
TEMS Investigation 16.0 Release Note

1. About This Release

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2. TEMS Investigation 16.0

2.1. New Features

2.1.1. LTE Advanced: Extensions for Carrier Aggregation

TEMS Investigation 16.0 broadens and deepens its reporting on carrier aggregation (CA), presenting a richer set of data on **secondary carriers/serving cells**:

- Serving cell information: bandwidth, downlink frequency, and downlink pathloss extended to secondary serving cell; band added for both.
- Neighbor cell information also given for neighbors on secondary carrier.
- PDSCH physical throughput split by carrier.

CA is the state-of-the-art weapon of mobile operators in their battle against capacity crunch. It allows devices and networks to combine **multiple disjoint** slices of frequency spectrum in real time, unlike previous technologies where spectrum allocations thus combined had to be contiguous. CA thus paves the way for more efficient spectrum utilization, allowing operators to put to use whatever bits of this precious commodity they can acquire or reallocate.

TEMS Investigation ensures unbiased **evaluation**, efficient **validation**, and incisive **optimization** of CA during rollouts worldwide, along with support for CA-capable handsets as they become available from device manufacturers for individual markets.

2.1.2. YouTube Streaming with On-device Clients

Instead of using a PC-based video player, YouTube streaming can now alternatively be tested with an **on-device service** which replays the stream on the device itself. Testing the device's own streaming player is of obvious interest and importance given the all-pervading character of today's smartphone use. The YouTube on-device service used by TEMS Investigation is essentially the same as the YouTube testing feature launched in TEMS Pocket 13.3.

2.1.3. More Flexible Licensing for Qualcomm Chipset Based Devices

To allow more flexibility in the use of Qualcomm chipset based devices for data collection, generic technology license requirements in TEMS Investigation have been **decoupled from the capabilities of the Qualcomm device**.

In practice, what this means is that you can use state-of-the-art, readily available devices even if your data collection is restricted to 2G/3G networks, and you do not then have to buy a license for 4G technology.

For example, you can now activate an LTE-capable phone such as Sony Xperia LT25i in TEMS Investigation without having an LTE technology license. The phone can then be used for collecting GSM and WCDMA data.

2.1.4. New Supplied Device: Samsung Galaxy S4 GT-I9506

This device was introduced in TEMS Investigation 15.3 but is now also **supplied, replacing the S4 GT-I9505** (which is still connectable and supported). The newer GT-I9506 model is LTE Category 4; in other respects, the two devices are generally similar.

2.1.5. Other New Supported Devices

- Samsung Galaxy S4 SHV-E330K (LTE-A CA, Bands 3 and 8)
- Samsung Galaxy S4 SHV-E330S (LTE-A)

2.1.6. Airplane Mode Control Function

A new control function has been implemented, allowing you to switch a device **to airplane (flight) mode and then back** to normal operation. One important application of such a function is to force a device to tear down and re-establish its connections, so that this signaling can be captured and its performance evaluated. For example, you can force the IMS client on a preconnected smartphone to re-register.

The airplane mode function is implemented with AT commands and is therefore applicable to all devices equipped with an AT port (which includes many of today's smartphones).

2.1.7. Rohde & Schwarz Enhancements: Scripted Scans; CGI Data; LTE MIMO Scanning

- Rohde & Schwarz TSMW scans (LTE RS, WCDMA CPICH, GSM RSSI) can now be **scripted** as well as executed manually.
- During WCDMA and GSM scans, **CGI data** is extracted from System Information.
- **LTE network multipath (MIMO)** reference signal scanning is now supported. Both **2 x 2** (two Rx, two Tx) and **2 x 4** (two Rx, four Tx) MIMO are catered for, and the presented output includes RSRP and RSRQ for each Rx–Tx combination.

Similar to carrier aggregation, MIMO offers a means to increase capacity in a network. MIMO, however, does so by enabling more efficient use of **existing spectrum**, without requiring investment in new spectrum or eNodeBs. The greatest efficiency gains with MIMO are obtained in rich scattering environments, something which gives rise to new

optimization challenges as most traditional networks are designed for line-of-sight transmission. These challenges can be forcefully addressed with TEMS Investigation.

2.1.8. Strengthened LTE Reporting with Hisilicon

The **Hisilicon Ascend D2** TD-LTE/TD-SCDMA/GSM phone is introduced in this release for the Chinese market. With it comes a range of **new information elements** which further illuminate various aspects of these technologies: for LTE, notably, MAC and PDCP measurements.

With TD-LTE deployments gathering momentum also outside of China, future Hisilicon devices may become available in other markets, and TEMS Investigation will then be well prepared for supporting such devices.

2.1.9. Improved Compatibility with TEMS Pocket Indoor Testing

TEMS Pocket has an indoor pinpointing function comparable to that of TEMS Investigation. Indoor logfiles recorded with TEMS Pocket were previously presented in the Map window in TEMS Investigation. From version 16.0 onward, however, such files (whether georeferenced or not) will **replay in the Pinpoint Window**, with waypoints and information elements plotted just as in TEMS Pocket itself. This is a usability boost improving consistency of behavior across products in the TEMS portfolio.

2.1.10. Full IP Sniffing with Lower Processing Load

Full-scale IP sniffing, where a large number of bytes are extracted from every packet, is a distinctly resource-intensive activity. To reduce the processing load, the default behavior of this operation has been changed so that IP Protocol Reports are no longer presented in the TEMS Investigation user interface, but **written to the logfile only**. An option is provided for reverting to the older behavior if desired.

2.1.11. New Information Elements Showing PC CPU and Memory Usage

A new category of information elements has been created showing the PC's current **CPU load, RAM usage, and free disk space**. These performance metrics are taken straight from Windows.

