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TEMS™ POCKET 14.1
PRODUCT PRESENTATION

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CONTENTS

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OVERVIEW OF TEMS POCKET

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WHAT IS TEMS POCKET?

- Your everyday phone turned into a powerful measurement probe
  - A regular phone and an advanced test tool in one device
- Network information captured from a user's perspective – wherever the user goes
  - Network quality and performance
- Measurement capabilities always ready and available
  - Promotes convenient and portable measurements
- Easy to learn and easy to operate
- An integrated part of the Ascom Network Testing portfolio

A small tool for big measurements

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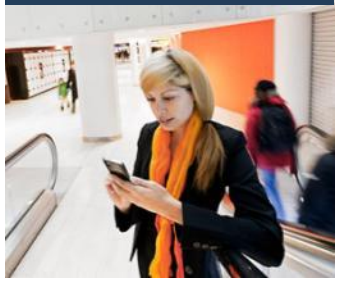
TEMS POCKET USE CASES

Indoor mapping

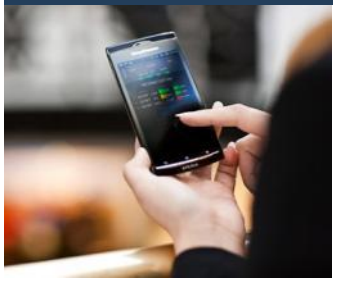


- Provides positioning measurement without need for GPS coverage

Coverage analysis

- Evaluates network accessibility in hard-to-reach areas

Site verification

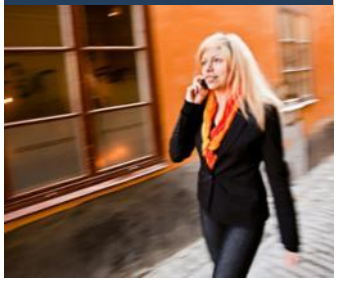


- Offers convenient ultra-portable tool for validating cell sites

Basic cell planning

- Allows operator to detect network anomalies and optimize cell performance

Remote operation



- Interoperates with TEMS autonomous tool to reduce manual testing

Personal handheld air interface testing solution

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THE INDOOR/ANYWHERE TESTING CHALLENGE

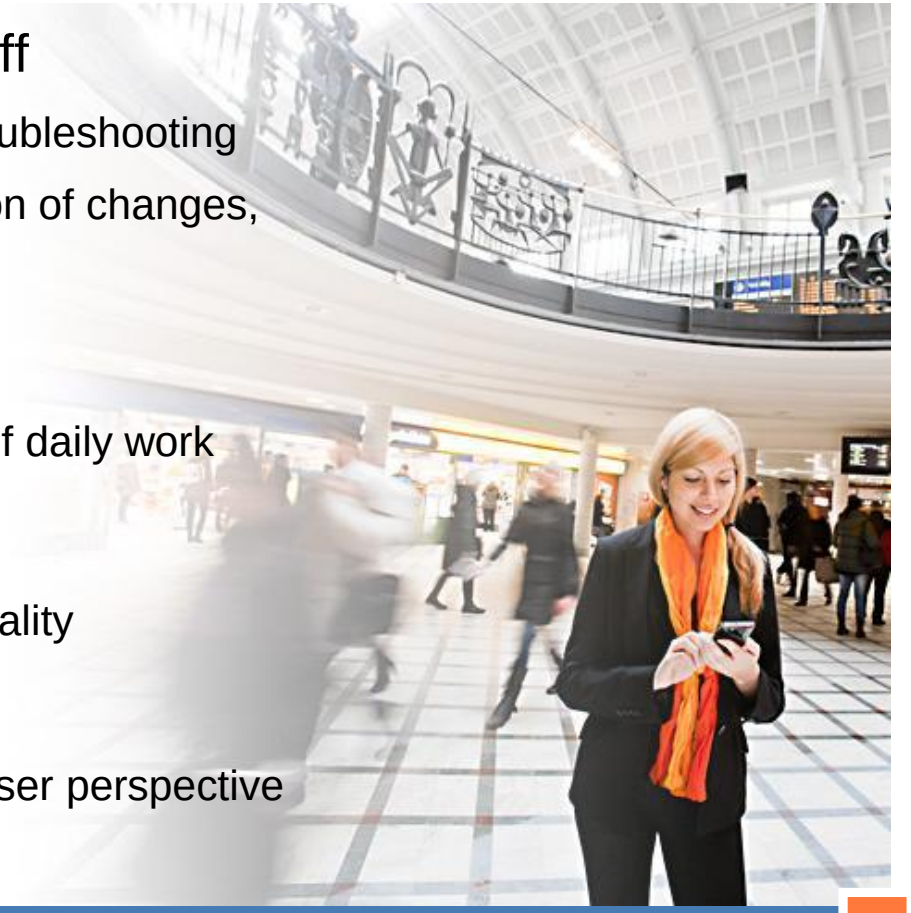
- More than half of today's global wireless voice and data traffic is generated indoors*
- Operators must be able to test network QoS inside buildings and other locations where drive testing isn't possible
- When testing these areas, users need a small, discreet but powerful test and measurement tool

** Analysys Mason anticipates this number to grow to over 80% for data traffic by 2016.*

The growing indoor/anywhere challenge

WHO CAN USE TEMS POCKET?

- RF engineers and network operations staff
  - For network planning, tuning, optimization and troubleshooting
  - For installation, rollout, site acceptance, verification of changes, service testing and maintenance
- Sales force
  - For capturing network status information as part of daily work
- Management
  - For easy and accurate visualization of network quality
- Customers
  - For automatic monitoring of quality from an end-user perspective and SLA monitoring



The entire organization can use TEMS Pocket

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TEMS POCKET PACKAGES

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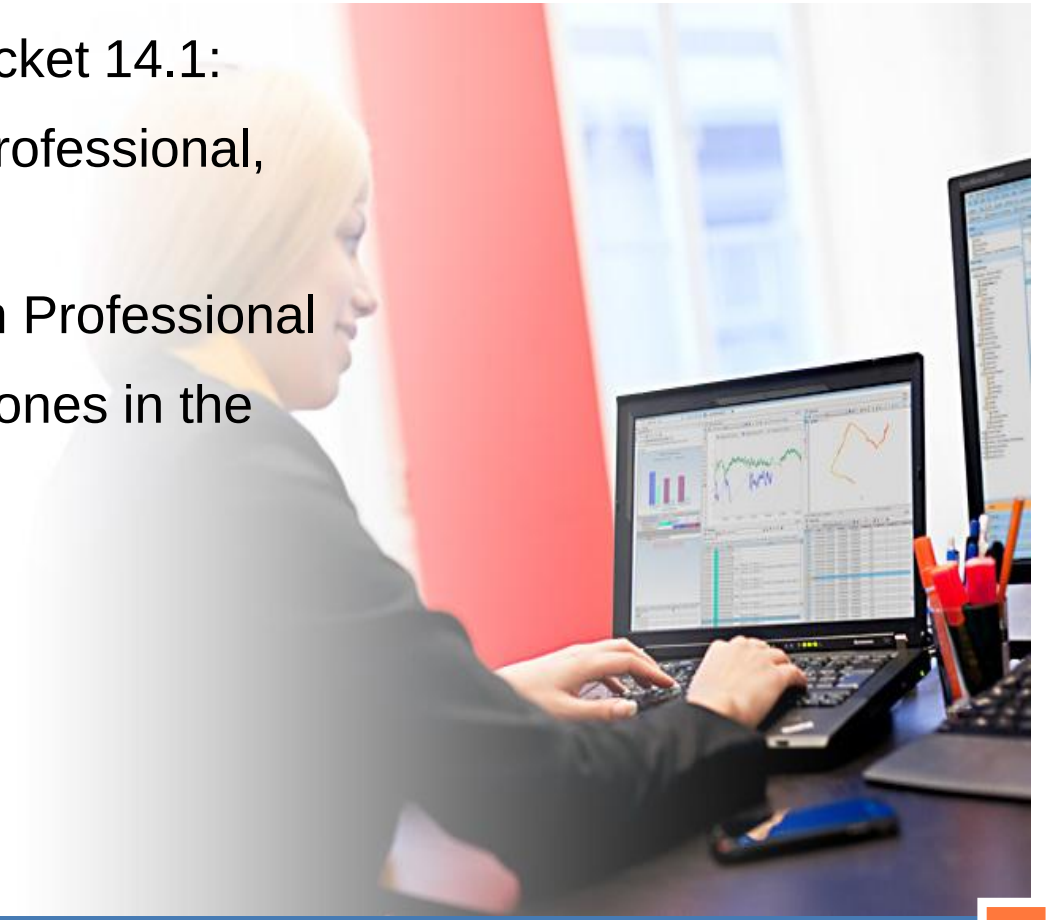
TEMS POCKET PACKAGES (1 OF 5)

- Changes in Packaging in TEMS Pocket 14.1:
  - Indoor option is now included in Professional, Premium, and Lite
  - Controller option is **not** included in Professional
  - Add-ons are movable between phones in the Global License Server



New in TEMS Pocket packaging

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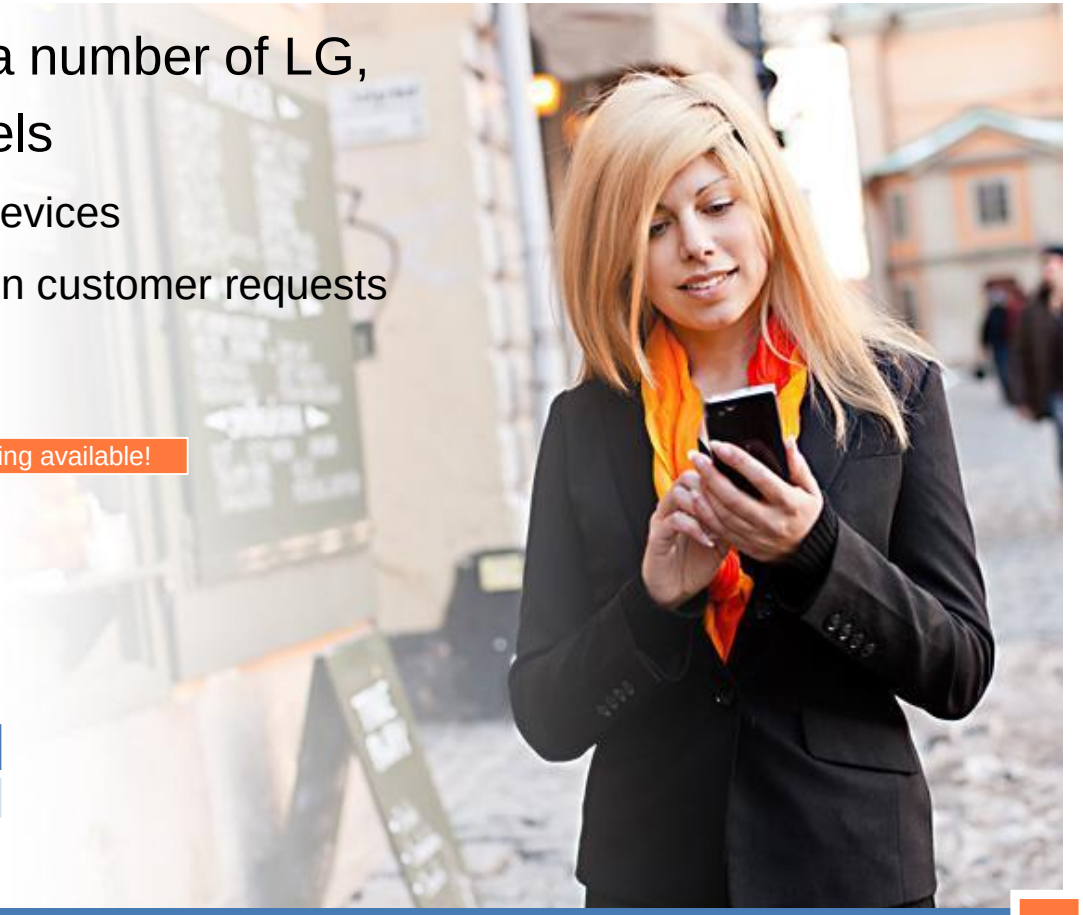
TEMS POCKET PACKAGES (2 OF 5)

- TEMS Pocket is implemented on a number of LG, Samsung and Sony handset models
  - Listed devices are the latest supported devices
  - Devices are continuously added based on customer requests

Release	Devices
TEMS Pocket 12.4	Sony Xperia arc S LT18a UMTS Sony Xperia arc S LT18i UMTS
TEMS Pocket 14.1	Sony Xperia T LT30a UMTS/LTE Sony Xperia V LT25i UMTS/LTE Samsung Galaxy S4 GT-i9505 UMTS/LTE Samsung Galaxy S4 GT-i9506 UMTS/LTE+ Sansung Note 3 SM-900V CDMA/LTE

New pricing available!

Release	Tablets
TEMS Pocket 14.1	Samsung Galaxy Note 10.1 LTE GT-N8020



A TEMS Pocket for every need

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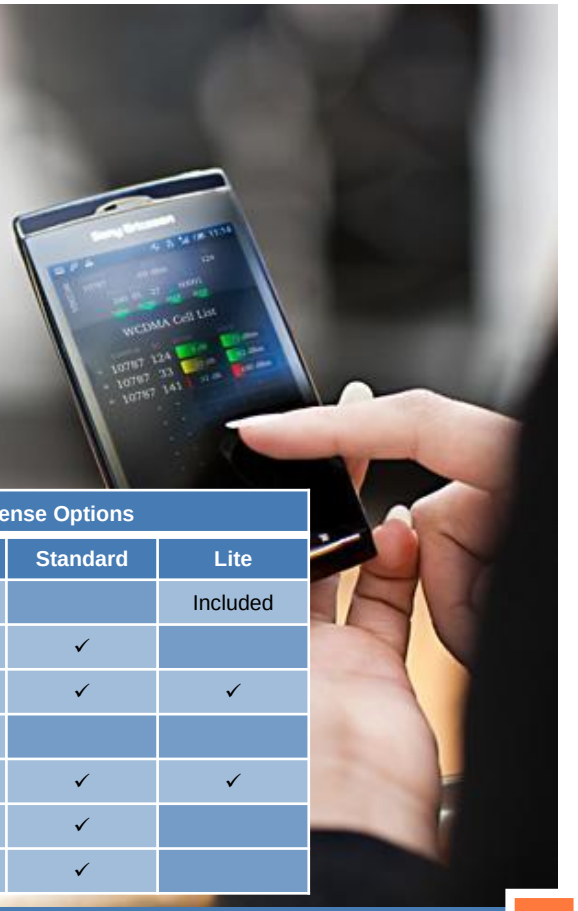
TEMS POCKET PACKAGES (3 OF 5)

- TEMS Pocket can be found in different packages:
  - **Standard*** – No RF logging. Attractively priced
  - **Professional** – Preferred engineering tool for local troubleshooting, supports logging and optional features
  - **Remote** – Autonomous probe controlled by FleetManager
  - **Premium** – Includes Remote and Professional functionality
  - **Lite** – TEMS Pocket application for any Android 4.0 device; limited network, cell information and service test capabilities



Configuration	TEMS Pocket 12.4	TEMS Pocket 13.3	TEMS Pocket 14.1
Standard	✓	✓	✓
Professional	✓	✓	✓
Remote		✓	✓
Premium		✓	✓
Lite		✓	✓

TEMS Pocket 14.1 Compatible License Options				
License	Remote	Professional	Standard	Lite
Indoor		Included		Included
POLQA	✓	✓	✓	
SSL	✓	✓	✓	✓
DRT Option		✓		
Controller Option		✓	✓	✓
Agent Option	Included	Included	✓	
VoLTE Option	✓	✓	✓	

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TEMS POCKET PACKAGES (4 OF 5)

- Configurations
  - **Standard** – When test and verification is done in real time and there is no need to store data for post-processing.
  - **Professiona**l – Collects test and network information for immediate and later analysis.
  - **Remote** – Control remotely via FleetManager. Limited user interface for local network troubleshooting.
  - **Premium** – Includes Remote and Professional functionality, as well as the Indoor license option.
  - **Lite** – Any Android 4.x pocket application.
- Optional Features
  - **TEMS Pocket DRT Option** adds connect support of the DRT 4311B scanner.
  - **POLQA license option** for AQM measurements.
  - **SSL license option** for encryption of HTTP Upload and email sessions.
  - **Controller option** adds support to control other TEMS Pocket agents.
  - **Agent option** adds support to be a controlled agent to a TEMS Pocket Standard.
  - **VoLTE option** for support of VoLTE testing.
- Expansions
  - Expand the handset for use with **TEMS™ Investigation.**
  - Expand from Standard to Professional.
  - Expand from Professional or Remote to Premium.
- All Expansions and Options can be added remotely

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TEMS POCKET PACKAGES (5 OF 5)

- DRT 4311B packaging:
  - First choose the base package you need:
    - **DRT4311B-V1** – Single tuner scanner base package supporting bands between 2MHz to 3000MHz
    - **DRT4311B-V2** – Dual tuner scanner base package supporting bands between 2MHz to 3000MHz and LTE MIMO
  - Then specify how many technologies you need:
    - **DRT4311B number of technologies** – 1 to 4 technologies
  - Then specify which technology it is:
    - DRT4311B Technology License – LTE
    - DRT4311B Technology License – WCDMA
  - Then select any extra options

DRT 4311B Extra Options		
Sales objects	**DRT4311B-V1**	**DRT4311B-V2**
Case DRT4311B Battery Kit	✓	✓
DRT4311B Transportation	✓	✓
DRT4311B Upgrade V1 to V2	✓	

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UPGRADES

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UPGRADE PATHS

- Software upgrade option available for the following TEMS Pocket 13 devices
  - Sony Xperia T LT30a UMTS/LTE
  - Sony Xperia V LT25i UMTS/LTE
  - Samsung Galaxy S4 GT-i9505 UMTS/LTE
  - Samsung Galaxy Note 10.1 LTE GT-N8020
- Hardware upgrade, cash-in your old device
  - Get the latest devices at a special upgrade cost
  - Old license is terminated remotely, no need to return device
  - Software and hardware warranty is terminated for the old device and transfered to the upgrade device
  - All license options purchased separately

Upgrade campaigns available at reduced price

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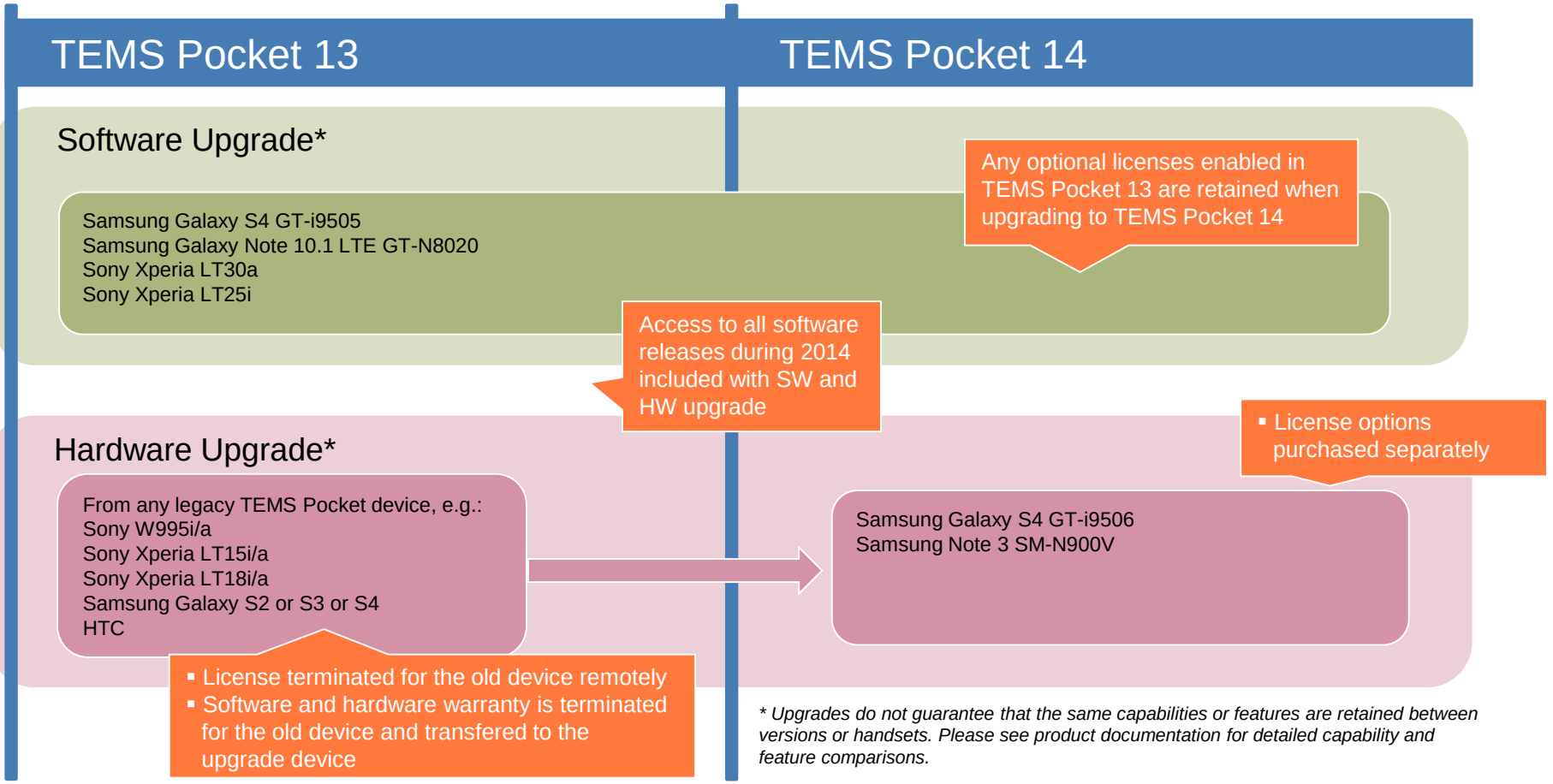
UPGRADES



Your choice of software or hardware upgrade

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WHAT'S NEW

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WHAT'S NEW IN TEMS POCKET 14.1?

