-year standard	E6474A-066
5-year corporate (for greater than 50 systems)	E6474A-067

A SUS license is required per computer in use, not per technology. For example, for three laptops in use simultaneously, making RANAdvisor measurements requires three SUS licenses.

The SUS encompasses a comprehensive range of benefits and services. It helps:

- Maintain a competitive advantage by keeping systems current
- Increase productivity through new and enhanced software functionality
- Provide access to high-quality technical support to keep products running as they should

For full details on SUS, please refer to the SUS data sheet.

On-site training is available for E6474A and for its applications that provides:

- Telephone assistance and Web training on specific topics
- On-site training and start-up assistance

On-Site Training	Part Number
E6474A first-day on-site training	H7211B-209
Additional day on-site training	H7211B-232
One-day extended hours remote assistance	H7211B-233
Remote training session	H7211B-235

Part 8: Ordering Examples

These examples show typical configurations to illustrate the ordering process. Every order must include an SUS license, 1-Year SUS has been added in the examples below. Refer to the SUS section for other options. Phones are listed in examples below for completeness; however, where phones are required, customers must supply them.

LTE

An LTE-FDD receiver measurements system to cover 2.6 GHz band for RF coverage measurements:

Description	Quantity	Part Number
LTE-FDD receiver measurements license	1	E6474A-645
MapX mapping license	1	E6474A-040
1-year drive test SUS	1	E6474A-060
Digital multi-band receiver	1	W1314B-E04

An LTE UE-based system that will support Qualcomm chipset and LG chipset UE for LTE only measurements:

Description	Quantity	Part Number
LTE phone measurements license	1	E6474A-640
LTE phone measurements upgrade license for LG devices	1	E6474A-641
MapX mapping license	1	E6474A-040
1-year drive test SUS	1	E6474A-060

An LTE UE-based system that will support Qualcomm chipset and LG chipset UE for LTE and UMTS measurements:

Description	Quantity	Part Number
LTE phone measurements license	1	E6474A-640
LTE phone measurements upgrade license for LG devices	1	E6474A-641
UMTS phone measurements license (includes GSM/E-GPRS)	1	E6474A-300
MapX mapping license	1	E6474A-040
1-year drive test SUS	1	E6474A-060

An LTE UE-based system that will support an LG UE for LTE with FDD-LTE receiver measurements and Qualcomm and UMTS phone and receiver measurements:

Description	Quantity	Part Number
LTE phone measurements license	1	E6474A-640
LTE phone measurements upgrade license for LG devices	1	E6474A-641
LTE receiver measurements license (FDD)	1	E6474A-645
UMTS phone measurements license (includes GSM/E-GPRS)	1	E6474A-300
Receiver addition to phone measurements license	1	E6474A-050
MapX mapping license	1	E6474A-040
1-year drive test SUS	1	E6474A-060
Digital receiver 800/850/900/2500/1800/1900/2100/2600	1	W1314B-E08

Adding a backpack with two batteries and an external charger to any order:

Description	Quantity	Part Number
RANAdvisor backpack with built-in USB hub and battery-charging power harness	1	E6473B-930
RANAdvisor battery pack for backpack	2	E6473B-925
RANAdvisor battery charger for backpack	1	E6473B-926

cdma2000

A cdma2000 phone and receiver-based measurement system for the cellular and PCS bands requires users to provide the receiver GPS and a laptop.

Description	Quantity	Part Number
cdma2000 phone measurement license	1	E6474A-101
Receiver addition to phone measurement license	1	E6474A-050
MapX mapping license	1	E6474A-040
1-year SUS	1	E6474A-060
GSM/CDMA/UMTS 850/1900 (UL/DL)	1	W1314B-E08

1xEV-DO Rev 0/A

A two-phone 1xEV-DO REV A measurement system with data-application tests for FTP requires users to provide a GPS, laptop, and test phone hardware.

Description	Quantity	Part Number
cdma2000 phone measurement license	1	E6474A-101
cdma2000 to 1xEV-DO REV A measurement upgrade license	1	E6474A-137
Multiple-phone license	1	E6474A-010
MapX mapping license	1	E6474A-040
1-year SUS	1	E6474A-060

A 1xEV-DO REV A receiver and phone measurement system (single phone) with data-application tests for FTP requires users to provide a GPS, laptop, and test phone hardware.

