

TEMS™ Investigation 26.0 Release Note

1 About This Release

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2 Important Information

2.1 Data Service Testing

Before using a device for data service testing, be sure to configure the device to use the desired connection.

- For **Mobile Network Testing**, make sure to **turn off Wi-Fi** on the device. If Wi-Fi is enabled, the device may run data transfers over Wi-Fi rather than over the mobile network it is camping on (even if a correct APN (Access Point Name) has been entered).
- For **Wi-Fi Network Testing** using a device with mobile connectivity, make sure to **disable mobile data** on the device.

2.2 Keeping Down Logfile Size When Running Data Services on Qualcomm and Samsung Chipset Based Devices

This section applies to Qualcomm chipset-based and Samsung chipset-based devices, unless otherwise stated. It is **strongly recommended** to follow these steps, since otherwise the PC processing load will become excessive.

- When testing **data services** only, use a Log Configuration activity with the option “Optimized for Data KPI Reports” selected. It is recommended that small data services are executed prior to the Log Configuration to configure the Log Configuration activity in the most optimal way.
- For Qualcomm chipset devices, you can alternatively either disable the DPL log (0x11EB) or set USB mode to RNDIS+DM+MODEM. Be aware that in RNDIS+DM+MODEM mode it is not possible to apply certain control functions such as RAT and band lock. In TEMS™ Investigation the DPL log is by default turned off in RNDIS+DM+MODEM mode.
- When testing both **VoLTE and data services** concurrently, use a Log Configuration script activity with the option “Optimized for Voice/Data KPI Reports” selected. It’s recommended that small data services are executed prior to the Log Configuration to configure the Log Configuration activity in the most optimal way.

3 TEMS™ Investigation 26.0

3.1 General

This release contains vendor-specific decoding updates of messages for devices based on Qualcomm and Samsung chipsets.

3.2 New TEMS Devices

- TEMS Samsung S24 Qualcomm Chipset
- TEMS Connect License: Qualcomm S
- TEMS Samsung S24 Exynos Chipset
- TEMS Connect License: Samsung K
- TEMS Google Pixel 8 & 8 Pro
- TEMS Connect License: Samsung K

*There might be regional differences in band support, please refer to <https://www.devicespecifications.com>, <https://www.gsmarena.com>, or <https://phonedb.net> for details

3.3 New Connectable Devices

- Sony XPERIA 1 V XQ-DQ54 with Debug Firmware
- TEMS Connect License: Qualcomm R
- Samsung S24 Qualcomm Chipset
- TEMS Connect License: Qualcomm S
- Samsung S24 Exynos Chipset
- TEMS Connect License: Samsung K

*There might be regional differences in band support, please refer to <https://www.devicespecifications.com>, <https://www.gsmarena.com>, or <https://phonedb.net> for details

3.4 New Features

3.4.1 Android 14 Readiness

Android 14 is officially supported for both devices with TEMS and commercial firmware.

3.4.2 Xiaomi HyperOS

Xiaomi's new HyperOS based on Android 14 is supported by TEMS Investigation 26.0.

3.4.3 On-device Updates Based on Android Version

Starting with this release, an Android version compatibility check will be performed before any On-device updates are installed on the devices. This is to mitigate the risk of incompatible software.

3.4.4 Performance Enhancements

Multiple performance enhancements have been implemented with this release of TEMS Investigation, the platform has been updated to utilize the latest .NET enhancement from Microsoft, improving the performance of the application by up to 25% for certain test cases and a 25% faster logfile replay has been observed.

Microsoft .NET 8 requires Windows 10 (version 1607 or later) or Windows 11 (version 22000 or later). The .NET 8.0.1 runtime is included with the TEMS Investigation installer.

3.4.5 Offline Map Tile Set Selection

It's now possible to easily switch between multiple different tile sets for offline maps. For instance, a user can prepare a tile set per city, and easily switch the active tile set in the launcher. Please refer to the Users' Manual for additional information on how to configure the offline map.

3.4.6 GLS Cloud Server License Bundling

With the release of TEMS Investigation 26.0, support for license bundling of counted licenses in GLS Cloud Servers has been added.

3.4.7 Standalone & Non-Standalone Band Lock

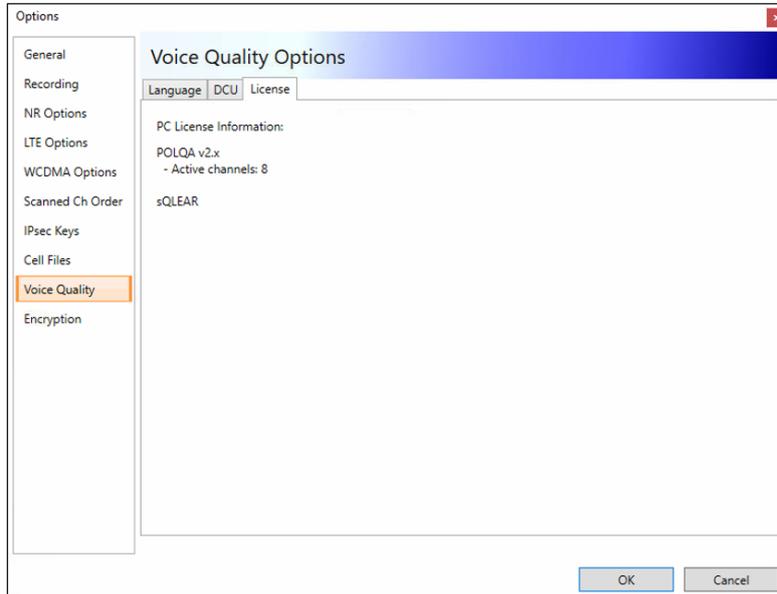
On a Qualcomm based device with TEMS firmware, it is now possible to set an NR NSA or SA band lock, either from a script or manually.