- WCDMA scanning with DRT4311B scanner
- Flexible scripted logfile recording
- Custom logfile naming at pinpointing
- Support for VoLTE and POLQA on U.S. operator smartphone

WCDMA scanning, flexible logfile recording and more

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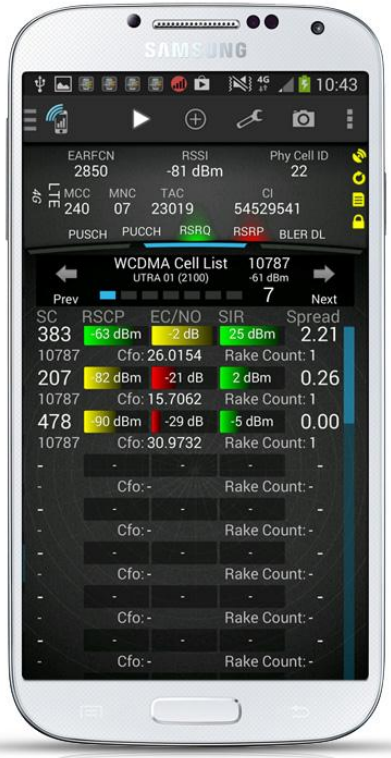
WCDMA SCANNING WITH DRT4311B SCANNER

- Scanning with an external DRT4311B scanner is extended to WCDMA in this release
- CPICH pilot scans can be performed, either manually or governed by a script
- The measurements are presented in newly created WCDMA scan data views
- WCDMA and LTE scanning can be made simultaneous



WCDMA scanning

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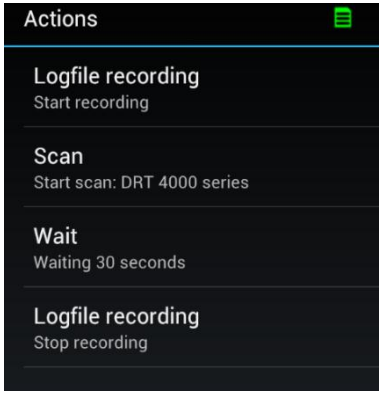
FLEXIBLE SCRIPTED LOGFILE RECORDING

- Introducing a new "Logfile Recording" action, which can also affix user-defined tags to logfiles for purposes of categorization
- The user can choose between:
  - One logfile per one or several actions
  - One logfile for one script iteration
  - One logfile from script start to script end



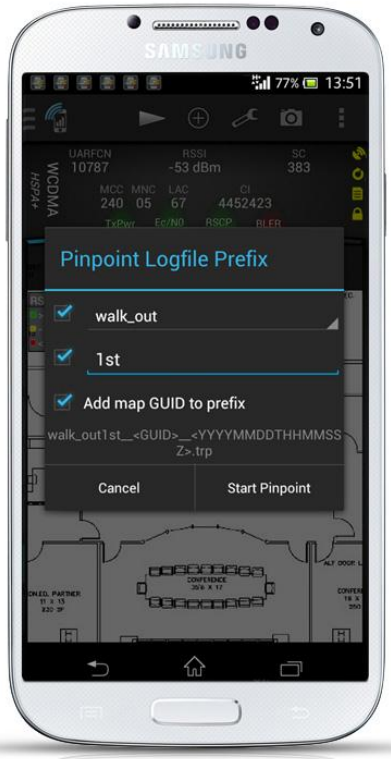
Built in quick creation of logfile actions

Automatic conversion of existing scripts

New flexible logfile creation

CUSTOM LOGFILE NAMING IN PINPOINTING

- A more elaborate logfile naming scheme is introduced as an option for indoor pinpointing
- Include the identity of the floorplan and also custom prefixes pre-defined and free text



Logfile naming in pin-pointing

WHAT'S NEW IN TEMS POCKET 14.0?

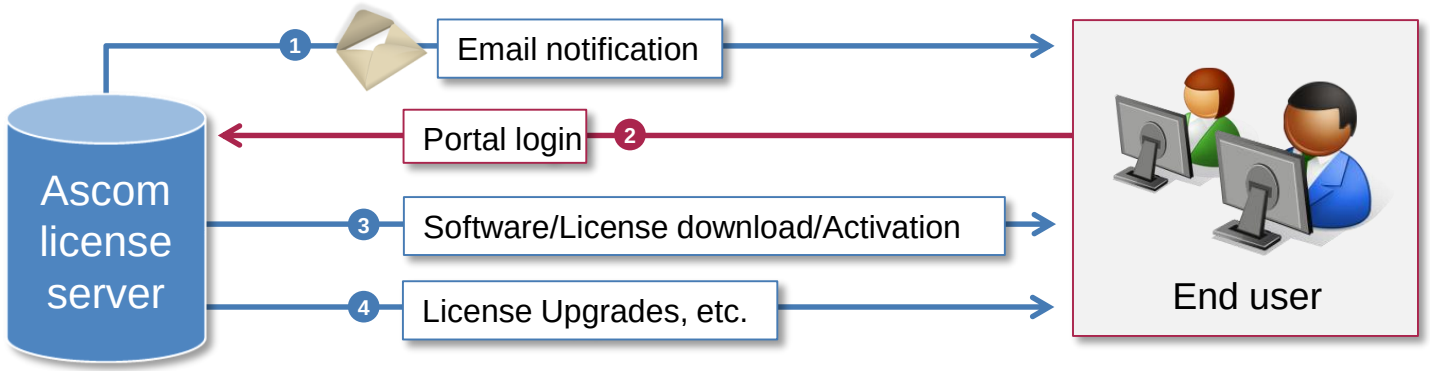
- Introducing the Global License Server
- LTE cell lock
- WCDMA UARFCN and cell lock
- Improved UI navigation
- Improved VoLTE testing with SIP message view
- New LTE Category 4 device, Samsung S4, GT-I9506
- New VoLTE capable device, Samsung Note 3, SM-N900V
- TEMS Pocket Remote, a part of TEMS™ Automatic

Samsung S4 GT-I9506, SIP message view and more

INTRODUCING THE GLOBAL LICENSE SERVER

- Enhanced control over your licenses
  - Instant access to software downloads and licenses
  - Know where your licenses are. Have license-assets at your fingertips
  - Assign and revoke licenses via Web interface
  - Auto return of SW licenses after set time period
- Protect your investment
  - No more hardware dongles or hardware keys to misplace

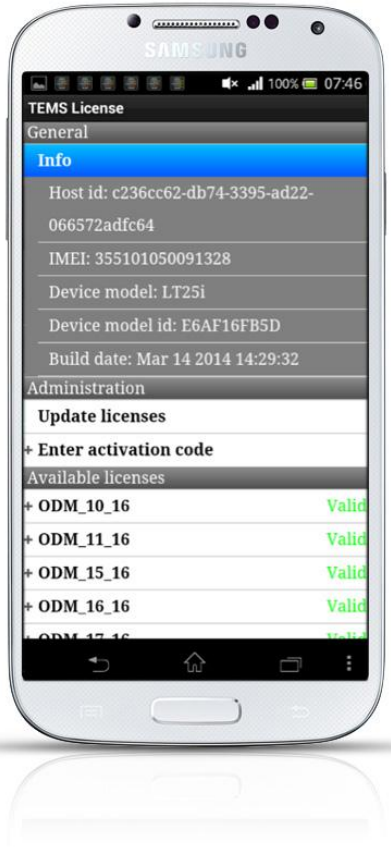
More information available in Global License Server – Commercial Presentation, NT13-23388



Enhanced control of your licenses

GLOBAL LICENSE SERVER IN TEMS POCKET

- A license viewer app is introduced in the phone
  - You can view available licenses
  - You can trigger a check for new licenses or remove licenses
- Background synchronization of licenses is handled
- Supports the activation of add-ons via activation code



Introduction of Global License Server

GLOBAL LICENSE SERVER IN TEMS POCKET

- Add-ons and extensions can be moved between devices in the Customer Portal
- Alternatives for how add-ons can be moved:
  - Movable between phones of the same model e.g., LT25i
  - Movable between all phones that support the feature
- New options for GLS support:
  - TEMS Pocket POLQA Option for Sony Lt25i GLS
  - TEMS Pocket SSL Option GLS
  - TEMS Pocket DRT Option GLS
  - TEMS Pocket Controller Option GLS
  - TEMS Pocket Agent Option GLS
  - TEMS Pocket VoLTE Option for Samsung Note 3 SM-900V GLS

TEMS Pocket 14.0 Flexiblliy		
License can be moved.. License Option	**Between phones of same model**	**Between all supported phone**
POLQA per phone	Not movable in 14.1	
SSL GLS		✓
DRT Option GLS		✓
Controller Option GLS		✓
Agent Option GLS		✓
VoLTE per phone GLS	✓	
TEMS Investigation SW expansion	Not movable in 14.1	
TEMS Pocket Professional Expansion TEMS Pocket Premium Expansion	✓	

Introduction of Global License Server

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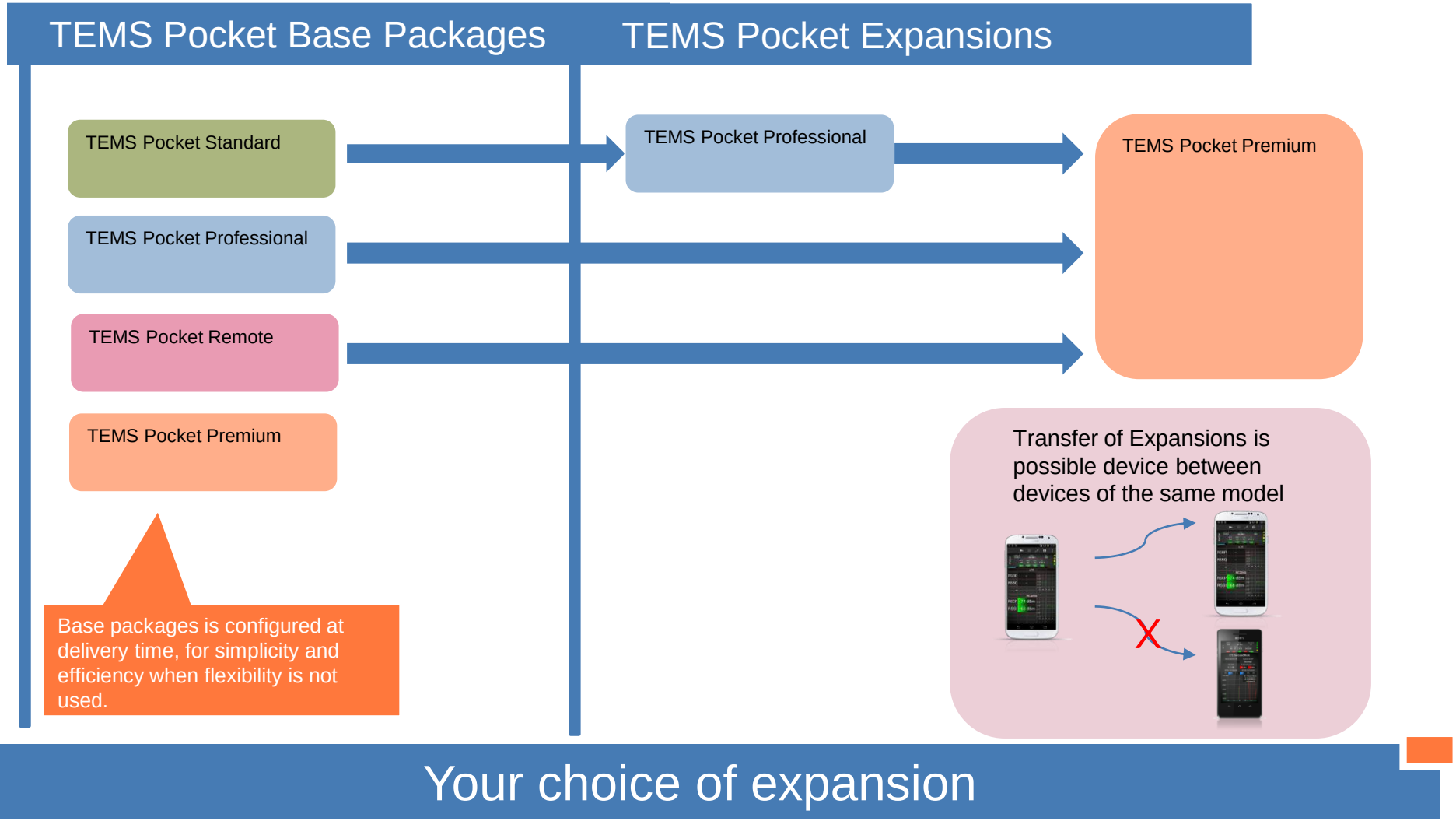
GLS FLEXIBILITY IN TEMS POCKET EXTENSIONS



Your choice of expansion

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GLS FLEXEBILLITY IN TEMS POCKET OPTIONS

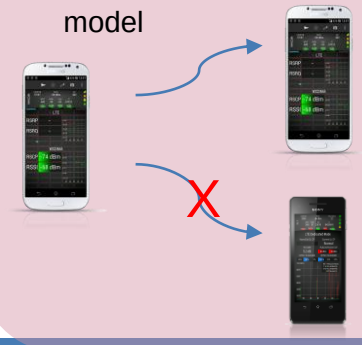
FIXED

- POLQA
- TEMS Investigation Connect

DEVICE OF SAME MODEL

- VoLTE

Transfer of Expansions is possible device between devices of the same model



ALL TEMS POCKET DEVICES

- SSL
- DRT Connect Option
- Controller Option
- Agent Option

Transfer of Expansions is possible device between all TEMS Pocket Devices

Your choice of options

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LTE CELL LOCK

Locking functions increase productivity by reducing test time (concentrate on real site coverage) and site coverage issues

- TEMS Pocket 14.0 introduces LTE cell lock capabillities
- The TEMS capability control app is extended to set LTE EARFCN and PCI
- Requires RAT lock to LTE in TEMS Pocket
- Supported on
  - Samsung S4 (GT-I9506)

Lock on LTE cell

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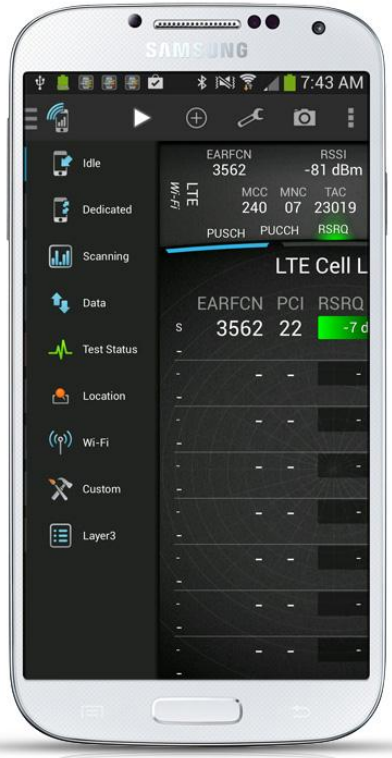
WCDMA UARFCN AND CELL LOCK

- TEMS Pocket 14.0 introduces WCDMA UARFCN lock and cell lock (disable handover)
- The TEMS capability control app is extended with WCDMA UARFCN lock and cell lock
- Supported on
  - Samsung S4 (GT-I9506)

Lock on WCDMA UARFCN and cell

IMPROVED NAVIGATION IN TEMS POCKET

- To make the navigation in TEMS Pocket even more efficient a new navigation drawer has replaced the home screen
- The navigation drawer is a panel that transitions in from the left edge of the screen and displays TEMS Pocket data views
- This gives faster access to views without losing focus
- It is aligned with the Android navigation drawer
- TEMS Pocket has a new icon



Navigation Drawer

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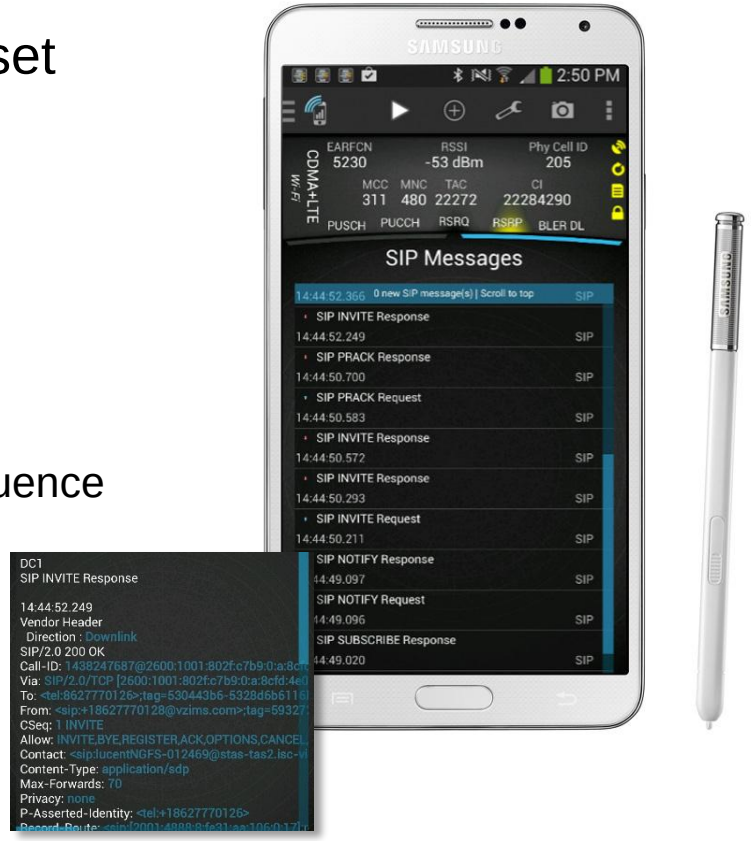
IMPROVED VOLTE TESTING WITH SIP MESSAGE LIST VIEW

- View VoLTE messages directly in the handset
  - Real-time header display, including message name, direction, time stamp and protocol
  - Freeze view and scroll through message history
  - Select message to view full contents
  - Syntax highlighting for easy reading
  - Easy navigation between decoded messages in sequence



Improve VoLTE testing

SAMSUNG GALAXY S4 GT-I9506 LTE+

- Samsung Galaxy S4 LTE GT-i9506
  - WCDMA 850(B5) 900(B8) 1900(B2) 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 800 (B20), 850 (B5), 900 (B8), 1800 (B3), 2100 (B1), 2600 (B7)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - **LTE Cat. 4 (150/50 Mbps)**
  - GPRS/EDGE Class 12
- Google Android 4.3
- Qualcomm 1.9 GHz MSM8974AA
- WLAN 802.11 b/g/n
- Integrated GPS with A-GPS support

TEMS Pocket on Samsung Galaxy S4 GT-i9506

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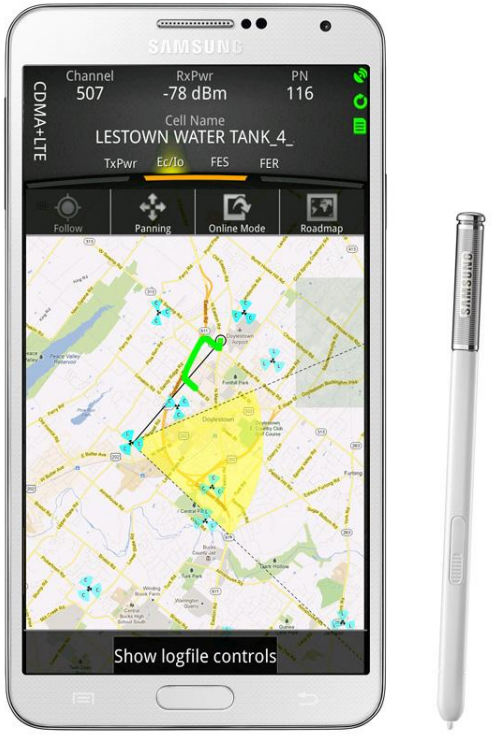
SAMSUNG GALAXY NOTE 3 SM-N900V

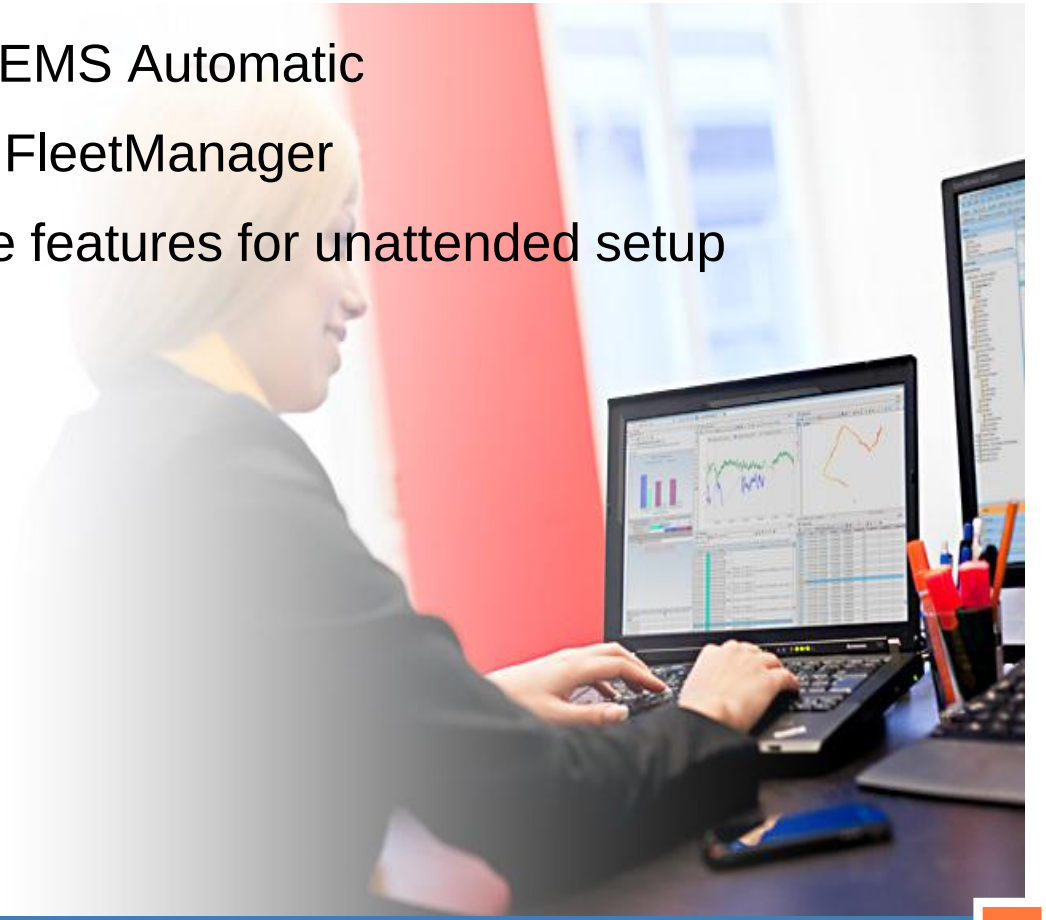
- Samsung Galaxy Note 3 SM-N900V
- LTE 700 (B13), 1700/2100 (B4)
- CDMA 800 (BC0), 1900 (BC14)
- Throughput capabilities
  - CDMA 2000, cdmaOne, xRTT
  - EV-DO Rel0, RevA
  - LTE Cat. 3 (100/50 Mbps)
- VoLTE
- Google Android 4.3
- 5.7'' Display
- Qualcomm 2.3 GHz MSM8974AB
- WLAN 802.11 b/g/n/ac
- Integrated GPS with A-GPS support
- Locked to U.S. operator Verizon Wireless



TEMS Pocket on Samsung Galaxy Note 3 SM-N900V

TEMS POCKET REMOTE, A COMPONENT IN TEMS AUTOMATIC

- TEMS Pocket Remote is a part of TEMS Automatic
- Controlled via the TEMS Automatic FleetManager
- TEMS Pocket Remote will add more features for unattended setup
- More focus on KPI measurement
- Revised pricing



TEMS Pocket Remote, a component in TEMS Automatic

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WHAT'S NEW IN TEMS POCKET 13.3.1?