Description	Quantity	Part Number
cdma2000 phone measurement license	1	E6474A-101
Receiver addition to phone measurement license	1	E6474A-050
cdma2000 to 1xEV-DO REV A measurement upgrade license	1	E6474A-137
MapX mapping license	1	E6474A-040
1-year SUS	1	E6474A-060
cdma 850/1900 (UL/DL)	1	W1314B-E08

W-CDMA (UMTS)

A UMTS with E-GPRS phone and receiver measurements system (single phone) requires users to provide a GPS and laptop.

Description	Quantity	Part Number
UMTS phone measurement license (includes GSM/E-GPRS)	1	E6474A-300
Receiver addition to phone measurement license	1	E6474A-050
MapX mapping license	1	E6474A-040
1-year SUS	1	E6474A-060
UMTS 2100 (UL/DL) GSM 900/1800 (DL)	1	W1314B-E21

HSPA+

An HSUPA, HSDPA, and HSPA+ two phone measurements system with data-application measurements and video streaming with MOS measurements requires users to provide a GPS, laptop, and test phone hardware.

Description	Quantity	Part Number
UMTS phone measurement license (includes GSM/GPRS)	1	E6474A-300
UMTS to HSPA+ phone measurement upgrade license	1	E6474A-327
Multiple-phone license	1	E6474A-010
MapX mapping license	1	E6474A-040
Wireless application measurements license	1	E6474A-740
Video streaming and Non-ref MOS license	1	E6474A-744
1-year SUS	1	E6474A-060

Adding PESQ or POLQA to a Configuration

Mobile-to-Mobile PESQ

Performing PESQ measurements between two mobile units connected to the same PC requires these options as well as the multi-phone license and the appropriate technology licenses installed on the PC. You must also have the mobile phones.

Description	Quantity	Part Number
PESQ single-phone voice MOS test	1	B9990A-200
PESQ multi-phone voice MOS test upgrade license	1	B9990A-300
3.5 mm TRS to RCA audio cable (one cable required per phone)	1 per phone	E6473B-885

Multi-Phone Mobile-to-Office Unit PESQ

Performing PESQ measurements between four mobiles connected to the same PC and an office unit requires these options as well as the multi-phone license and the appropriate technology licenses installed on the PC. You must also have the mobile phones. The B9000A-300 supports up to four mobile phones.

Description	Quantity	Part Number
PESQ single-phone voice MOS test	1	B9990A-200
PESQ multi-phone voice MOS test upgrade license	1	B9990A-300
3.5 mm TRS to RCA audio cable (one cable required per phone)	1 per phone	E6473B-885
Voice quality office unit PESQ MOS test solution (4 lines)	1	B9990A-400

Add POLQA to Mobile-to-Mobile PESQ (example)

This option will enable POLQA measurements for up to two phones.

Description	Quantity	Part Number
POLQA license for two-phone measurements	1	B9990A-230

Add POLQA to Multi-Phone Mobile-to-Office Unit PESQ (example)

This option will enable POLQA measurements for up to four phones. Because POLQA licenses are incremental, both options 230 and 231 must be ordered.

Description	Quantity	Part Number
POLQA license for two-phone measurements	1	B9990A-230
POLQA upgrade from two phones to four phones	1	B9990A-231
POLQA voice quality office unit software upgrade from PESQ	1	B9990A-441

Mobile-to-Mobile POLQA

Performing POLQA measurements between two mobiles connected to the same PC requires these options as well as the multi-phone license and the appropriate technology licenses installed on the PC. You must also have the mobile phones.

Description	Quantity	Part Number
POLQA license for two-phone measurements	1	B9990A-230
3.5 mm TRS to RCA audio cable (one cable required per phone)	1 per phone	E6473B-885

Multi-Phone Mobile-to-Office Unit POLQA

To make POLQA measurements between four mobiles connected to the same PC and an office unit requires these options as well as the multi-phone license and the appropriate technology licenses installed on the PC. You must also have the mobile phones. The B9000A-440 can support up to eight mobile phones.

Description	Quantity	Part Number
POLQA license for two-phone measurements voice MOS test	1	B9990A-230
POLQA license upgrade from two to four phones	1	B9990A-231
3.5 mm TRS to RCA audio cable (one cable required per phone)	1 per phone	E6473B-885
POLQA voice quality office unit (8 lines)	1	B9990A-440



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dtconfig-sg-nsd-tm-ae
30168135 918 1215