2.2. Other Enhancements

- LTE "Transmission Mode" information element expanded into two elements: "Transmission Mode", updated from Layer 3 messages, and "Transmission Scheme", indicating the corresponding PDSCH transmission scheme and updated from UE mode reports.
- The following types of scanning with R&S TSMW can now be scripted: LTE signal scan, WCDMA CPICH scan, and GSM RSSI scan. Please note that for this reason, previously created configuration sets for such scans cannot be reused in TEMS Investigation 16.0.

2.3. Corrected Bugs

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2.4. Removed Features

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3. Known Bugs and Limitations

The bulk of the material previously presented under this heading has been moved to the regular user documentation. Most device-related items have been transferred to the Device Configuration Guide, section 4.16 “Known Device-related Limitations”, while some are found in other parts of that volume, or in the Installation Guide or User’s Manual.

3.1. PC Application Related

3.1.1. Installation and Start-up

- If TEMS Investigation takes a long time to start up (more than about 45 seconds), the delay may be caused by the OS trying unsuccessfully to check the application’s Verisign certificate. If a network has been detected, the OS will try to contact Verisign to verify that the certificate is not on the Certificate Revocation List (CRL). TEMS Investigation will not continue until this procedure times out.

There are two ways to remedy this:

1. Open up your proxy to enable access to the Certificate Revocation List. The details of how to accomplish this may vary between countries.
2. Turn off the certificate revocation check in Internet Explorer:
 - Open Internet Explorer, and from the Tools menu select Internet Options.
 - On the Advanced tab, under Security, uncheck the option “Check for publisher’s certificate revocation” and click Apply.

(This procedure can be automated by the use of Group Policies.)

- When installing TEMS Investigation under Chinese or Japanese Windows, TEMS Investigation will not recognize file paths such as `C:\User\\...`, where `<user name>` contains Chinese or Japanese characters. This will prevent proper use of the application. (Similar problems may occur with other non-ASCII characters.)

3.1.2. Application Use

- When using the Copy Worksheet function, any Map settings will be lost.
- When many devices are used for data collection, the number of windows in the workspace should be kept to a minimum to lower the CPU load. It is also advisable to start a new logfile recording at least once every hour in order to reduce RAM consumption.
- During logfile recording as well as during logfile replay, temporary files are created by the application to enable the user to browse the history of the logfile. These files can become very large (3–4 times the logfile size), the exact size depending on the

number of devices activated in the application at recording time. The temporary files are named according to the format “**tems_n**” and created in the Windows temp directory (default: **C:\path\tmp**, where the path is defined by the environment variable TMP). Make sure there is plenty of space on the disk where the temp directory resides. The temporary files are removed when you exit the application; however, if the application terminates abnormally, this might not happen. The files must then be removed manually.

- TEMS Pocket 8.x (HTC) logfiles are not positioned correctly using the TEMS Pocket Positioning Tool, so that the TAB file cannot be opened in TEMS Investigation. The workaround is to create a new TAB file manually in TEMS Investigation using the Position Map function.
- Service Control Designer: The Wait For example in the User’s Manual, section 12.10.6.2 does not work, since a Wait For activity cannot be triggered by another activity that is inside a (different) while loop.
- Service Control Designer: If multiple Service Control Designers are open simultaneously, a script run from one of them could fail.
- Service Control Designer: Running multiple Synchronized Voice Call Sequence snippets (for different devices) in a Parallel structure does not work. It is necessary to put each such snippet in its own script; the scripts can then be run concurrently if desired.
- SMS testing with Service Control scripts does not work for devices that do not support AT commands.
- When using the serving cell indication in the Map window to show the strongest scanned CPICH, this works only for the 1st UMTS frequency (the one decoded into the information elements named “1st”).
- The information element “Frequent AQM Score Downlink” is not populated when loading a logfile where uplink PESQ data has been merged in.

3.1.3. TCP Settings

Windows Vista and Windows 7 have a function for automatic tuning of TCP settings. Check whether that function is enabled as follows:

1. Open a Command Prompt using the Run As Administrator option (right-click the Command Prompt item on the Start menu).
2. Type **netsh interface tcp show global** and inspect the value returned for Receive Window Auto-Tuning Level.
3. If this parameter is disabled, give the command **netsh interface tcp set global autotuninglevel=<autotunelevel>** to enable it. The value of **<autotunelevel>** should be “**highlyrestricted**” if the server you are contacting does not have RFC1323 implemented or does not support the TCP receive window scaling factor. Otherwise, **<autotunelevel>** should have the value “**normal**”.

3.1.4. MTU Size

For LTE operation it may be necessary to adjust the MTU (Maximum Transmission Unit) size, that is, the maximum IP packet size in bytes. The optimum MTU size depends on the network bandwidth and other factors, so it is impossible to give a

universally valid recommendation. In general, however, the faster the LTE network, the more important it is to choose a good MTU setting to be able to approach the maximum achievable throughput.

Here is how to change the MTU size in Windows Vista and Windows 7:

1. Open a Command Prompt using the Run As Administrator option (right-click the Command Prompt item on the Start menu).
2. Run the command `netsh interface ipv4 show interfaces` and note the identity of the relevant interface.
3. Run the command `netsh interface ipv4 set subinterface <interface id from step 2> mtu=<desired MTU setting> store=persistent`.

Example: `netsh interface ipv4 set subinterface 25 mtu=1360 store=persistent`

4. Contact Information

Please visit our website at ► www.ascom.com/networktesting.

For customer support contact information, see the page
► www.ascom.com/en/index/support/support-tems.htm.