- Caching of cell identities for **better visibility of CI** during local troubleshooting
- Selective Wi-Fi scanning during data sessions for **increased performance and battery life-time**
- Customizable display formats for certain value elements for **ease of use** depending on user preferences
- Dynamic Naming of Files Uploaded via FTP for **easier file management**
- SIM free/Flight Mode start-up of TEMS Pocket

Multidevice TEMS Pocket and video streaming support

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CACHING OF CELL IDENTITIES

- The difficulty with cell IDs is that they are reported only when a cell is serving, and even then it may take a while.
- TEMS Pocket now caches serving cell IDs as you move around, enabling more frequent display of CI to the user
  - Cached cell IDs are displayed in *italics*
  - The caching operation is similar for GSM, WCDMA and LTE networks
  - Mainly for local troubleshooting – Cache is not stored to logfile so to capture CI for post processing the logfile recording should be running for each new serving cell

Improved display of cell identities

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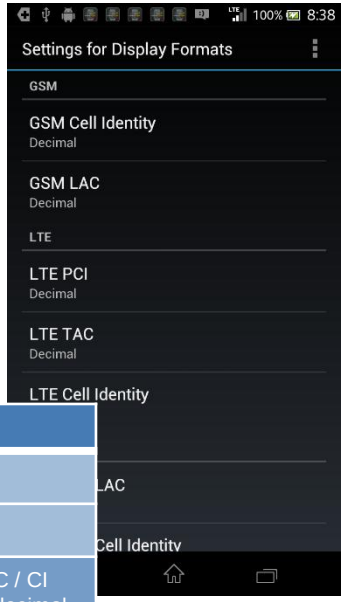
CUSTOMIZABLE VALUE ELEMENT DISPLAY FORMATS

- The user can now select between some formats for how the cell ID, LAC, TAC and PCI will be presented
- Promotes ease of use and allows parameter display based on user preferences
- All can be presented in decimal or hexadecimal format
  - *WCDMA cell ID can be in RNC/ cell ID*
  - *LTE cell ID can be in eNodeB / cell*
  - *LTE PCI can be in Group ID / Physical ID*



TEMS Pocket 13.3 Customizable Value Elements				
GSM Cell Identity	Decimal	Hexadecimal		
GSM LAC	Decimal	Hexadecimal		
WCDMA Cell Identity	Decimal	Hexadecimal	RNC / CI Decimal	RNC / CI Hexadecimal
WCDMA LAC	Decimal	Hexadecimal		
LTE Cell Identity	Decimal	Hexadecimal	eNB / Cell Decimal	eNB / Cell Hexadecimal
LTE TAC	Decimal	Hexadecimal		
LTE PCI	Decimal	Hexadecimal	Group ID / Phy ID Decimal	

Customizable format of value element

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SELECTIVE WI-FI SCANNING

- Wi-Fi scanning consumes considerable resources and will detract noticeably from the performance of Wi-Fi data transfer if performed continually.
- A new function has therefore been introduced which allows you to **turn off** TEMS Pocket-induced Wi-Fi scanning while data is being transferred via Wi-Fi.
- Promotes longer battery lifetime and increased performance
- Reducing performance load on the handset enables more accurate data measurements over Wi-Fi

Improved Wi-Fi data performance

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INTRODUCING A NEW SMALL BACKPACK

- **Custom-made** lite backpack for indoor surveys
  - **Flexible** mounting of phones and scanner with Velcro
  - Up to 6 smartphones and small, battery powered in-building scanner
  - Ventilation slits for **reduced** internal ambient **temperature**
  - Removable metal plate for magnetic **antenna mount**
  - **Carry-on** sized
  - **Discreet** look to ward off unwanted attention
- Lightweight at only ~5kg, **including**:
  - 6 x smartphones
  - 3 x USB power-packs
  - In-building scanner connected to TEMS Pocket

TEMS Small Backpack

NEW SMALL BACKPACK

- Two options for additional power:
  - USB power-pack solution
    - Dual USB output (2A and 1A)
    - 11200 mAh
    - Bring extra one for even more test time
  - PCU power solution
    - 7 post USB hub
    - Integrated battery charger with LED indicators
    - Low battery audible alarm
    - Reusable with TEMS Investigation

Property	Value/Description
Dimensions	29 cm (W) × 48 cm (H) × 18 cm (D)
Weight	Backpack: 1.7 kg PCU: 2.3 kg USB power-pack: 0.3 kg each
Operating temperature	Internal ambient 0ºC ... +45ºC

Stay powered while on-site

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WHAT'S NEW IN TEMS POCKET 13.3?

- Control multiple TEMS Pocket **agent** devices from a single **controller** for in-building benchmarking and comprehensive handheld surveys
- Test **video streaming** to monitor and record user experience
- Ensure smooth device transition to LTE via the new **LTE RACH** data view
- New **indoor backpack** for smaller test kits
- Stay organized with **custom storage location** for TEMS Pocket user files
- **Protective housing** for TEMS Pocket Remote via the new RMU
- **New firmware** for Samsung S4 GT-i9505, adding support for the DRT external scanner
- External USB power-pack available as optional accessory

Multidevice TEMS Pocket and video streaming support

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LOCAL CONTROL OF MULTIPLE DEVICES (1 OF 2)

- TEMS Pocket introduces **multidevice measurement setup** where one "controller" device (tablet) controls the actions of a set of "agent" devices
- Now a **single user** can manage multiple TEMS Pocket devices
  - Double, triple or even **hextuple test coverage** per session
  - Ideal toolkit for **indoor deployment** and **benchmarking** tests
  - **Quick setup** of multiple devices and scripts
  - **Easy monitoring** of status and progress for individual devices

TEMS Pocket controller/agents

LOCAL CONTROL OF MULTIPLE DEVICES (2 OF 2)

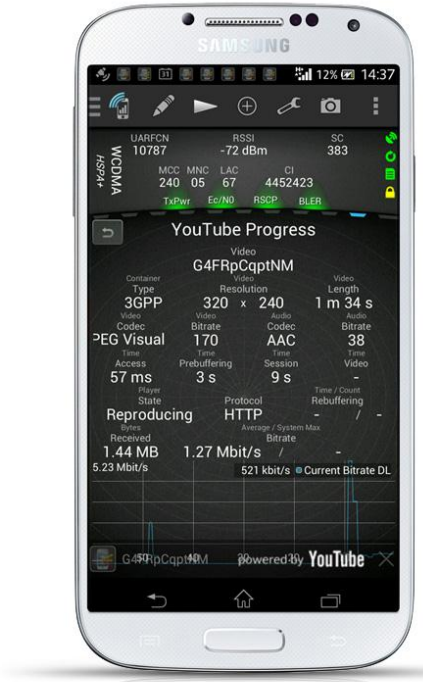
- All scripts are managed via the controller
- Agents can run the same or individually different scripts
- Agents create individual logfiles and handle logfile upload according to script
- Pinpointing for indoor positioning is performed at the contoller and distributed in real time to the agents
- The communication between controller and agents takes place over Bluetooth
- The controller can not be used as a measurement device in this release

TEMS Pocket 13.3 Compatible License Options				
License	**Remote**	**Professional**	**Standard**	**Lite**
Controller Option		✓	✓	✓
Agent Option	Included	Included	✓	

TEMS Pocket controller/agents

VIDEO STREAMING TESTING

- Mobile streaming service produces, according to statistics, up to 40% of the total global mobile traffic.
- You can now test **streaming videos** from YouTube in TEMS Pocket
- Measure, view and record KPIs
  - Audio and video codecs used
  - Service access time
  - Pre-buffeing time
  - Re-buffering time and counts
  - Current/max bit rates
- View the video in real time directly in TEMS Pocket



Video streaming testing

CUSTOM STORAGE LOCATION

- If a device has multiple storage media available – for example, if it has an external memory card inserted in addition to its built-in memory – you can now **select where to store** TEMS Pocket logfiles
- Expands the possible storage capabillities
- Easily back up your files on removable media

Custom storage location

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TEMS POCKET REMOTE IN RMU

- TEMS Pocket Remote Samsung S4 GT-I9505 mounted in a ruggedized smartphone solution, for unattended deployments
- Antenna diversity
- External power socket
- External GPS antenna
- Same form factor as RTU
- Periodic restart to avoid failure in phone, OS or application

TEMS Pocket Remote in RMU

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DEVICES AND ACCESSORIES

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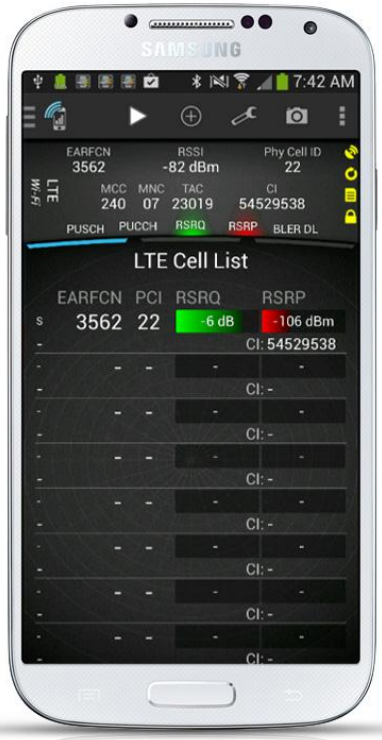
SAMSUNG GALAXY S4 GT-I9506 LTE+

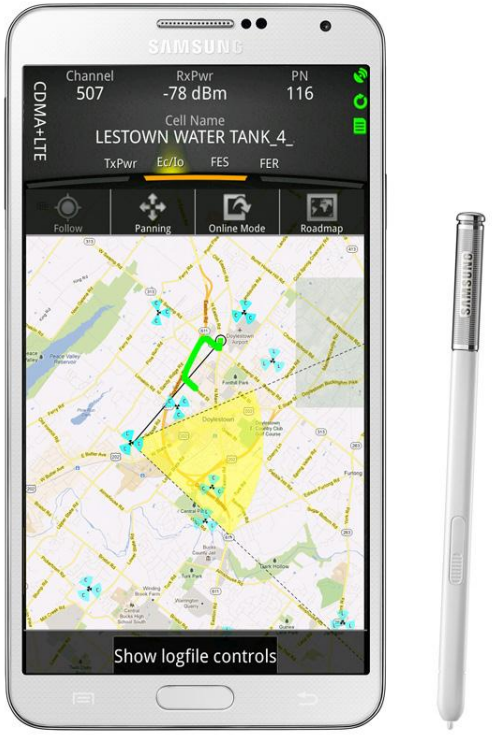
- Samsung Galaxy S4 LTE GT-i9506
  - WCDMA 850(B5) 900(B8) 1900(B2) 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 800 (B20), 850 (B5), 900 (B8), 1800 (B3), 2100 (B1), 2600 (B7)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - **LTE Cat. 4 (150/50 Mbps)***
  - GPRS/EDGE Class 12
- Google Android 4.3
- Qualcomm 1.9 GHz MSM8974AA
- WLAN 802.11 b/g/n
- Integrated GPS with A-GPS support



TEMS Pocket on Samsung Galaxy S4 GT-i9506

SAMSUNG GALAXY NOTE 3 SM-N900V

- Samsung Galaxy Note 3 SM-N900V
- LTE 700 (B13), 1700/2100 (B4)
- CDMA 800 (BC0), 1900 (BC14)
- Throughput capabilities
  - CDMA 2000, cdmaOne, xRTT
  - EV-DO Rel0, RevA
  - LTE Cat. 3 (100/50 Mbps)
- VoLTE
- Google Android 4.3
- 5.7’’ Display
- Qualcomm 2.3 GHz MSM8974AB
- WLAN 802.11 b/g/n/ac
- Integrated GPS with A-GPS support
- Locked to U.S. operator Verizon Wireless



TEMS Pocket on Samsung Galaxy Note 3 SM-N00V

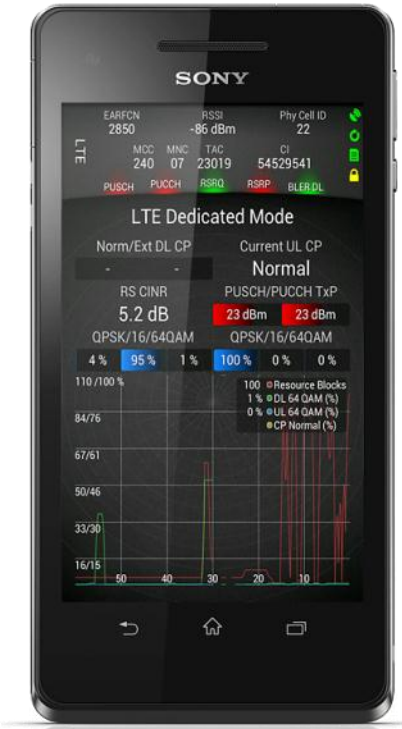
SONY XPERIA T

- Sony Xperia T LT30a
  - WCDMA 850(B5) / 1900(B2) / 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 700 (B17), 850 (B5), 1700 (B4), 1900 (B2)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - LTE Cat. 3 (100/50 Mbps)
  - GPRS/EDGE Class 12
- Integrated GPS with A-GPS support
- Qualcomm 1.4 GHz MSM8960
- WLAN 802.11 b/g/n
- Control functions (see separate table)
- Google Android 4.0

TEMS Pocket on Sony Xperia LT30a

SONY XPERIA V

- Sony Xperia V LT25i
  - WCDMA 850(B5) / 900(B8) / 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 850 (B5), 800 (B20), 1800 (B3), 2100 (B1), 2600 (B7)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - LTE Cat. 3 (100/50 Mbps)
  - GPRS/EDGE Class 12
- Integrated GPS with A-GPS support
- Qualcomm 1.4 GHz MSM8960
- WLAN 802.11 b/g/n
- Control functions (see separate table)
- Google Android 4.0



TEMS Pocket on Sony Xperia LT25i

SAMSUNG GALAXY NOTE 10.1 GT-N8020

- Samsung Galaxy Note 10.1 LTE GT-N8020
  - WCDMA 850(B5) / 900(B8) / 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 800(B20) 900(B8) 1800(B3) 2600(B7)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - LTE Cat. 3 (100/50 Mbps)
  - GPRS/EDGE Class 12
- Google Android 4.0 tablet
- Qualcomm 1.4 GHz MSM9615
- WLAN 802.11 b/g/n
- Integrated GPS with A-GPS support

TEMS Pocket on Samsung Galaxy Note 10.1 LTE

SAMSUNG GALAXY S4 GT-I9505

- Samsung Galaxy S4 LTE GT-i9505
  - WCDMA 850(B5) 900(B8) 1900(B2) 2100(B1)
  - GSM/GPRS/EDGE 850/900/1800/1900 MHz
  - LTE 800 (Band 20), 850 (B5), 900 (B8), 1800 (B3), 2100 (B1), 2600 (B7)
- Throughput capabilities
  - HSDPA Cat. 24 (42 Mbps)
  - HSUPA Cat. 6 (5.8 Mbps)
  - LTE Cat. 3 (100/50 Mbps)
  - GPRS/EDGE Class 12
- Google Android 4.2
- Qualcomm 1.9 GHz MSM9615
- WLAN 802.11 b/g/n/ac
- Integrated GPS with A-GPS support

TEMS Pocket on Samsung Galaxy S4 GT-i9505

EXTERNAL ANTENNA

- Connect custom antennas to Sony Xperia LT25i
  - Directional, bidirectional
  - Extended cable reach
- Cost-effective antenna verification
  - Easily verify already deployed antenna solutions or find faulty cables using only a mobile device
  - Super-portable for use in cars, buildings or pedestrian locations
- Permanent fixture
  - Includes mini-antenna for normal handheld use
  - Internal antenna permanently disabled
  - SMA female connector

Portable antenna solution

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IN-BUILDING SOLUTION FOR HIGH-PERFORMANCE

AND MULTITECHNOLOGY SCANNING, DRT 4311B

- TEMS Pocket 13.2 introduces a unique in-building solution for high-performance and multitechnology scanning
- The 4311B external scanning receiver platform from DRT offers:
  - Small form factor – 4x8x25 cm with passive cooling
  - Lightweight – 1.1 Kg
  - Portable – Integrated, changeable battery supporting up to 4hrs use
  - Wideband – 2 MHz to 3000 MHz frequency range, 40 MHz bandwidth/tuner
  - Multitechnology – LTE FDD/TDD, GSM, WCDMA (CDMA/EV-DO TBA)
  - Dual or single receiver – MIMO and simultaneous multiband measurement
- Availability
  - Enabled by optional TEMS Pocket DRT license
  - Supported by all TEMS Pocket 13 devices
  - Connectable to smartphone or tablet via USB cable

TEMS Pocket supports external DRT scanner

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EXTERNAL GPS

- The following Bluetooth positioning units have been tested and verified with TEMS Pocket
- GlobalSat BT-359
  - GPS recever with 1HZ update rate
- Garmin GLO
  - GPS and GLONASS receiver with 10 Hz update rate
- Additional receiver models will work but are not officially supported

Bluetooth GPS

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DEVICE PROTECTION

- Field work often inflicts wear and tear on equipment and accidents can always happen
- TEMS Pocket Samsung Galaxy S4 and Note 3 now include casing from OtterBox™, the market leader in phone protection
- The Defender-series protection offers:
  - Robust, 3-layer protection withstanding drops, bumps and shocks
  - Built-in screen protector prevents scratches
  - Port covers keep out dust and debris
  - Holster-style swiveling belt clip, serving also as a desk stand, included

Protect from daily wear and tear

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USB POWER-PACK

- Heavy use of data services and difficult radio conditions can quickly drain a device battery
- Extend the operation time of your TEMS Pocket with an external USB power-pack
- Use multiple packs to hot-swap power for long sessions
- Bring a spare – just in case!
- **Just Mobile Gum Max Duo™**
  - 11.200 mAh
  - Dual USB output – 1A and 2.4A
  - High-grade aluminium shell

USB power-pack

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FEATURES AND FUNCTIONALITY

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OVERVIEW

- Extremely powerful
  - Convenient verification of indoor environments
  - Air interface information collection in logfiles with the same level of detail as TEMS Investigation
  - Service testing using user-scripted behavior
  - Automatic transfer of data to the back end for quick and easy access to post-processing tools
- Ideal tool for site verification and indoor troubleshooting
  - Always available
  - Fits in your pocket

Powerful functionality in your pocket!

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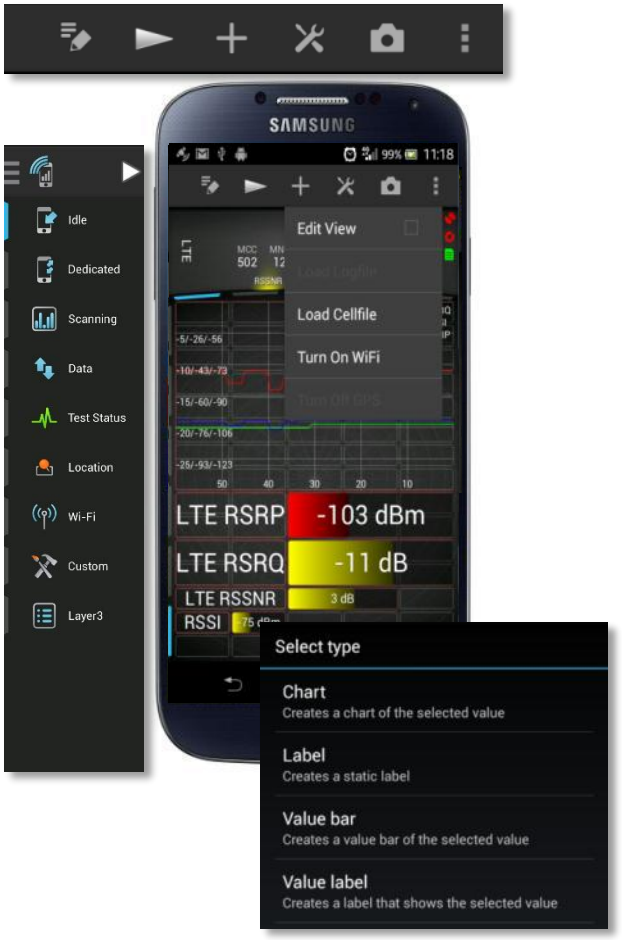
DATA VIEWS (1 OF 3)

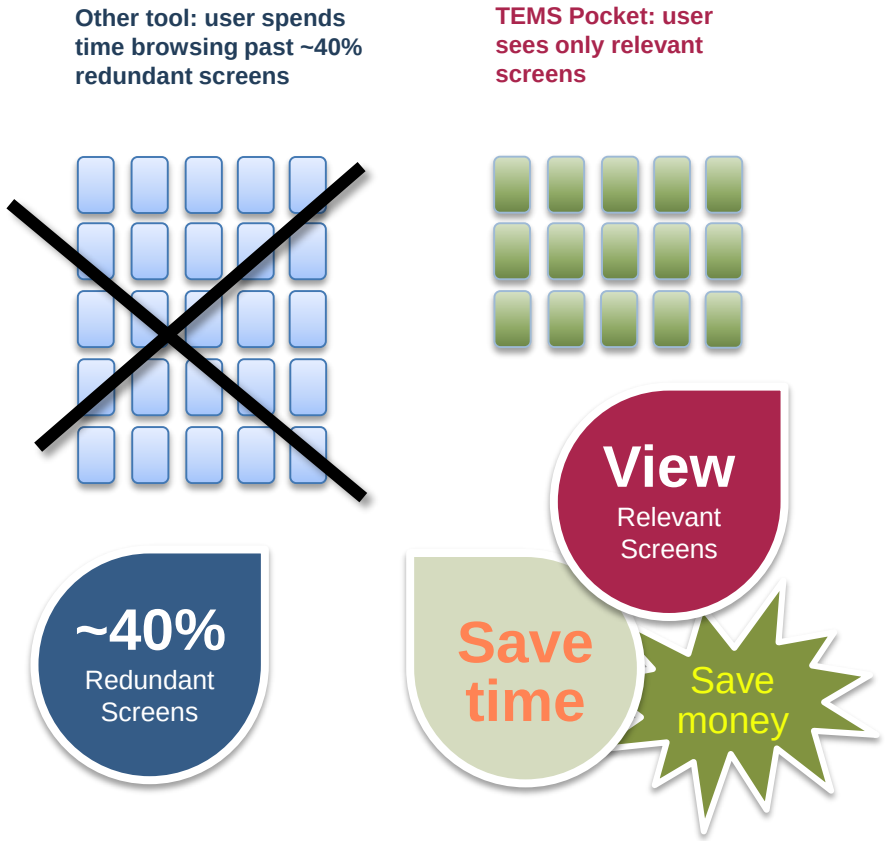
- Data views present RAN information and service performance – monitor information and statistics in real time
- Context-sensitive – only data views with valid contents are visible
- Ease of use – move between data views with native Android navigation keys or by swiping
- Flexible – create custom views based on individual preferences
- Navigation designed according to Google guidelines and best practices



Find what you need when you need it

DATA VIEWS (2 OF 3)

- Context-sensitive – why it matters
- Traditional handheld tools display all screens at all times, i.e., showing empty WCDMA screens when testing GSM
- TEMS Pocket shows screens depending on test case and technology



Find what you need when you need it

DATA VIEWS (3 OF 3)

- Quick navigation with navigation drawer
- Detailed network information
  - Serving/neighbor information
  - RACH procedure
  - Dedicated mode
  - HSPA, EGPRS, EDGE, LTE, Wi-Fi parameters
  - CDMA/EV-DO performance
- More than 180 different presentable measurements
- Histograms – Bar chart with binned data
- Line charts – View measurement over time

Real-time monitoring of network status and service performance

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ALERTS AND NOTIFICATIONS (1 OF 2)

- Monitoring multitechnology and multiservice testing can generate overwhelming amounts of data
- Bring important network, service and device events to the user's attention via customizable alerts
  - Audio alerts – focus elsewhere, still react when needed
  - Pop-up messages – visual, silent notification
  - Markers in line charts and in-/outdoor map – the "when and where" of events
  - Create best practices and ways of working by sharing settings between devices and users

Audiovisual feedback

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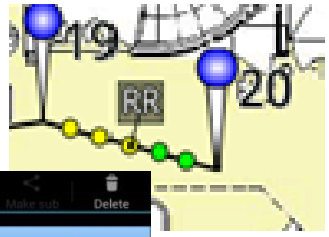
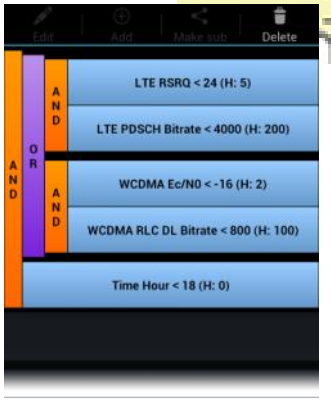
ALERTS AND NOTIFICATIONS (2 OF 2)

- Powerful event analytics directly in the handset
- A wide array of KPI events supported
  - Call events – such as blocked or dropped calls
  - General radio events – such as cell or system change
  - L3 events – trigger on user selectable L3 message
  - Device related – GPS location lost, battery low, time and date
  - Service events – such as FTP error, success or script progress
- Create your own events
  - User-defined event triggered by measurements reaching or crossing preset threshold
  - Hysteresis parameter to prevent ping-pong effect
  - Powerful event editor for complex event definitions





Wide range of customizable events

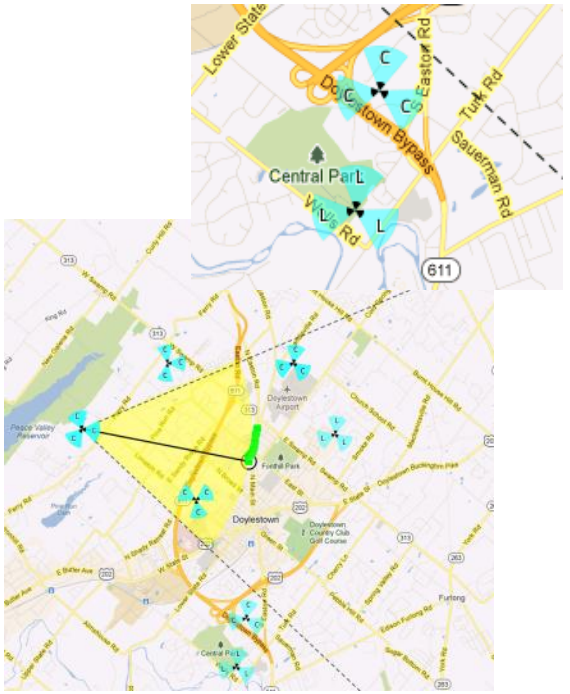
OUTDOOR MAPPING (1 OF 2)

- Locate network trouble spots and geographical network performance
- View measurements on map where GPS coverage is available
- Toggle automatic map panning, centering map on user when driving
- Control when maps should be downloaded to limit impact on tests and measurements

Locate network trouble spots in real time

OUTDOOR MAPPING (2 OF 2)

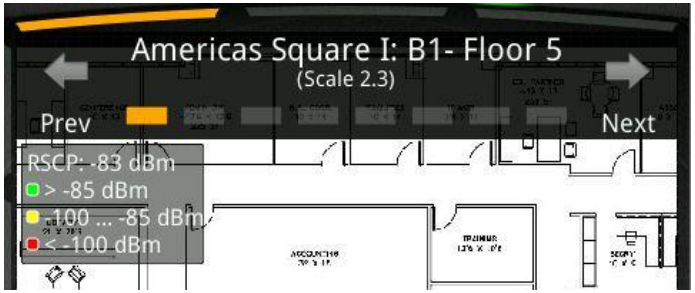
- Work with multiple layers and toggle information on the fly
  - Filter displayed cell sites based on technology to reduce clutter
  - Serving cell indicator indicates current cell
  - Graphical indication of serving cell direction and beamwidth
  - Supports switching between satellite, road, terrain or hybrid maps
- Plot measurements
  - Easily locate areas with potential issues
  - Available in both real time and replay
- Plotted measurements change based on current RAT automatically



Multiple layers of information

GENERAL MAPPING

- Indoor and outdoor map displays a legend for the plotted measurement, indicating:
  - Plotted value name
  - Color range
  - Instantaneous value
- Plotted value changes automatically with RAT for four key measurements:
  - Signal quality
  - Signal strength
  - Signal RSSI
  - Physical UL/DL throughput



Technology	Signal Quality	Signal Strength	Signal RSSI	Physical UL/DL Throughput
GSM	RxQual	RxLev	RxLev	✓
CDMA/EV-DO	Ec/Io	Ec	RxPwr	✓
WCDMA	Ec/No	RSCP	RSSI	✓
LTE	RSRQ	RSRP	RSSI	✓

Convenience and ease of use

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CELL SITE INFORMATION (1 OF 2)

- Not all important cell information is available from the network or handset
- Correlating channel numbers and cell IDs with physical cell sites can be difficult in a real-time environment
- Cell names are used to give a descriptive label to a sector or site
- View cell name in TEMS Pocket by importing cell/BTS files

Efficiently identify individual cell sites

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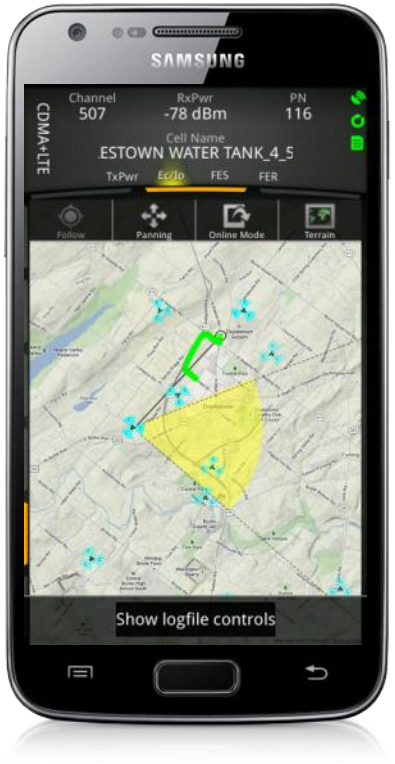
CELL SITE INFORMATION (2 OF 2)

- View cell site locations directly on the map
- Immediately gain better understanding of the network topology, in real time
- Direction and beamwidth visualized to catch swapped feeders
- Serving cell easily identified via line indicator
- Filter cells per technology (UMTS, LTE, CDMA)
- Supported in outdoor maps



Real-time mapping of cell sites

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LAYER 3 MESSAGE VIEWER

- View L3 messages for GSM, WCDMA, CDMA and LTE directly in the handset
  - Real-time header display, including message name, direction, time stamp and protocol
  - Freeze view and scroll through message history
  - Select message to view full contents
  - Syntax highlighting for easy reading
  - Easy navigation between decoded messages in sequence
- Previously exclusive to PC-based test solutions
- Potentially save a round-trip back to the office, capture signaling issues immediately in the field
- Analyze messages either in real time or via logfile replay

View L3 signaling in your hand

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DEVICE CONTROL FUNCTIONALITY

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COMMON PROBLEM AREAS

Problem	TEMS Solution*
How do I test a specific carrier in a multicarrier network without closing down adjacent channels?	Lock device to UARFCN or ARFCN.
How do I verify acquired spectrum?	Lock device to frequency band.
How commercial devices select a serving cell is out of my control. How do I isolate and test a single cell sector?	Lock device to cell.
How do I test specific technologies in my network?	Lock device to radio access technology (RAT).
How do I verify only my in-building DAS system while excluding macro sites in my tests?	Lock to multiple cells, WCDMA and GSM, at the same time. TEMS UNIQUE FEATURE!
How do I prevent commercial users from accessing a specific sector and still be able to test it myself?	Set the cell configuration to prevent access for all devices and utilize cell barred control in TEMS Pocket to circumvent the access restriction.

Locking functions increase productivity by reducing test time (concentrate on real site coverage) and site coverage issues

** Available on selected devices.*

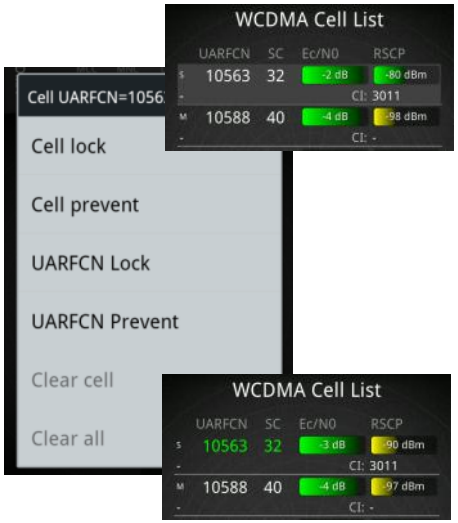
Test like an engineer

UNIQUE MULTILOCK AND PREVENT

- Validating in-building coverage is now even more reliable and time saving with TEMS Pocket cell multilock
  - Select a list of cells to lock to, e.g., only outdoor or indoor sites
  - User definable cell lists make for fast and reliable distribution
  - Automated cell lock via scripts for faster testing
- Cell multilock addresses some of the following challenges
  - How can an exclusively macro network be evaluated while indoors?
  - How can only in-building sites be verified without locking to each individual cell which adds significant time in the field?
  - How do I ensure all teams test the same sites?
  - How can I quickly exclude cell sites I've already tested?

Access cell control directly in the cell list display

Easy as 1-2-3:
Press, select, lock!



Available on selected devices.

In-building efficiency

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MULTI-RAT AND MULTIBAND LOOK

- The user can now lock on to several technologies at the same time
- Possible combinations of RAT locks
- The user can also lock on to multible bands per RAT

Combinations	LTE	WCDMA	GSM
GSM/WCDMA/LTE			
UMTS	No	Yes	Yes
GSM only	No	No	Yes
WCDMA only	No	Yes	No
LTE only	Yes	No	No

Lock on to several RATs and bands

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GSM CONTROL USE CASES

Case study of scenarios using GSM ARFCN lock

GSM ARFCN Lock – Use Cases	Ascom, LT18i/a	Ascom, LT25i/LT30a	Other Qualcomm devices*
GSM Idle			
Force Reselection to ARFCN	Yes	Yes	No
Stay on ARFCN	Yes	Yes	No
Prevent Reselection to ARFCN	Yes	Yes	No
GSM Dedicated			
Force Handover to ARFCN	Yes	Yes	No
Stay on ARFCN	Yes	Yes	No
Prevent Handover to ARFCN	Yes	Yes	No
General			
Max number of ARFCN	∞	∞	N/A
Use function without restarting phone	Yes	Yes	No
Automate usage via scripts	Yes	Yes	No
Interleave together with other control functions	Yes	Yes	No
Control in real time	Yes	Yes	No

Unrivaled GSM capabilities on Android smartphones

*Availability and scope of control functionality is device-dependent and may vary between devices, version and provider

Test like an engineer

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WCDMA CONTROL USE CASES

Case study of scenarios using two popular TEMS control functions: WCDMA carrier and cell lock

WCDMA Cell and Carrier Lock – Use Cases	Ascom, LT18i/a	Ascom, LT25i/LT30a	Samsung, S4 GT-I9506	Ascom other Qualcomm device
WCDMA Idle Mode				
Forced Reselection to Cell	Yes	Yes[1]	No	No
Forced Reselection to UARFCN	Yes	Yes	No	No
Stay on Cell	Yes	Yes	No	No
Lock on UARFCN	Yes	Yes	Yes	No
Prevent Reselection to Cell	Yes	No	No	No
Prevent Reselection to UARFCN	Yes	No	No	No
Dedicated Mode				
Forced Handover to Cell	Yes	No	No	No
Forced Handover to UARFCN	Yes	No	No	No
Stay on Cell	Yes	Yes	Yes	No
Lock on UARFCN	Yes	Yes	Yes	No
Prevent Handover to Cell	Yes	No	No	No
Prevent Handover to UARFCN	Yes	No	No	No
General				
Max number of Cells	∞	1[1]	1, not selectable	Not possible
Max number of UARFCN	∞	1	1	N/A
Use function without restarting phone	Yes	Yes	In Roadmap	No
Automate usage via scripts	Yes	Yes	No	No
Interleave together with other control functions	Yes	Yes	No	No
Control in real time	Yes	Yes	In Roadmap	No

TEMS Sony devices can offer real-time control with no need to reboot the device for changes to take effect.

This enables user to work more efficiently and reliably, reducing operational expenses.

[1] Cell must be in network reported neighbor list

Test like an engineer

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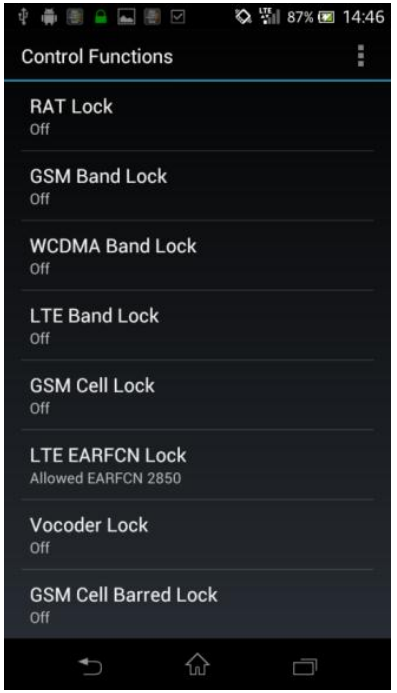
LTE CONTROL USE CASES

Case study of scenarios using LTE EARFCN lock and PCI lock

LTE EARFCN Lock – Use Cases	Ascom, LT25i/LT30a	Ascom, Samsung GT-I9506	Other Qualcomm devices*
LTE Idle			
Force Reselection to EARFCN	Yes	No	No
Stay on EARFCN	No	Yes	No
Lock to PCI	No	Yes	No
LTE Connected			
Stay on EARFCN	Yes	Yes	No
Lock to PCI	No	Yes	No
General			
Max number of Channels	1	1	N/A
Use function without restarting phone	Yes**	In Roadmap	No
Automate usage via scripts	Yes	No	No
Interleave together with other control functions	Yes	No	No
Control in real time	Yes	In Roadmap	No

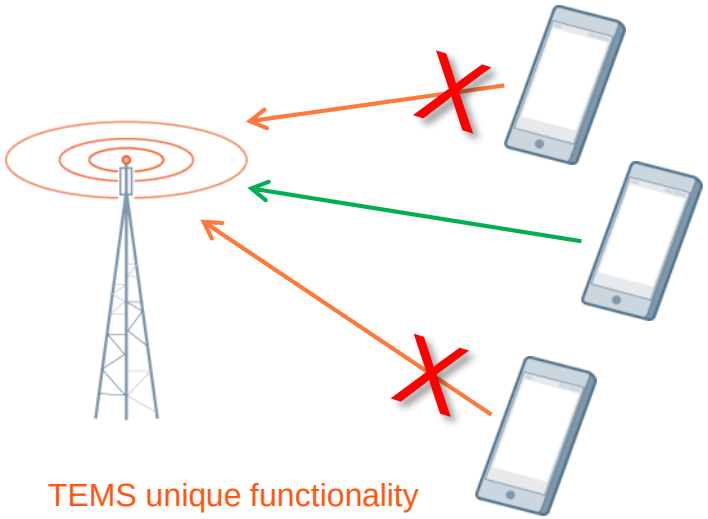


* Availability and scope of control functionality is device-dependent and may vary between devices, version and provider
** An initial reboot is required to prevent or allow network initiated handovers but individual channel locks can be done in real time.

Test like an engineer

CELL BARRED CONTROL

- Enables the mobile device to ignore barred cells
- If a cell introduces itself as barred, commercial devices are not allowed to camp on to that cell
- Barring cells can be useful when testing non-commissioned sites in public networks with existing users
- Prevents public users from interfering with site tests
- Alternative ways are often costly, sometimes error-prone and can impact commercial users
- Available on Lt18i/a, LT25i and LT30a



TEMS unique functionality for Android

Efficient site comissioning

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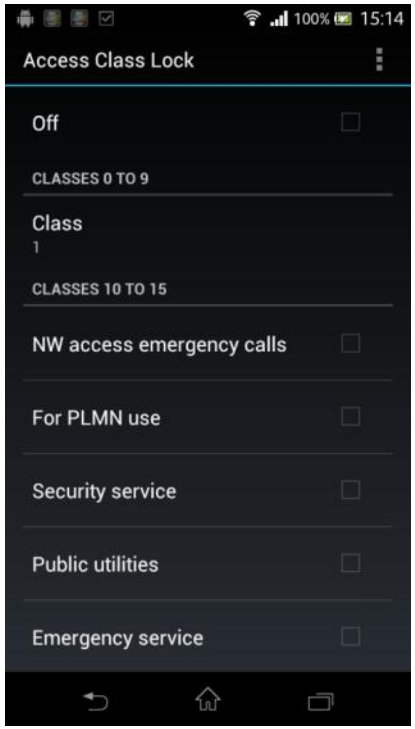
ACCESS CLASS CONTROL

- Control and override AC (Access Class) originally given to USIM
- Can be used to enable evaluation of the various network ACs other than the AC set to USIM
- Test emergency access calls, public or security services
- Choose between AC 0-9 and 10-15
- Alternative solution requires multiple different SIM-cards, manual configuration of the handset and possibly even changes in the network
- AC control increases operational efficiency and reliability
- Available on LT25i and LT30a



TEMS unique functionality for Android

Emergency and security services

FAST DORMANCY CONTROL FUNCTION

- Fast dormancy is a 3GPP mechanism designed to save smartphone battery as well as network resources by minimizing the time the device spends in power-consuming states. The mobile device initiates the procedure by sending a message to the network where it requests to end the current data session.
- The new control function in TEMS Pocket lets you decide whether to allow or inhibit fast dormancy in a WCDMA network. If you inhibit the mechanism, the device's "session end" requests will be suppressed, so that the network will not receive them.
- Available on LT25i and LT30a

Fast dormancy

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SERVICE TESTING

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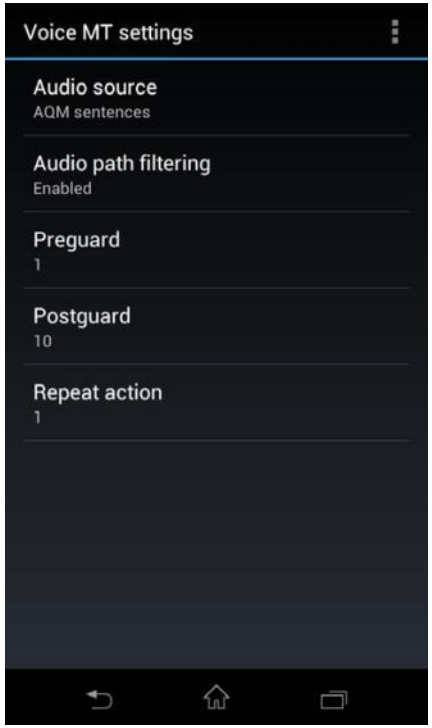
MT/MO VOICE TEST

- Users can automate tests of mobile originated (MO) or mobile terminated (MT) CS voice calls
- Enables M2M call setup tests with a super-portable solution
- TEMS Pocket can wait for incoming voice calls and answer each call
- Calling party will hear audio picked up by answering device microphone
- Supporting POLQA* for MOS score calculation
- Devices supporting control of audio path filtering can be set to enable or disable audio filters



** Available on selected devices.*

Portable mobile-to-mobile solution

EMAIL SERVICE TESTING

- Perform automated email service assurance and data transfer testing
- View KPIs such as data transfer cutoff and success/failure ratios directly in the handset
- Numerous features facilitate efficiency
  - Automatic generation of random contents – save time spent to set up test cases
  - Custom email size – easily test email server size limits
  - Custom sender and receiver information
  - HTML, plain-text format and custom attachments
- Test encrypted email transfer using separate SSL license option*

** Sale of SSL License Option is restricted according to embargo classification*

Email service assurance

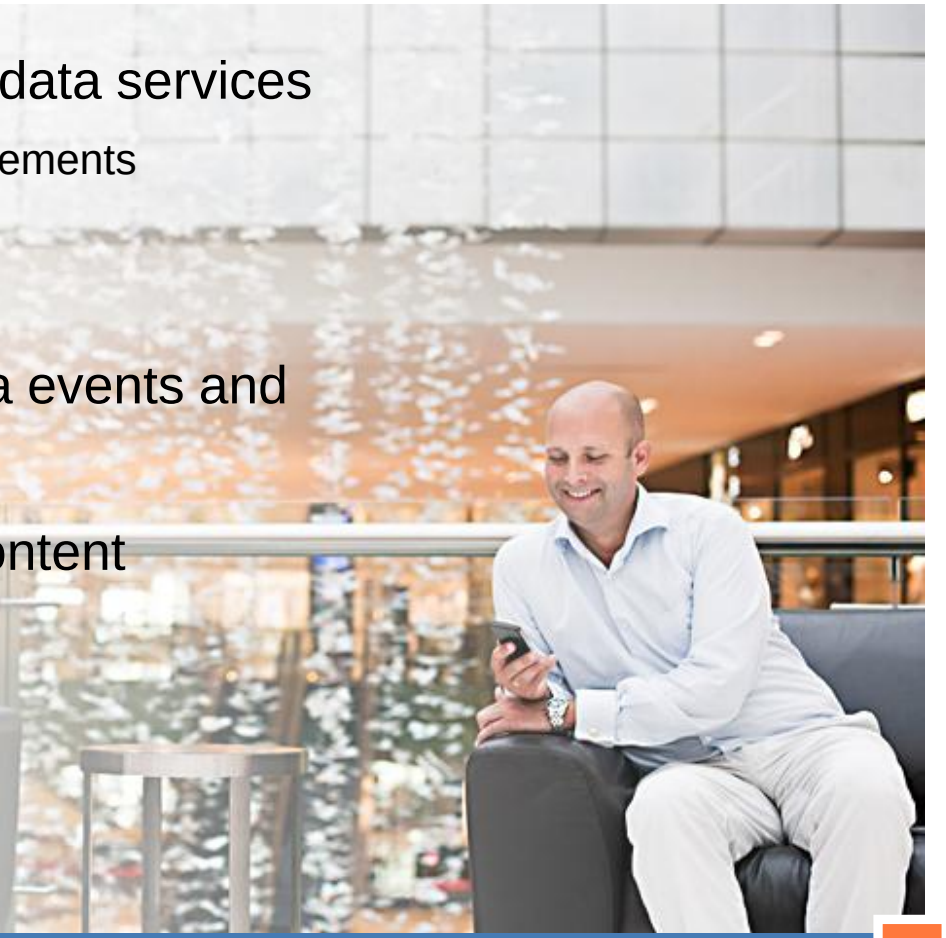
SMS SERVICE TESTING

- Perform automated SMS service assurance and delivery testing
- View KPIs such as delivery times and success/failure ratios directly on the handset
- Numerous features facilitate efficiency
  - Automatic generation of random contents – save time spent on setting up test cases
  - Custom SMS size – easily test SMS fragmentation
  - Custom SMS-C
  - Send multiple SMSs – tagged with a sequence number to easily detect lost messages

SMS service assurance

DATA TESTING

- TEMS Pocket supports a wide range of data services
  - FTP Upload & Download for throughput measurements
  - HTTP Get & Post for Web service tests
  - Ping for latency and delay characteristics
- Generate and capture similar major data events and KPIs as other TEMS solutions
- Automatic generation of random data content helps with quick and easy test setup – no need for special test files



Data testing

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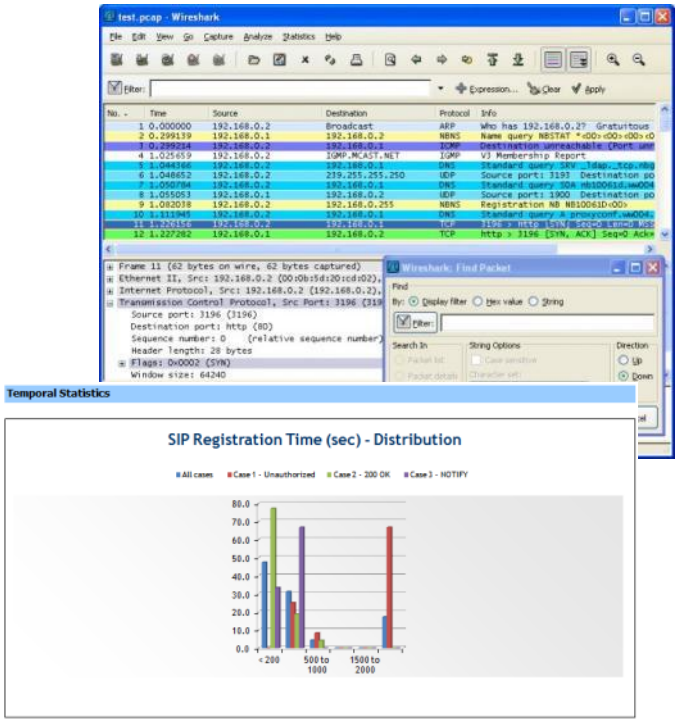
IP LOGGING

- Traditional IP capture tools capture only IP data
- TEMS provides **positioned** IP data, even in indoor environments where GPS is not available
- Available in logfile together with radio environment QoS information
- Scriptable for efficiency and automation
- Wireshark format available for analysis via third-party tools
- Analyze in TEMS™ Discovery for comprehensive KPI reports, such as SIP for VoLTE testing



IP analysis

VOLTE TESTING (1 OF 2)

- VoLTE deployment challenges
  - Network evolution – Rapid LTE network introduction not always optimized for voice
  - Subscriber expectations – VoLTE must meet or exceed CS voice performance
  - Alternative solutions – OTT voice services may be seen by subscribers as viable, low cost alternatives to VoLTE
  - Technology challenges – Integrated, end to end IMS functionality (including QoS/QCI classification) must be tested from the device through the network
- Ascom continues to lead in VoLTE testing
  - First network testing vendor to test and analyze VoLTE performance on a live LTE network
  - Flexible architecture provides genuine view of subscriber experience, supporting multiple OEMs, IMS clients
  - Heavily engaged in VoLTE lab and pre-commercial networks with leading operators worldwide
  - Leadership in voice quality testing as authors and co-authors of various recommendations and contributions (P.862.1, P.862.3, etc.)

VoLTE testing in TEMS Pocket

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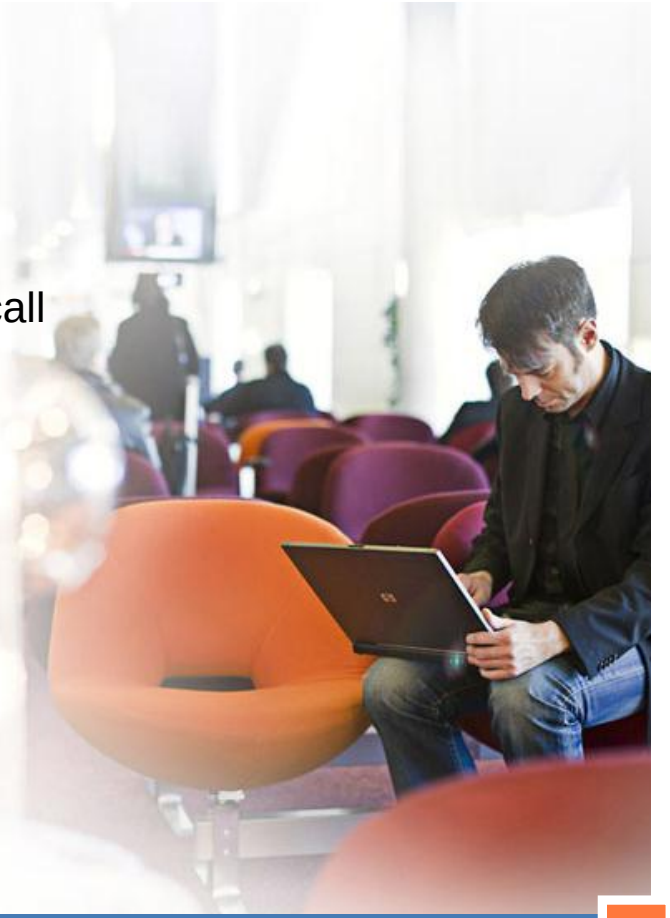
VOLTE TESTING (2 OF 2)

- Introducing support for VoLTE testing on Samsung Note 3, SM-N900V
- Perform automated call setup and call answer
  - The phone selects if it will be a circuit switched call or VoLTE call
- Reports and collects:
  - SIP Message View with full text decoding
  - Call success, failures and setup time available directly in the handset
  - IP trace collected for detailed IMS analysis in post processing
- More VoLTE devices are continuously being added based on customer requests



VoLTE devices for TEMS Pocket

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AUDIO QUALITY MEASUREMENTS (1 OF 4)

- POLQA – AQM suitable for today's heterogeneous networks
- Addresses some of the known weaknesses in the PESQ algorithm
- TEMS Pocket offers a unique POLQA solution with distinct benefits
  - Filter control – Consistent measurements without device audio filter characteristics affecting the perceived network quality, avaliable on Lt18i/a TEMS UNIQUE FEATURE!
  - Vocoder control – Audio testing per voice codec* TEMS UNIQUE FEATURE!
- Handheld solution – Super-portable, suitable for in-building tests
- Real-time display of MOS score on the handset – save time on post-processing
- Call mobile-to-mobile or mobile-to-fixed

** Available on selected devices*

Best-in-class POLQA solution

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AUDIO QUALITY MEASUREMENTS (2 OF 4)

- Vocoder control
  - Network decides which voice codec the phone should use (e.g., HR, FR, EFR, AMR)
  - Vocoder control provides a non-intrusive alternative to making changes in network configuration
  - Controls codec capabilities reported to the network
  - The **only** way to test specific voice codecs
  - Available on LT18i/a, LT25i and LT30a
- Filter control
  - Device-specific audio-enhancing functions such as noise suppression, audio stretch, comfort noise and gain control affect MOS calculations
  - Adds device-specific character to the audio provided by the network
  - Filter control allows disabling of these filters so that a MOS score can be calculated based on the network alone
  - Enables consistent testing and device-independent MOS evaluation
  - Available on LT18i/a

Unique time-saving benefits

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AUDIO QUALITY MEASUREMENTS (3 OF 4)

- 8-second sample length
- Processing time 3-6 seconds (S-WB 6-10s)
- MOS presented after sample is processed
- Max average score 4.2 MOS (S-WB 4.0)
- Automate via TEMS Pocket scripts
  - AQM
  - Filter control*
  - Vocoder control*

Supported features	LT18i/a	LT25i
Moblie to Call generator POLQA DL only	Yes	Yes
Mobile to Mobile POLQA DL or DL/UP	No	Yes
Call generator to Mobile	No	No

** Available on selected devices*

POLQA details

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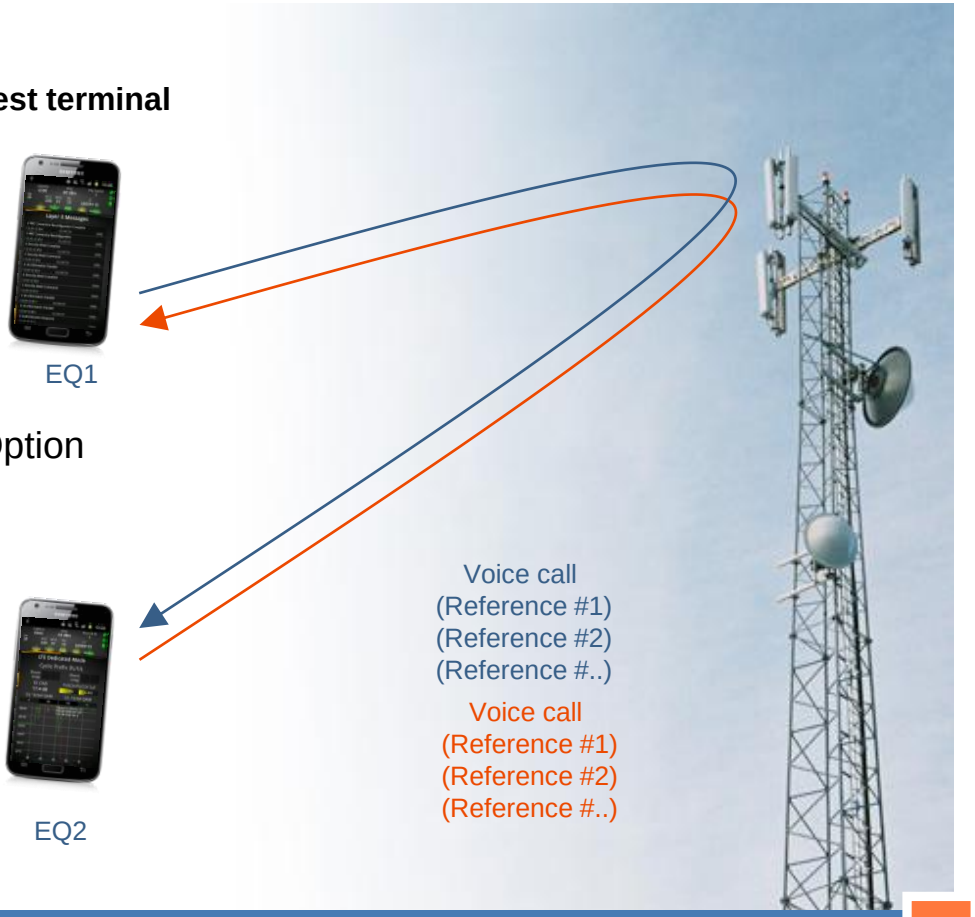
AUDIO QUALITY MEASUREMENTS (4 OF 4)

- In this release:
  - Mobile-to-fixed and mobile-to-mobile POLQA
  - Downlink and Uplink MOS score for CS audio
  - Supported on Xperia LT25i
  - Vocoder control
  - Narrowband and super-wideband sampling
  - Optional feature via TEMS Pocket POLQA License Option
  - Mobile-to-fixed requires CallGenerator with POLQA and CS voice licenses
- Coming releases:
  - DL/UL POLQA in mobile-to-fixed
  - Fixed-to-mobile calls with DL/UL POLQA
  - POLQA for additional devices



POLQA going forward

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WI-FI TESTING

- Most Wi-Fi measurement solutions focus only on Wi-Fi
- TEMS Pocket allows users to measure Wi-Fi together with cellular technologies such as LTE, HSPA and CDMA
- Perform scripted or manual Wi-Fi scanning
- Scan Wi-Fi in parallel with other actions, e.g., FTP and voice
- Detect Wi-Fi channel interference through spectrum analysis
- Supported by all TEMS Pocket Android handsets

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INDOOR TESTING (1 OF 3)

- Perform pinpointing to obtain positioning when GPS coverage is not available
  - Pan, place and delete waypoints on floor plan image
  - Browse and transition seamlessly between multiple floors
- Easy configuration and setup
  - Use picture from phone camera or download floor plans
  - Display and edit maps on the device
  - Run custom scripts while pinpointing

Locate in-building trouble spots

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INDOOR TESTING (2 OF 3)

- Pre-planned indoor routes
  - Load and follow previously recorded waypoint route
  - For repeatable tests or to serve as route instructions for teams in the field
- Makes pinpointing easier and faster
  - Navigate using Previous and Next keys
  - Commit waypoint with a single click, no other navigation required
- Bundle and preconfigure maps for distribution
  - All maps are bundled in a single-file map set
  - Represents a group of floors or buildings
  - Support for MapInfo .tab files for automatic Lat/Long configuration

Plan ahead to work efficiently

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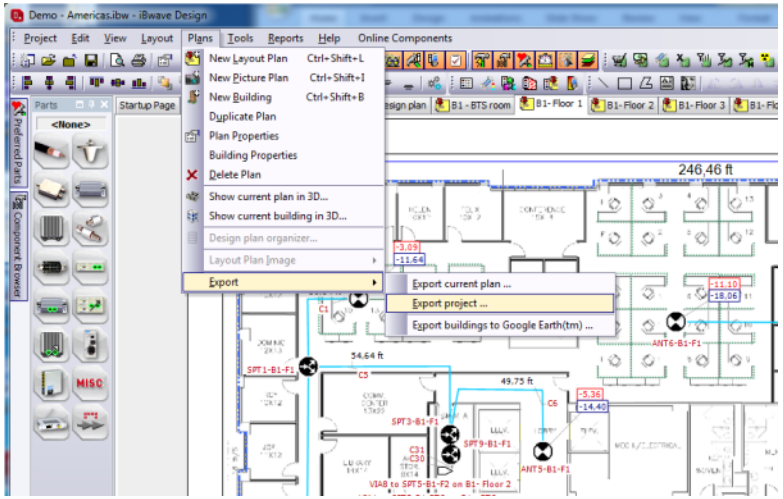
INDOOR TESTING (3 OF 3)

- Integrated with iBwave Design
  - Network project and life cycle management tool
  - Exports .JPEG floor plans and .tab MapInfo for georeference information (iBwave Design 6.0) or .ibwc files containing all information in a single container
  - .ibwc or floor plans with MapInfo data can be imported by TEMS Pocket and TEMS Investigation
  - Supports import of measurements from TEMS solutions – tune propagation models and verify coverage predictions
  - Seamless integration between project management and testing solutions – save time and get coherent information



iBwave
It's what's INSIDE that counts™

TEMS Pocket unique feature

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FLEXIBLE MEASUREMENT CONFIGURATION (1 OF 3)

- Automate data collection and service testing
  - Combine multiple actions into a test sequence
  - Follow the pattern of a user
  - Test consistently
  - Trigger script start and stop based on events
- Easy configuration and setup
  - Display and edit scripts on the handset
  - Transfer scripts between different TEMS Pocket devices
- Test concurrent voice/data sessions
  - Test voice and data services at the same time
  - Collect Wi-Fi measurements in the background

Make testing easy with TEMS Pocket

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FLEXIBLE MEASUREMENT CONFIGURATION (2 OF 3)

- Simple and efficient service testing
- Services supported in measurement configuration (test sequence)
  - MO/MT voice, AQM, SMS send, video streaming
  - FTP UL/DL, HTTP DL/UL, ICMP ping, email (SMTP)
  - Multi-RAB (concurrent voice and data services)
  - Idle (passive), Wait (pause with no logfile recording)
  - Wi-Fi scanning, IP logging
  - Logfile upload (FTP or HTTP)
- Repeat the test action, if necessary
- Automatically control GPS and logfile recording

Make testing easy with TEMS Pocket

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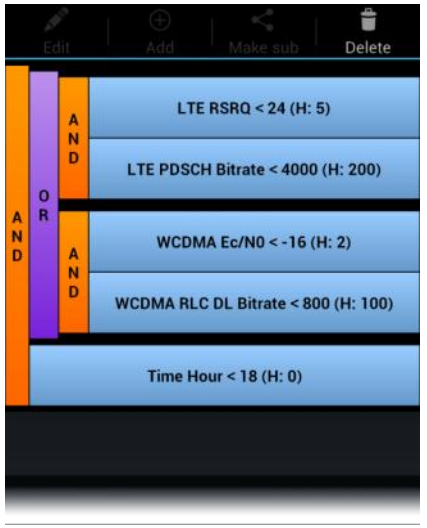
FLEXIBLE MEASUREMENT CONFIGURATION (3 OF 3)

- Intuitive status icons allow you to reliably track progress and monitor testing
- Provides continuous feedback and verification of test setup
- Readily answers such questions as:
  - Do I have GPS coverage or should I initiate manual pinpointing?
  - Is my script running and is logfile being recorded?
  - Is control functionality being used to modify device behavior?
  - What service tests are being performed, and have they experienced any errors?
- Site comissioning: Green for go – red for no!

Be in control of your measurements

EVENT-BASED TESTING

- Execution of scripts can be set to trigger automatically
- Triggers are based on events, including time, dates and even users' own defined events
- Combine with auto-start of TEMS Pocket for semi-autonomous use
- Example use cases
  - Run a specific test scenario at given time intervals, e.g., every 15 mins, the 1st day of the month, or between 6-9 p.m.
  - Start tests when going from no service to service
  - Start recording when a specific radio environment is present, e.g., poor coverage
- Enables the user to collect data only when absolutely needed or even leave the phone unattended for periods of time
- Reduces amount of unecessary or redundant data collected



Even for limited unattended use

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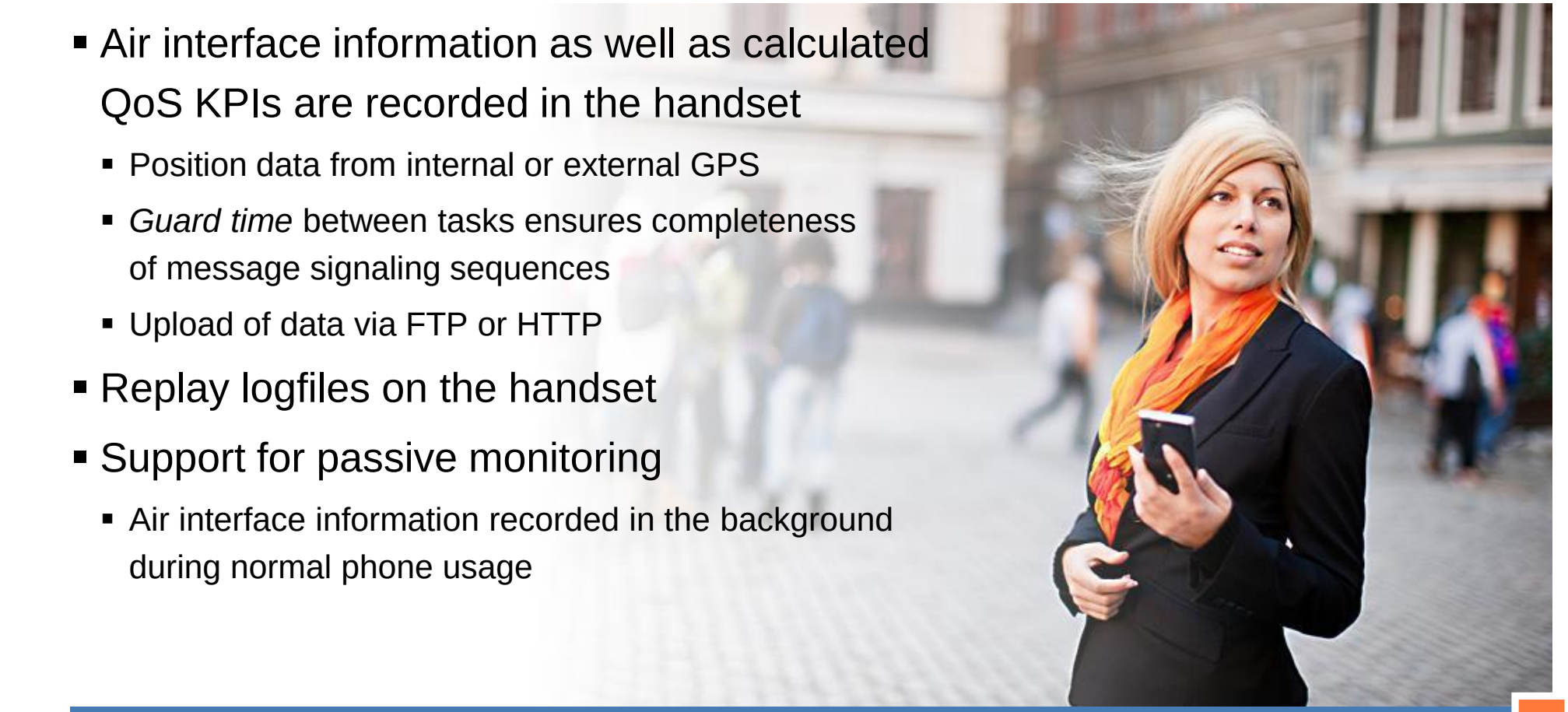
LOGFILE HANDLING (1 OF 2)

- Air interface information as well as calculated QoS KPIs are recorded in the handset
  - Position data from internal or external GPS
  - *Guard time* between tasks ensures completeness of message signaling sequences
  - Upload of data via FTP or HTTP
- Replay logfiles on the handset
- Support for passive monitoring
  - Air interface information recorded in the background during normal phone usage



Store information in logfiles

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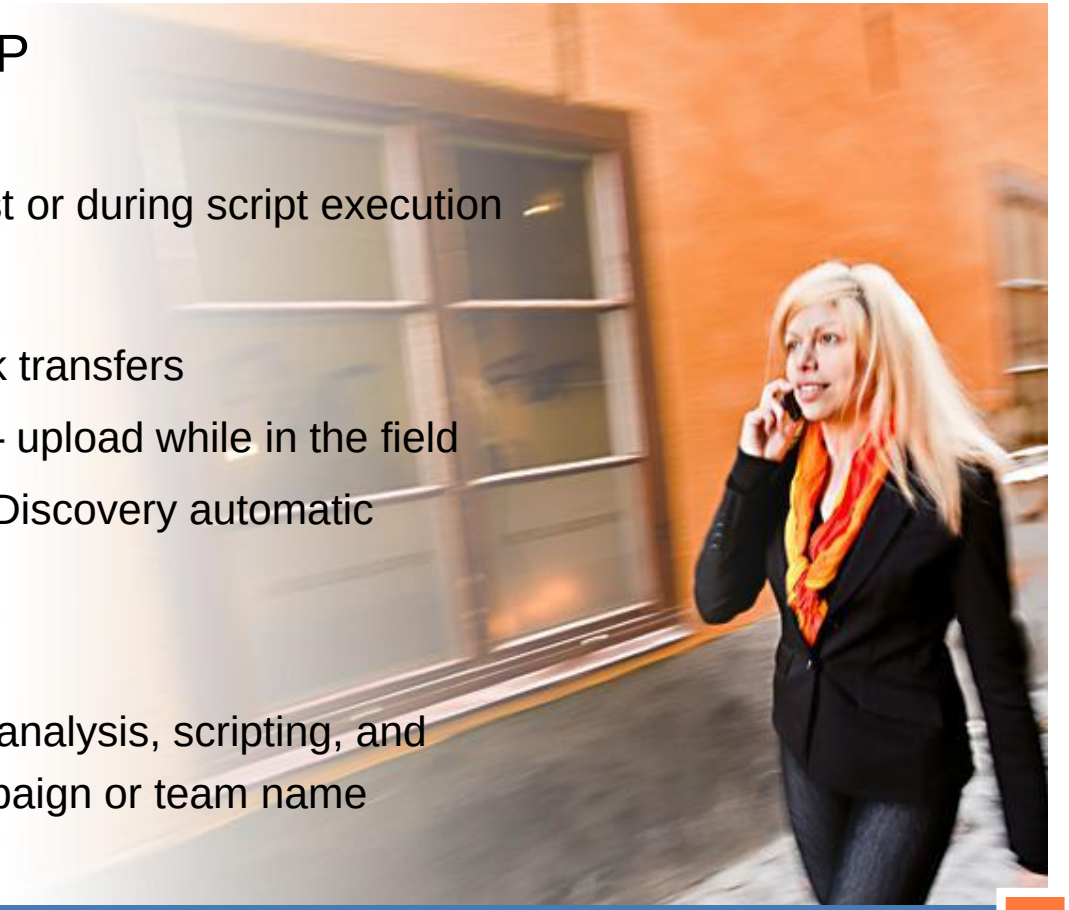
LOGFILE HANDLING (2 OF 2)

- Automated upload via FTP or HTTP
  - Available as a script action
  - Customize upload upon completion of test or during script execution
- Efficient data handling
  - Shorter data upload periods – avoids bulk transfers
  - Data available more quickly for analysis – upload while in the field
  - A real time-saver when used with TEMS Discovery automatic data processing feature
- Custom label
  - Add custom text to logfile name to assist analysis, scripting, and logfile management, e.g., by adding campaign or team name



Handle recorded data efficiently

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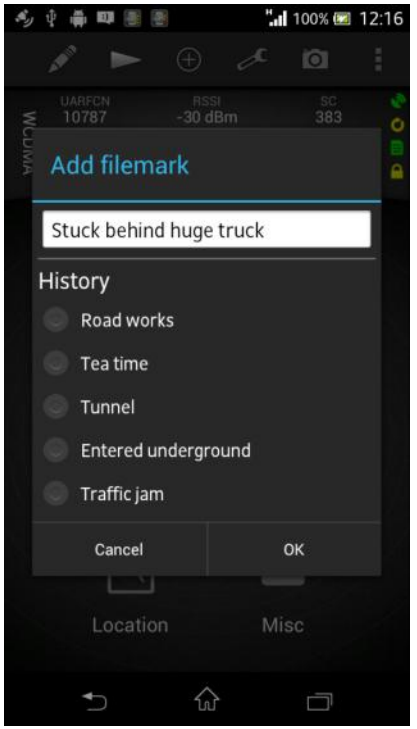
FILEMARKS

- Insert filemarks into a logfile
- Tag segments of particular interest in the file
- Note some pertinent facts related to the recording
- “Last five used” are stored in History for quick access
- One common use case is when traveling through a subway or metro system while inserting a filemark for each station with the station name
- Increases efficiency and reliability when collecting data



Take notes while you go

NEW LOGFILE FORMAT

- TEMS Pocket 12.3 introduced a new logfile format
- Why a new logfile format?
  - Common logfile format for TEMS products
  - Design a more flexible and versatile framework for recording of data
  - Facilitate future development efforts
  - Increase usability and performance for users
- Will the new logfile format affect me as a user?
  - Save time – No more logfile converter tool!
  - Synergies in having one logfile format used by all my TEMS products

Enhanced usability with new logfile format

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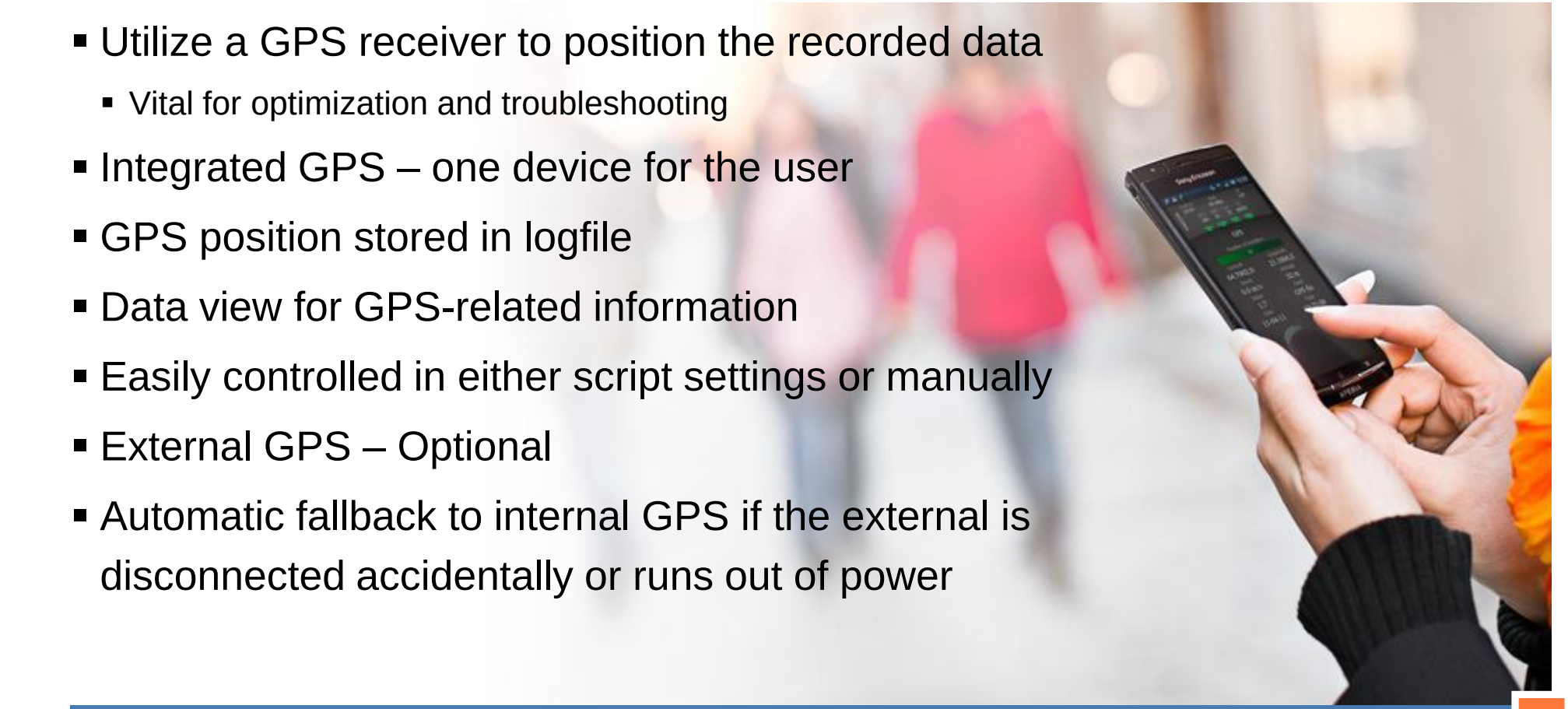
GPS SUPPORT

- Utilize a GPS receiver to position the recorded data
  - Vital for optimization and troubleshooting
- Integrated GPS – one device for the user
- GPS position stored in logfile
- Data view for GPS-related information
- Easily controlled in either script settings or manually
- External GPS – Optional
- Automatic fallback to internal GPS if the external is disconnected accidentally or runs out of power



Geographically positioned measurements

GETTING STARTED

- Learn how to use your TEMS Pocket immediately
  - Training available directly on the device
  - User Manual accessible in the Help menu
  - Quick Guide helps new users getting started with the essentials of handheld testing
- Mobile-friendly documentation
  - Easy to read on a small screen
  - Powerful search and contents index for immediate access to the right information
- Hands-on training
  - Pre-configured maps, scripts and other test files included on the device

Get started immediately

[ ]

SCANNING IN TEMS POCKET

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SCANNER BENEFITS

- Accurate and high-performance reference data source for efficient coverage and measurement validation
- Reduce equipment cost and time needed to monitor and benchmark wireless environments
- Pinpoint both uplink and downlink interference, even narrowband, improving customer experience
- Efficient spectrum clearance when refurbishing legacy frequency bands for new wireless technologies
- Monitor overshooting macro network coverage in-building allowing UEs to focus on in-building network for increased capacity and reduced hardware cost
- Increase capacity through efficient neighbor planning

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WHY USE SCANNERS?

- Scanner use-cases
  - Coverage validation
  - Co-channel interference measurement in CDMA/WCDMA systems
  - Co/Adjacent channel interference measurements in GSM or OFDMA systems (LTE)
  - Neighbor list validation for non-ANR systems
  - ANR decision validation
  - Macro network monitoring for in-building scenarios
  - Reference source for benchmarking applications
- In each case, scanners exceed what a UE can accomplish:
  - Comprehensive measurements
  - Multicarrier, multi-RAT
  - Fast – adequate number of samples to support conclusions
  - Guaranteed accuracy
  - Longer life cycle than UEs

Scanners help to increase efficiency, capacity and experience

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DRT4311B – INTRODUCTION

- TEMS Pocket introduces a unique solution for high performance and multitechnology scanning
- In-building or small, portable benchmarking use cases
- The 4311B external scanning receiver platform from DRT offers:
  - Small form-factor – 4x8x25 cm chassis with passive cooling
  - Lightweight – 1.1 Kg
  - Portable – Integrated, changeable battery supporting up to 4hrs use
  - Wideband – 2 MHz to 3000 MHz frequency range, 40 MHz bandwidth/tuner
  - Multitechnology – LTE FDD/TDD, GSM, WCDMA, TD-SCDMA, CDMA/EV-DO
  - Dual or single receiver – LTE MIMO and simultaneous multiband measurement
- Availability
  - Enabled by optional TEMS Pocket DRT license
  - Supported by all TEMS Pocket 13 devices
  - Connectable to smartphone or tablet via USB-cable

Super-portable for in-building use

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DRT4311B – TEMS POCKET

- Availability
  - For both TEMS Pocket Professional or Standard users
  - Enabled by optional TEMS Pocket DRT License
  - Supported by all TEMS Pocket devices
  - Connectable to smartphone or tablet via USB-cable
- Capabilities
  - Automate scanning via TEMS Pocket scripts
  - Run scan tasks in parallel with other tasks on the device
  - View scanner information directly on the handset
  - Scanner data contained within the TEMS Pocket logfile

Scanners help to increase efficiency, capacity and experience

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IN-BUILDING SOLUTION FOR HIGH-PERFORMANCE

AND MULTITECHNOLOGY SCANNING, DRT 4311B

Scanner views in TEMS Pocket

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DRT4311B – CONFIGURATION

- DRT4311B is available in two base configurations:
  - DRT4311 B-V2
    - Dual receiver unit
    - Best performance for simultaneous multiband scans
    - MIMO-capable
  - DRT4311B-V1
    - Single receiver unit
    - Reduced price at reduced performance
    - No-MIMO support
    - Can be upgraded to V2 at additional cost
- Licensing
  - One optional license per technology, all bands included

Scanners help to increase efficiency, capacity and experience

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DRT4311B – ACCESSORIES

- DRT4311B includes
  - Integrated GPS and GPS antenna
  - Ethernet and USB 2.0 connectivity
  - 2-year warranty
  - AC power adapter (EU and U.S.), Car power adapter
  - USB cable for connecting to mobile device or PC
- Optional – Battery Kit
  - 1 x Battery pack, AC/DC battery charger, AC power cable (U.S. plug)
  - 1 x Extra battery (for an additional 4hrs use)
- Optional – Hard transportation case
  - Pelican Brand 1520 wih custom foam inserts, holds all 4311B, accessories and battery kit
- Note: RF antennas purchased separately

Scanners help to increase efficiency, capacity and experience

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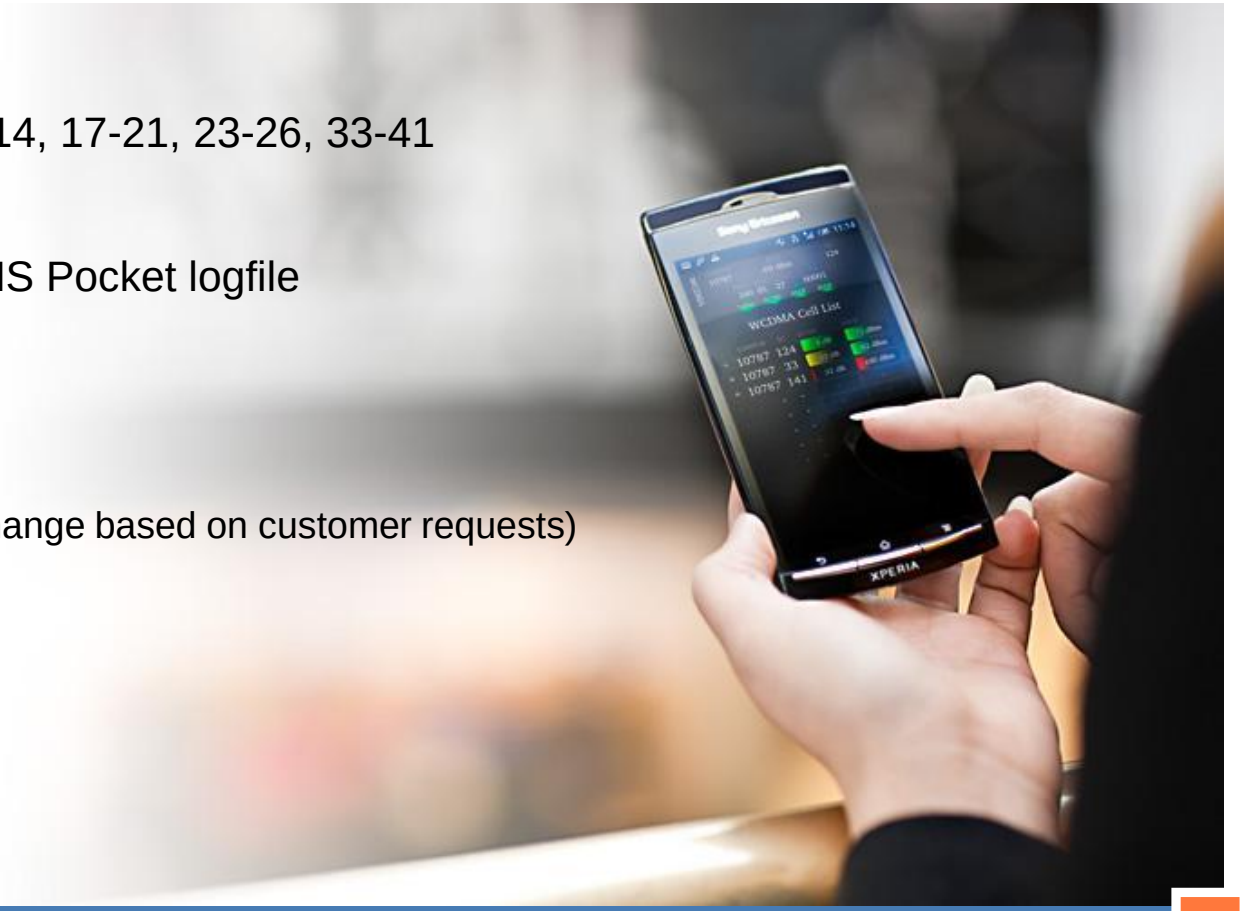
DRT4311B – CURRENT AND FUTURE CAPABILITIES

- TEMS Pocket 13.3
  - LTE FDD/TDD EUTRA Band 1-14, 17-21, 23-26, 33-41
  - Automate scanning via scripts
  - Scan data contained within TEMS Pocket logfile
- TEMS Pocket 14.1
  - WCDMA CPICH pilot scans
- Coming releases (order may change based on customer requests)
  - CDMA/EV-DO
  - GSM



Scanners help to increase efficiency, capacity and experience

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TEMS POCKET REMOTE

A component in TEMS Automatic

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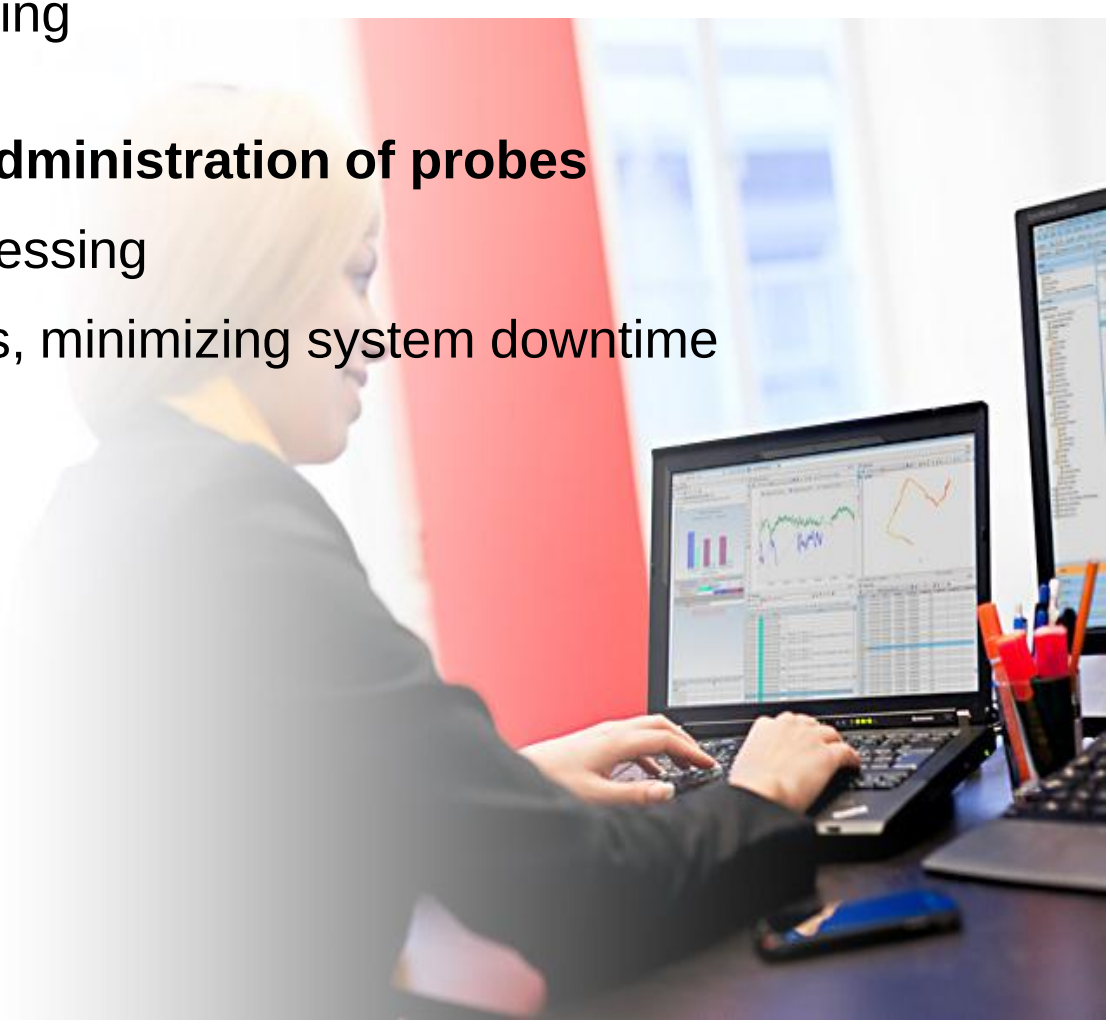
TEMS™ AUTOMATIC

Round-the-clock autonomous testing

FleetManager for remote fleet administration of probes

- Automatic data upload and processing
- Remote administration of probes, minimizing system downtime and administration
  - Probe monitoring
  - Script administration
  - Device configuration
  - Software administration



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TEMS™ POCKET REMOTE

Smartphone solution – Handheld

Basic solution for smartphone testing the handheld or with car-holder scenario

- TEMS Pocket Remote can be used and carried as a normal phone
- TEMS Pocket Remote can be mounted in car holders

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TEMS POCKET REMOTE

Smartphone solution – Backpack

Backpack solution for indoor and pedestrian testing

- Lightweight backpack, only ~5kg with 6 smartphones, and USB or PCU power-pack solutions
- Flexible mounting of devices
- Holds up to 6 x TEMS Pocket smartphones
- Carry-on size
- Discreet look
- Can be controlled by TEMS Pocket tablet – Controller

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TEMS POCKET REMOTE

Smartphone solution – Unattended

RMU – Ruggedized solution for unattended deployments of TEMS Pocket Remote smartphones

- One TEMS Pocket Remote smartphone in a box with:
  - External RF antenna with diversity
  - External SIM slot
  - External GPS
  - Perodic restart to avoid UE failure situations

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TEMS AUTOMATIC

RTU Control Unit (RCU) – Advanced unattended solution

RTU Control Unit (RCU), a flexible solution for smartphone testing meeting high availability requirements.

Each RCU unit can handle up to 4 external USB units 2x voice and 2x data (4x smartphones/ 1x MDU/ 2x RMU/ 1x external scanners), to support:

- Dedicated data upload device, offloading measurement devices and freeing up more time for measurement
- Time-based test synchronization for benchmarking
- Local GUI – Remote Status Indicator support for in-field probe administration
- Remote Software Upgrade via FleetManager
- In-built external GPS, shared across all measurement devices
- Advanced device control functionality with quick recovery handling, minimizing device downtime and increasing measurement efficiency

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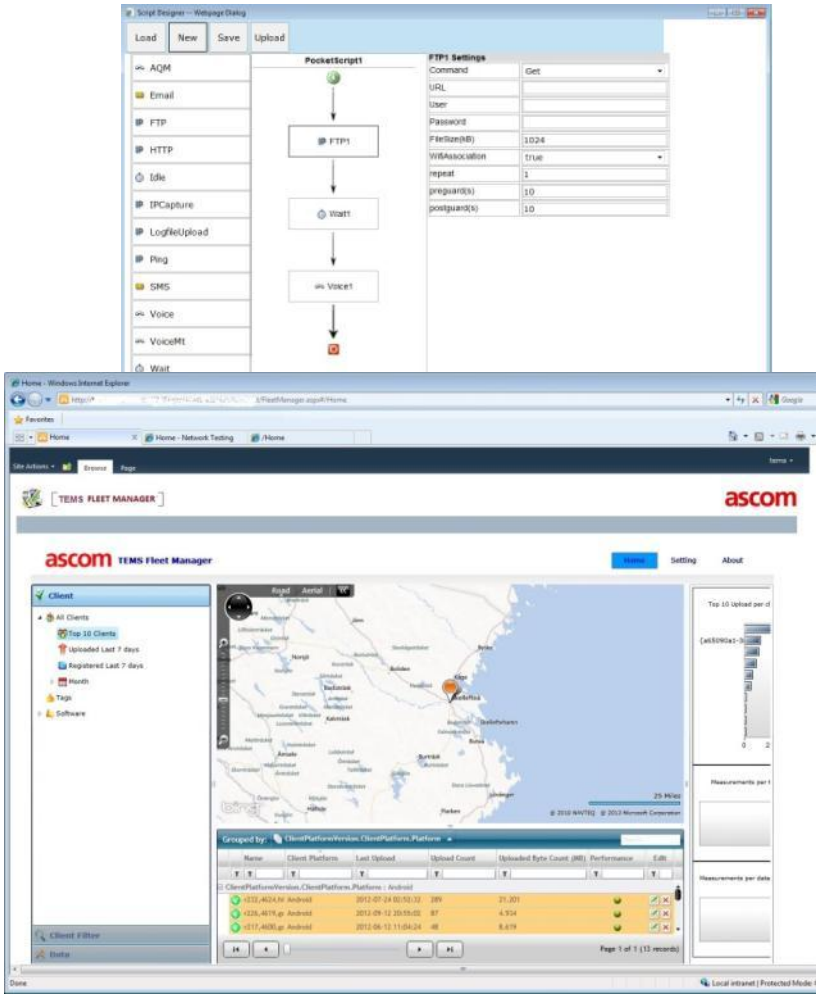
AUTONOMOUS OPERATION

- TEMS Pocket Remote
  - Probe for autonomous and unattended use
  - Monitoring, benchmarking or user experience testing
  - Controlled via Web interface by FleetManager
  - Reduces need for local and manual interaction with individual handsets
- FleetManager
  - Configure and manage remote clients
  - Settings per device or group of devices
  - Create and deploy scripts as campaigns to clients
  - Monitor remote client via last location, counters and reported events



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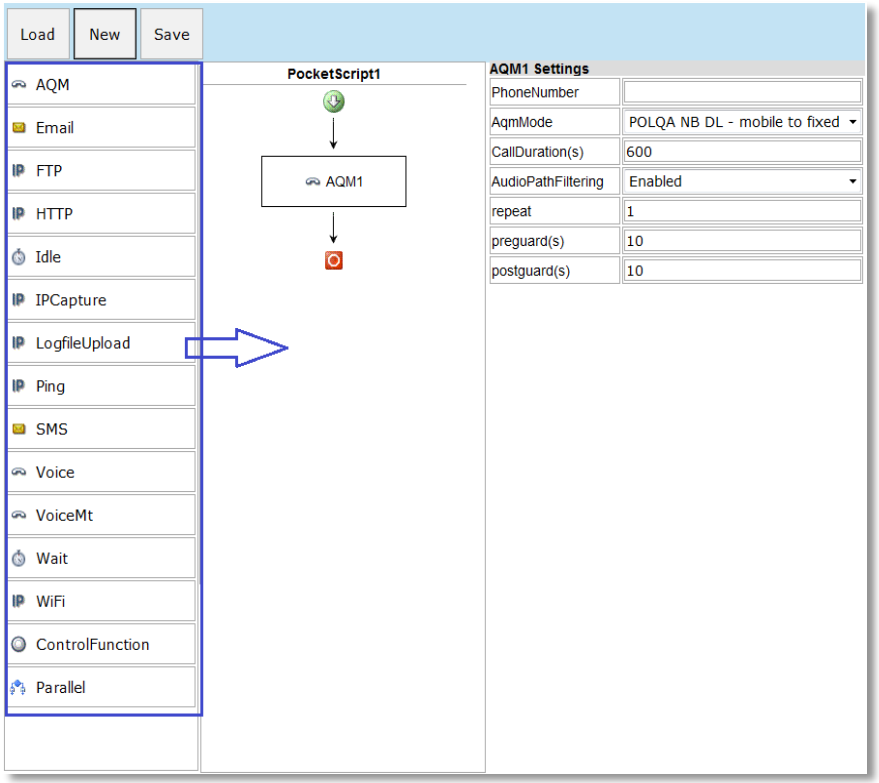
SCRIPT DESIGN TOOL – POCKET REMOTE

- Simplifies data collection and service testing
  - Flexible and efficient creation of advanced test scripts
  - Easy to create, adapt, and reuse scripts
- Based on an intuitive flow chart concept
  - Drag-and-drop activities into workflow pane
  - Toolbox of control logic
  - Application of control functions to devices
  - Predefined building blocks
  - Configuration details in separate tab

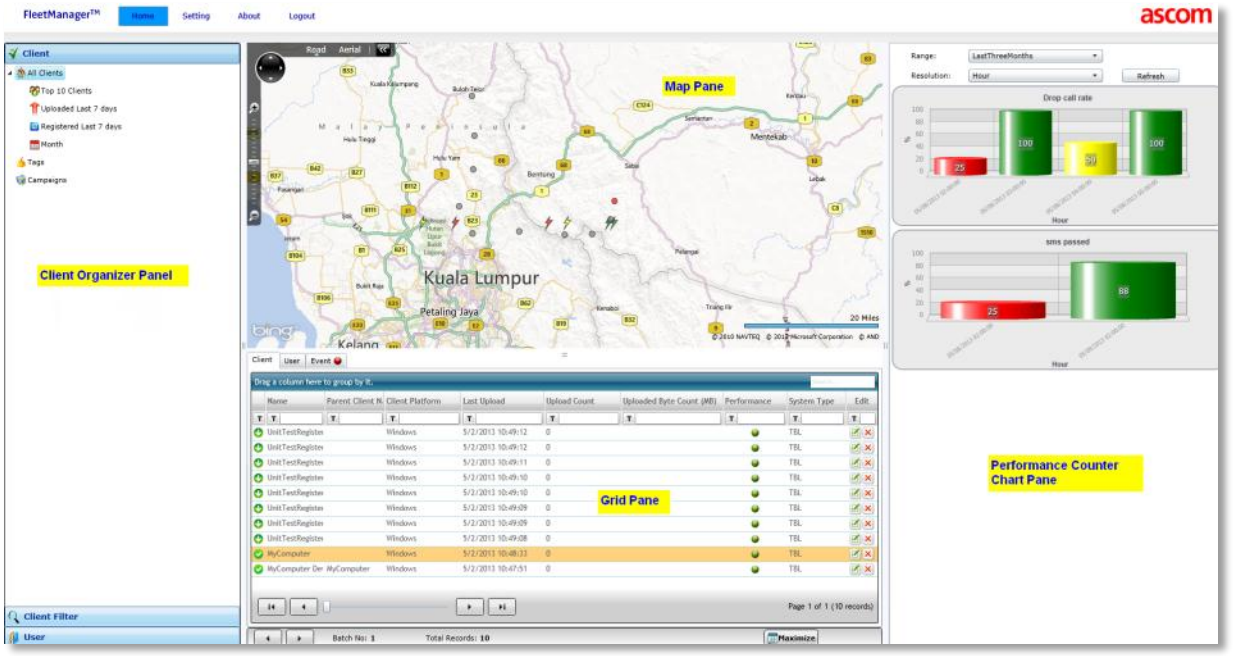


Edit and create scripts in your browser

PROBE ADMINISTRATION

Web-based application enabling efficient O&M of all your probes over air

- Probe administration
  - Initial configuration*
  - Software administration*
  - Status monitoring



*Supported part of FleetManager Rel 1.1

One tool to learn, operate, administrate and support

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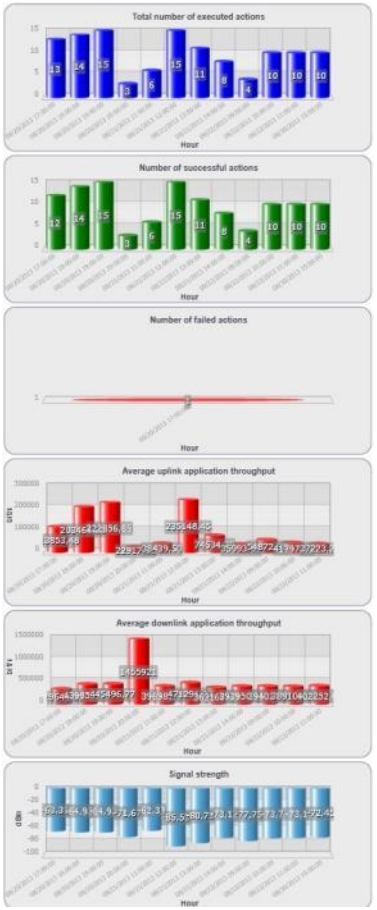
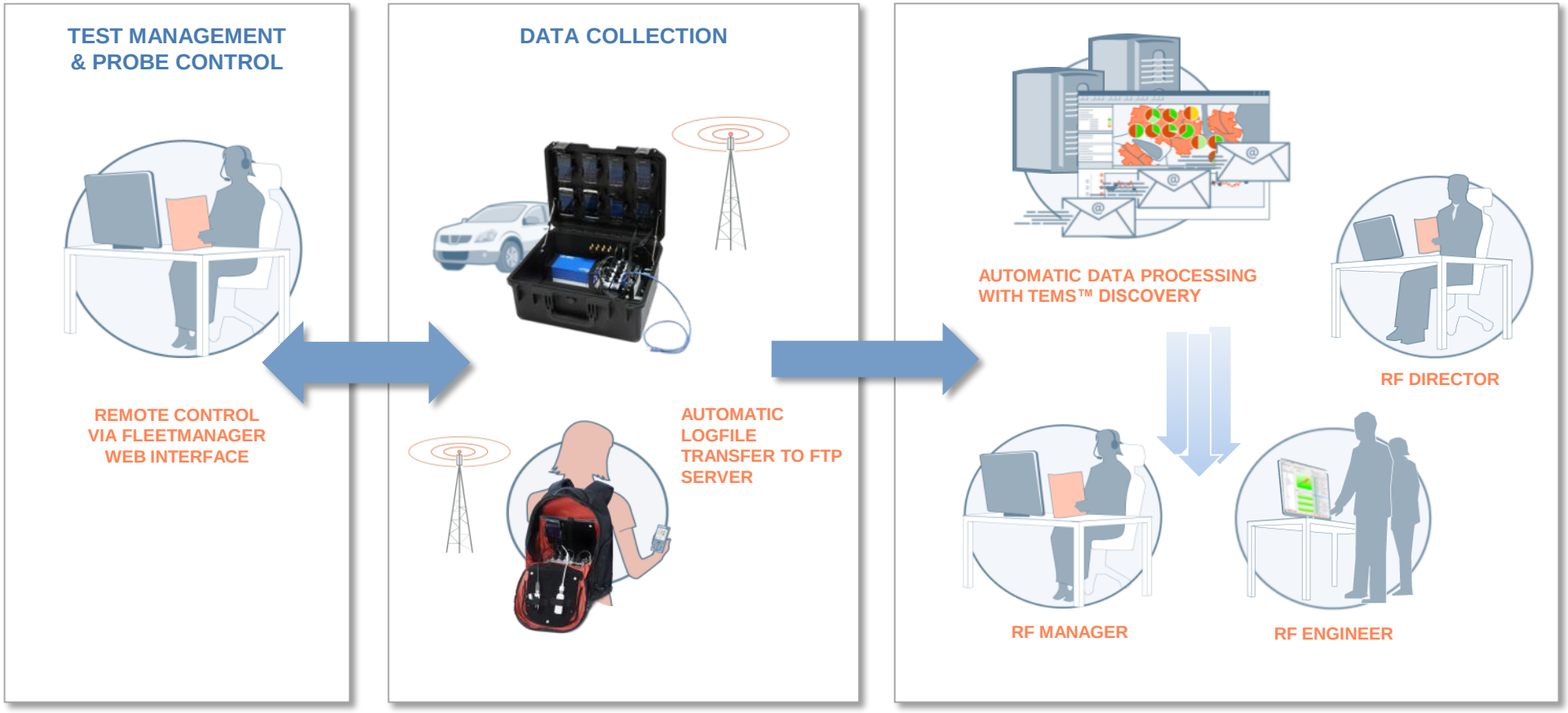
TEMS POCKET REMOTE, PERFORMANCE COUNTER

- Improved visibility of probe performance in FleetManager – counters uploaded
  - Number of successful actions made
  - Number of failed actions per service type
  - Average throughput
  - Average signal strength



TEMS Pocket Remote, Performance Counter

SOLUTION OVERVIEW



Remote monitoring, benchmarking, and QoS surveying

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[ ]

COMBINED SOLUTIONS

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DUAL USE WITH TEMS INVESTIGATION

- Devices offered with TEMS Pocket can be expanded for use with TEMS Investigation*
- Shared device means less cost and dual use
- As an example, use the device with TEMS Investigation while drive testing. For instant pedestrian testing, quickly disconnect and start using TEMS Pocket
- Simple remote license upgrade going either from TEMS Pocket and adding TEMS Investigation capability or vice versa

** Available on selected devices.*

Dual use, ease of use

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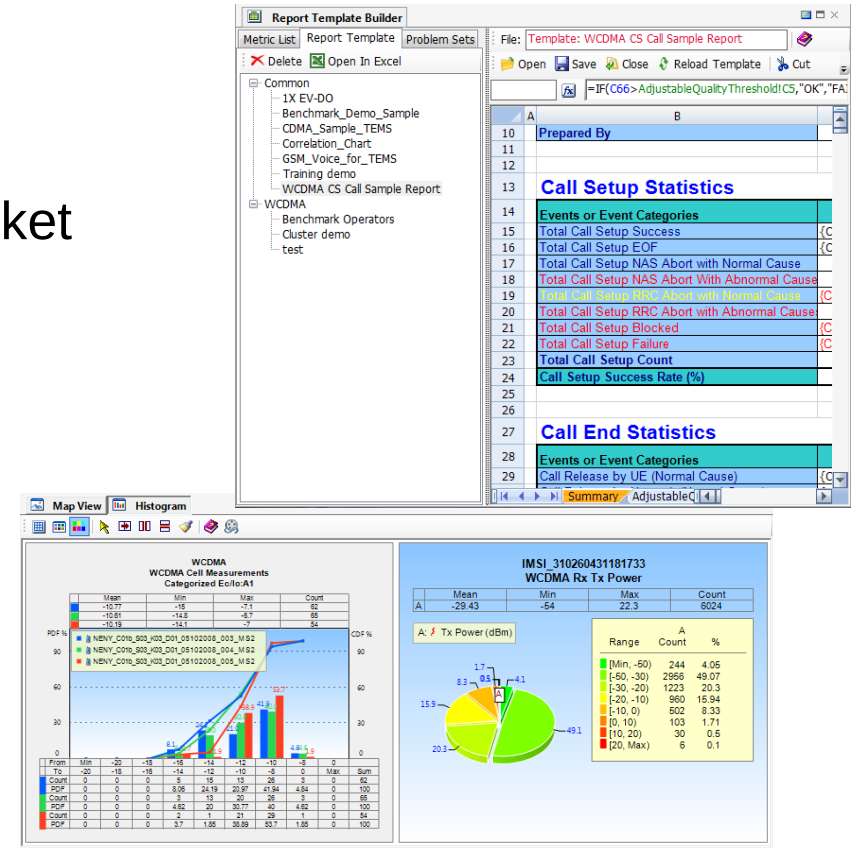
AUTOMATING WITH TEMS DISCOVERY

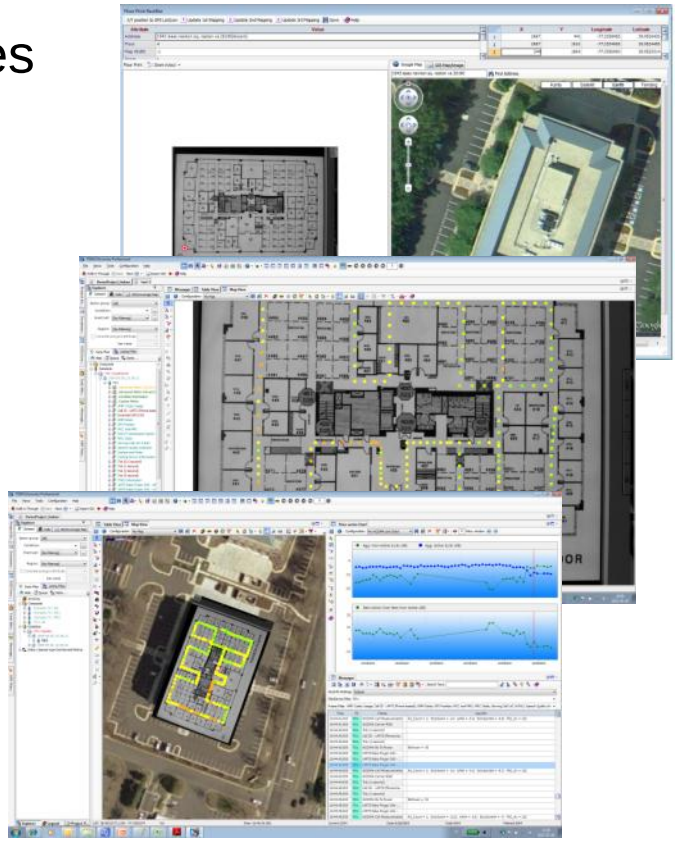
- Automatic monitoring and processing of incoming logfiles
- Use with automatic upload from TEMS Pocket for unattended post-processing
- Automatic creation of KPI plots and reports according to user's configuration
- Automatic email notifications to multiple recipients – Excel reports sent directly to your inbox



Custom automatic reporting

INDOOR ANALYSIS WITH TEMS DISCOVERY

- Seamless import of TEMS Pocket maps and logfiles
- Logfiles, bitmap floor plan images and metadata, all in one zip file
- Simply drag and drop metric into the map view and the metric is displayed on the corresponding floor plan image
- Simple three-step geolocation of map and measurements
- Repositioning of indoor waypoints to improve the appearance of the measurements on the map



Indoor and outdoor networks combined

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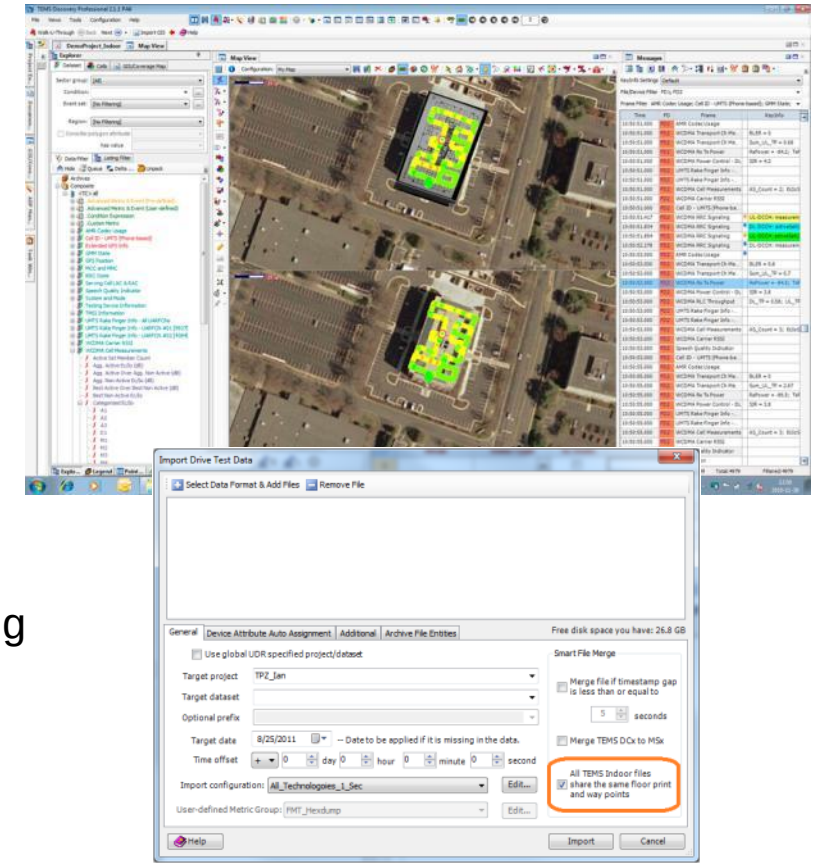
INDOOR BENCHMARKING

- Problem
  - How to work indoors with multiple measurement devices and still manage to provide accurate positioning to all?
- Solution
  - Use a single master TEMS Pocket device to provide indoor positioning for many TEMS probes
  - No special setup is required in the field
  - Indoor pinpointing position data is easily merged during post-processing with TEMS Discovery
  - Avoids device-to-device communication in the field, which is a potential source for failure and data loss



Reliable multidevice testing

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TRANSMITTER ACCESSORY

- Problem
  - As indoor cellular coverage expands, installation providers need to be able to conduct surveys, both before and after installation
  - Indoor system installation is often expensive and involves coordination between multiple parties
- Solution
  - DRT4302A – Battery powered, small size, ultraportable transmitter
  - Remote operation via Wi-Fi or wired Ethernet
  - CW/GSM/WCDMA capable
  - 850, 900, 1800, 1900, 2100 bands supported
  - Pelican carrying case – keep it organized and protect the equipment
  - 1.8m/6-foot tripod for rapid deployment – no need to mount equipment on surrounding environment or fixtures

Coverage verification

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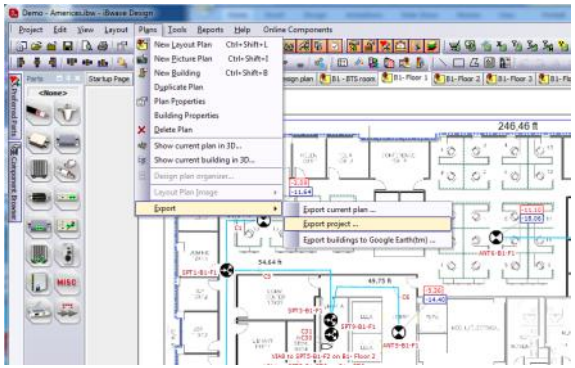
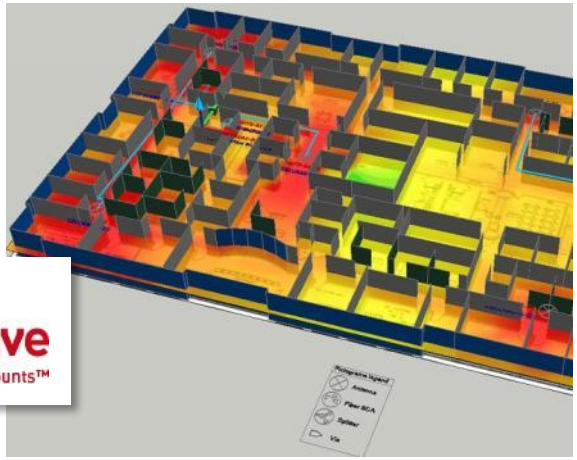
TEMS POCKET IN THIRD-PARTY SOLUTIONS

- iBwave
  - Solutions for in-building wireless networks
  - Design and life cycle management
  - Worldwide presence
- iBwave Design
  - Network architecture design
  - Floor plans with coverage/propagation plots
  - Project documentation and reporting
  - Equipment management and cost tracking





iBwave
It's what's INSIDE that counts™

TEMS Pocket integrates with iBwave solutions

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SUMMARY

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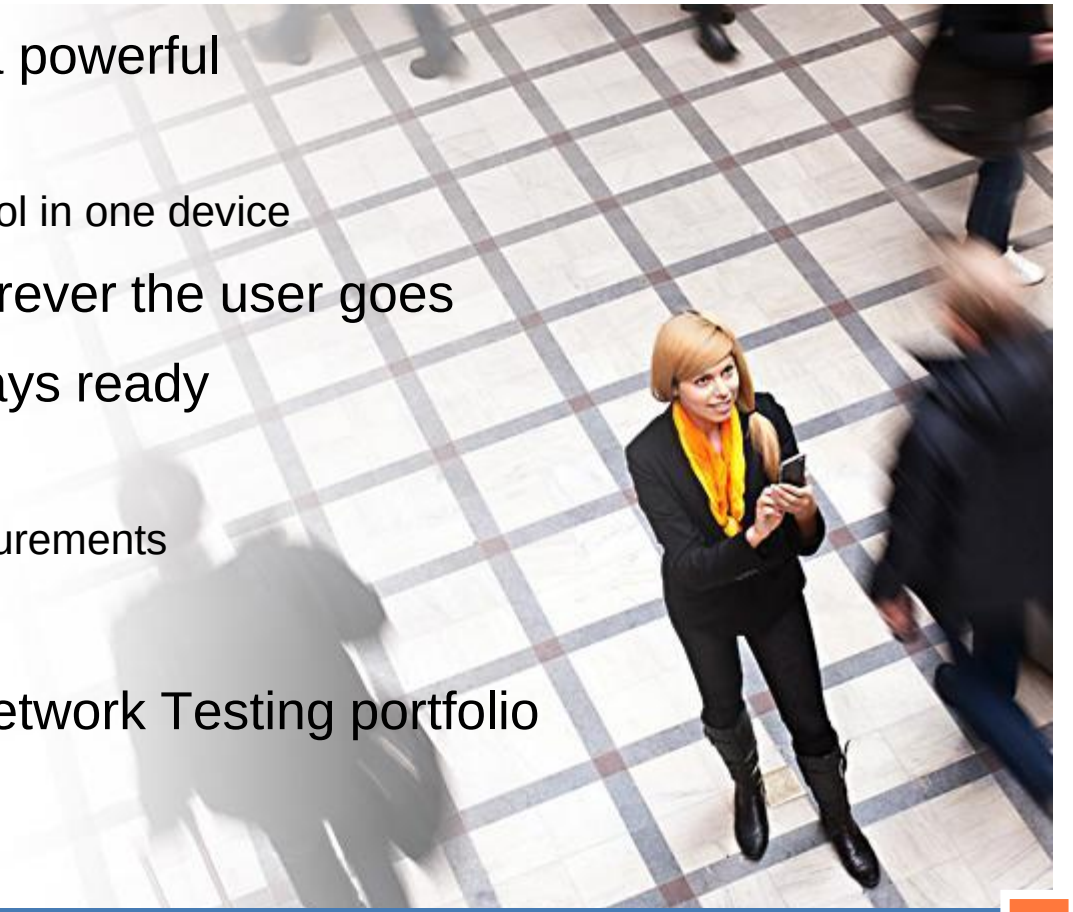
TEMS POCKET

- Your everyday phone turned into a powerful measurement probe
  - A regular phone and an advanced test tool in one device
- Captures network information wherever the user goes
- Measurement capabilities are always ready and available
  - Promotes convenient and portable measurements
- Easy to learn and easy to operate
- An integrated part of the Ascom Network Testing portfolio



A small tool for big measurements

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HOW CAN I USE TEMS POCKET?

- Use TEMS Pocket for:
  - Data collection and service testing
  - Indoor measurements as well as outdoor drive tests
- As a passive semiautomatic probe
  - Combine a call sequence, the GPS and automated logfile transfer
  - Background logging of measurements
- As a stand-alone tool
  - Verify installation and rollout of base stations
  - Verify service performance (statistics and KPIs)
- Allow problems to find you
  - Help important customers with their specific problems
- Use TEMS Pocket with TEMS Investigation and TEMS Discovery
  - Tuning, optimization, and troubleshooting tasks
  - Collect data for statistics, KPIs, and more
- Use TEMS Pocket as your everyday phone

Your imagination sets the limits

FEATURES AND PHONE CAPABILITIES (1 OF 3)

GSM/WCDMA Devices	Xperia LT25i	Xperia LT30a	Samsung S4 GT-i9505	Samsung S4 GT-I9506	Samsung Galaxy Note 10.1 GT-N8020
WCDMA 850 (Band 5)	✓	✓	✓	✓	✓
WCDMA 900 (Band 8)	✓		✓	✓	✓
WCDMA 1900 (Band 2)		✓	✓	✓	
WCDMA 2100 (Band 1)	✓	✓	✓	✓	✓
WCDMA AWS (Band 4)		✓			
GSM 850	✓	✓	✓	✓	✓
GSM 900	✓	✓	✓	✓	✓
GSM 1800	✓	✓	✓	✓	✓
GSM 1900	✓	✓	✓	✓	✓

UMTS/LTE Devices	Xperia LT25a	Xperia LT30a	Samsung S4 GT-i9505	Samsung S4 GT-I9506	Samsung Galaxy Note 10.1 GT-N8020
LTE 700 (Band 17)		✓			
LTE 1700 (Band 4)		✓			
LTE 800 (Band 20)	✓		✓	✓	✓
LTE 1800 (Band 3)	✓		✓	✓	✓
LTE 2600 (Band 7)	✓		✓	✓	✓
LTE 900 (Band 8)			✓	✓	✓
LTE 1900 (Band 2)		✓			
LTE 850 (Band 5)	✓	✓	✓	✓	
LTE 2100 (Band 1)	✓		✓	✓	

CDMA Devices	Samsung Note 3 SM-N900V
CDMA 800 (BC0)	✓
CDMA 1900 (BC14)	✓
CDMA 1700 (BC15)	
EV-DO	Rev. A, ⩽ 3.1 Mbit/s
LTE Class	Cat. 3 (100/50 Mbps)
LTE 1900 (Band 2)	
LTE 1700 (Band 4)	
LTE 700 (Band 13)	✓

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FEATURES AND PHONE CAPABILITIES (2 OF 3)

Capability	Xperia LT25i	Xperia LT30a	Samsung S4 GT-i9505	Samsung S4 GT-I9506	Samsung Galaxy Note 10.1 GT-N8020
HSDPA category	24 (≤ 42 Mbps)	24 (≤ 42 Mbps)	24 (≤ 42 Mbps)	14 (≤ 21 Mbps)	24 (≤ 42 Mbps)
HSUPA category	6 (≤ 5.76 Mbps)	6 (≤ 5.76 Mbps)	6 (≤ 5.76 Mbps)	6 (≤ 5.76 Mbps)	6 (≤ 5.76 Mbps)
GPRS Class	12 (≤ 86 Kbps)	12 (≤ 86 Kbps)	12 (≤ 86 Kbps)	12 (≤ 86 Kbps)	12 (≤ 86 Kbps)
EDGE Class	12 (≤ 237 Kbps)	12 (≤ 237 Kbps)	12 (≤ 237 Kbps)	12 (≤ 237 Kbps)	12 (≤ 237 Kbps)
LTE Class	Cat. 3 (100/50 Mbps)	Cat. 3 (100/50 Mbps)	Cat. 3 (100/50 Mbps)	Cat. 4 (150/50 Mbps)	Cat. 3 (100/50 Mbps)
HR	✓	✓	✓	✓	✓
FR	✓	✓	✓	✓	✓
EFR	✓	✓	✓	✓	✓
WCDMA/GSM AMR	✓	✓	✓	✓	✓
AMR-WB GSM	✓	✓			
AMR-WB WCDMA	✓	✓	✓	✓	✓

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FEATURES AND PHONE CAPABILITIES (3 OF 3)

Control Feature	Xperia LT25i	Xperia LT30a	Samsung S4 GT-i9505	Samsung S4 GT-I9506	Samsung Note 10.1 GT-N8020	Samsung Note 3 SM-N900V
WCDMA/GSM RAT lock	✓	✓	✓	✓	✓	
WCDMA/GSM Band lock	✓	✓	✓	✓	✓	
GSM Cell lock	GSM	GSM				
WCDMA EARFCN lock	✓	✓		✓*		
WCDMA Cell (SC) lock	Real-time	Real-time		✓**		
WCDMA/GSM Cell multi-lock/lock prevention	GSM	GSM				
LTE RAT lock	✓	✓	✓	✓	✓	
LTE Band Lock	✓	✓	✓	✓	✓	
LTE EARFCN look	✓	✓				
LTE PCI Lock				✓		
CDMA/EV-DO RAT lock						
Cell Barred Control	✓	✓				
Access Class Control	✓	✓				

Feature	Sony Ericsson		Samsung / LG
	Xperia LT30a	Xperia LT25i	All devices
External antenna		✓	
IP capture	✓	✓	✓

AQM	*TEMS Pocket 12.4 Xperia LT18i/a*	Xperia LT25i
POLQA NB DL	✓	✓
POLQA WB DL		✓
POLQA Mobile-to-Mobile		✓
POLQA Mobile-to-Fixed	✓	✓
Audio Filter Control	✓	
Vocoder Selection	✓	✓

TEMS Unique Capabilities

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DISPLAYED MEASUREMENTS WCDMA/GSM*

- **UMTS General**
  - RAT
  - MCC
  - MNC
  - LAC
  - CI
  - **Data mode**
- **WCDMA**
  - UARFCN
  - SC
  - RSCP
  - Ec/N0
  - RxPower
- **WCDMA Serving Cell**
  - RRC State
  - TxPower
  - SIR
  - PCA
  - TPC Step Size
  - TPC UL/DL
- **WCDMA RACH**
  - Initial TxPower
  - Msg TxPower
  - Max TxPower
  - Preamble Count
  - Max Preamble
  - Preamble Offset
- **HSPA Data**
  - Cell data support (R99/HSDPA/HSPA)
  - IP UL/DL bit rate
  - RLC UL/DL bit rate
  - MAC UL/DL bit rate
  - RLC Rx/Tx Error
  - E-DPCH Happy Rate (%)
  - E-DPCH DTX Rate (%)
  - E-DPCH Retr. Rate (%)
  - Average E-DCH Transport Block size
  - Average Serving Grant Index
  - HSDPA Modulation Rate (%)
  - Number of active HARQ processes
  - HS-DSCH Number of channelization codes on HS-SCCH (min/max/avg)
  - CQI (min/max/avg)
  - HS-DSCH actual transport block size (min/max/avg)
  - HS-DSCH requested transport block size (min/avg/max)
  - HS-DSCH blocks/s HS-DSCH blocks successful on first attempt (%)
  - HS-DSCH blocks not successful
- **GSM**
  - ARFCN
  - BSIC
  - RxLev
  - RxQual
  - C1, C2
- **GSM RACH**
  - Establish Cause
  - Max Retransmission
  - Reestablishment Allowed
  - Max TxPower
  - TxInteger
  - Random Reference
  - BS PA MFRMS
  - Paging Block Index
  - Paging Block Group
  - Imaging Multiframe
  - BS AG BLKS RES
  - CCCH Combined
  - CCCH/PCCCH Group
- **GSM Serving Cell**
  - TCH ARFCN
  - RLT Ratio
  - RxQual
  - Timeslots
  - Timing Advance
  - TxPower
  - Channel Type
  - Subchannel
  - Ciphering
  - Hopping
  - HSN
  - MAIO
- **GPRS/EDGE Data**
  - Cell Data Support
  - Best UL/DL coding scheme
  - UL/DL Timeslots used
  - UL/DL bit rate, Block Error and Retransmission rate on RLC/MAC
  - Own/Other data ratio during last multiframe
  - EGPRS C-Value
  - EGPRS BEP EGPRS
  - BEP variance
  - EGPRS Link adaptation algorithm

** TEMS Pocket does not filter or reduce measurements recorded to logfiles. Displayed measurements are a subset of all recorded data. Measurements may differ between devices.*

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DISPLAYED MEASUREMENTS LTE/WI-FI*

- **LTE Cell Configuration**
  - MME Group ID
  - MME Code
  - PCI
  - PCIG
  - DL EARFCN
  - DL Bandwidth
- **LTE Data**
  - RRC State
  - Transmission Mode
  - Rank 1
  - Rank 2
  - CQI CW0
  - CQI CW1
  - Timing Advance
  - PDSCH BLER
  - PDSCH MCS CW0
  - PDSCH MCS CW1
  - PDSCH Throughput
  - PUSCH Throughput
  - PUSCH TxPower
  - PUCCH TxPower
  - PUSCH MCS CW
  - DL No. of Resource Blocks
  - Cyclic Prefix (% of short/long)
  - Modulation usage (% per modulation)
- **LTE Cells**
  - RSRP
  - RSRQ
  - Serving Cell RS CINR
  - EARFCN
  - Physical Cell ID
  - RSSI
  - MCC
  - MNC
  - TAC
  - CI
- **LTE RACH**
  - Initial Tx power
  - Current Tx Power
  - Preamble Step
  - Max Preambles, Transmitted number of Preambles
  - Latency, Contention Resolution Timer
  - Connection Type, Result and Reason
- **Wi-Fi**
  - Channel
  - Frequency
  - RSSI
  - Security Settings
  - SSID
  - BSID (MAC)
- **Time**
  - Year
  - Month
  - Day of Month
  - Hour
  - Minute

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DISPLAYED MEASUREMENTS CDMA/GENERAL*

- **CDMA General**
  - System ID
  - Network ID
- **CDMA Cell**
  - Channel
  - PN
  - Ec/Io
  - Ec
- **CDMA Performance**
  - RF Mode (RAT and state)
  - Frame Erasure Rate (CDMA)
  - Packet Error Rate (EV-DO)
  - Rx Power
  - Tx Power
  - Strongest Active Set Ec/Io
  - Finger SUM
- **CDMA Data**
  - RLP Throughput DL Distribution
  - RLP Throughput UL Distribution
  - RLP Throughput DL Current
  - RLP Throughput UL Current
- **FTP**
  - Throughput
  - Server URL
  - Direction
  - Port
  - Transfer/Remaining Time
- **HTTP**
  - Throughput
  - URL
  - Transfer/Remaining Time
- **Voice**
  - Dialed Number
  - Setup Time
  - Retries
  - Selected vocoder
- **Ping**
  - Host URL
  - Min/Max/Avg RTT Delay
- **Email**
  - Server, Port, State
  - Success, Failure Rate
  - Transfer/Remaining Time
- **POLQA**
  - MOS Score & Score Distribution
  - Sentence number
  - Mode (Narrow/Super Wideband)
- **SMS**
  - Destination Phone Nr
  - Success/Failure/Total
  - Access Delay (Min, Max, Avg)
  - End-to-end (Min, Max, Avg)
- **Video Streaming**
  - Container Type (e.g. MP4, AVI)
  - Video Resolution
  - Video Length
  - Video Codec
  - Video Bitrate
  - Autio Codec
  - Audio Bitrate
  - Access Time
  - Prebuffering Time
  - Session Time
  - Video Time
  - Player State
  - Rebuffering Time
  - Rebuffering Count
  - Bytes Received
  - Average Bitrate
  - Max Bitrate
- **Script General**
  - Iterations
  - Success/Failures
  - Runtime
  - Number of actions
  - Number of repetitions
  - Elapsed time
  - Current action
  - Next action
- **GPS**
  - Number of Satellites
  - Lat/Long
  - Speed
  - Altitude
  - HDOP
  - Qual
  - Date
  - Time (UTC)

** TEMS Pocket does not actively filter or reduce measurements recorded to logfiles. Displayed measurements are a subset of all recorded data. Measurements may differ between devices.*

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ANALYZE TEMS POCKET DATA

- Analysis of TEMS Pocket 14.1 logfiles
  - TEMS Investigation 16 or later versions
  - TEMS Discovery 10 or later versions
- Note for WCDMA Scanning:
  - TEMS Investigation 16.1
  - TEMS Discovery 10.0.4
  - TEMS Route Reader 10.1
- Note for video streaming post-processing
  - TEMS Investigation 16.0
  - TEMS Discovery 10.0.3
  - TEMS Route Reader 9.1.2
- Manage data, analyze, troubleshoot, and generate reports.
  - Utilize the full power of the Ascom Network Testing TEMS Portfolio.

An integrated part of the Ascom Network Testing TEMS Portfolio

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HOW TO UPGRADE

- Sony Xperia Firmware
  - Sony Xperia device firmware can be upgraded remotely via Sony's Update Service http://www.ascom.com/nt/en/index-nt/support-tems/device-services/update-services.htm
- TEMS Pocket for Xperia, Samsung and HTC
  - Please contact TEMS Customer Care http://www.ascom.com/nt/en/index-nt/support-tems.htm to receive FTP credentials to access a TEMS Pocket software installer which can be run on a PC to upgrade your software
- For add-on license options, please contact Ascom NT customer care or sales representative
  - http://www.ascom.com/nt/en/index-nt/support-tems.htm

Note: Firmware only! Sony Xperia TEMS Pocket updates are distributed via TEMS Customer Care.

Get your free upgrades

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Against the background of these uncertainties readers should not rely on forward-looking statements. Ascom assumes no responsibility to update forward-looking statements or adapt them to future events or developments.

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