The screenshot shows the 'Default Workflow' editor with a 'Band Lock' activity named 'bandLockActivity1' (EQ1) set to 'No Band Selected'. To the right, the 'Properties - bandLockActivity1' pane is open, displaying a list of bands and their selection status.

Band	Selection
CDMA	None selected
CDMA One (IS-95)	None selected
CDMA2000	None selected
EV-DO	None selected
GSM	None selected
LTE	None selected
NR	None selected
NR NSA	None selected
NR SA	None selected
WCDMA	None selected
WiFi	None selected
Equipment	EQ1
Activity Name	bandLockActivity1
Enabled	True

3.4.8 POLQA & sQLEAR License status

The status of POLQA and sQLEAR PC licenses are now visible in the Voice Quality Options window.



3.4.9 sQLEAR Speech Path Delay

TEMS Investigation 26.0 now supports sQLEAR Speech Path Delay on devices with TEMS firmware.

3.4.10 OTT Media

The OTT Media framework includes a testing system for measuring the Quality of Service (QoS) and Quality of Experience (QoE). This system allows you to test a wide range of real OTT applications, as well as specific chosen ones, to gather Key Performance Indicator (KPI) information.

3.4.10.1 Video Call

With OTT Video Call, you can test mobile-to-mobile (M2M) video calls using real OTT applications in real-time/during drive testing on either devices with TEMS or commercial firmware.

Python scripts for WhatsApp and Skype are available for download at the Infovista Support Portal for immediate OTT Video Call testing.

The following GLS (Global License Server) license is required:

- TI-ODM-OTT-Med-T12

This feature requires On-device 1.240 or later to be installed on the device.

3.4.10.2 Supplementary Action Services

With OTT Supplementary Action, you can test the Success Rate and Duration of any UI action on an OTT App that you have in mind, such as loading a page, log on or log off, liking a post etc.

Python scripts for the following OTT Apps are available for download at the Infovista Support Portal for immediate OTT Supplementary Action testing:

- Facebook (Post Status, Like Post, Comment Post, Delete Post, Load User Feed, Load Page Feed)
- Instagram (Search Hashtag, Load Feeds)
- Netflix (Logon, Logoff)
- Twitter (Load Home, Load User, Search Tweet)

The following GLS (Global License Server) license is required:

- TI-ODM-OTT-Med-T12

This feature requires On-device 1.244 or later to be installed on the device.

3.4.11 TWAMP QI

ITU-T has updated the Interactivity Score algorithm in ITU-T G.1051 (03/2023). Instead of PDV median, the PDV standard deviation is used to calculate the Interactivity Score.

$$IntAct = I_L \times D_{PDV} \times D_{DQ}$$

$$D_{PDV} = 1 - \frac{PDV_{SQ}}{u}$$

$$D_{DQ} = 1 - vP_{DQ}$$

TWAMP QI has been updated to calculate the Interactivity Score based on this update. Parameter values for e-Gaming and Video Chat HD setting files have also been updated.

- E-Gaming

Parameter	f _{max}	a	b	u	v
Value	100	61	14	120	4

- Video Chat HD

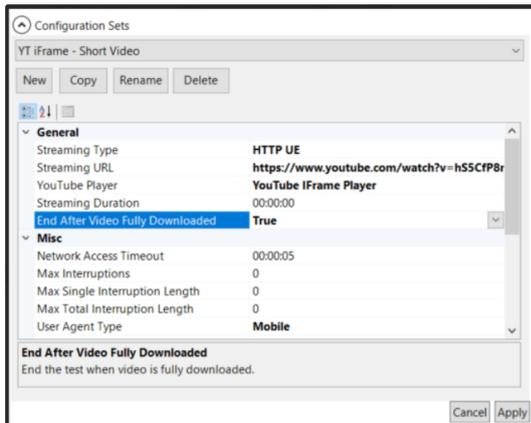
Parameter	f _{max}	a	b	u	v
Value	100	215	50	150	30

The TWAMP Server will also now run as a System Service. As a System Service, it will automatically be started whenever the server is started or rebooted and be able to run 24x7 without any manual user intervention.

3.4.12 YouTube

3.4.12.1 Buffer Complete

It is now possible to end the Streaming test when the video is fully downloaded without waiting for the full video payout to be completed.

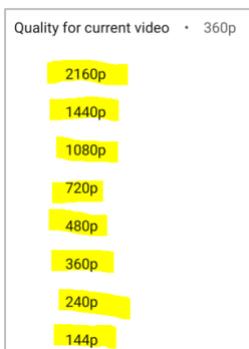


When set to True, the Streaming activity will end successfully once the video is fully downloaded.

3.4.12.2 YouTube 18.49.36 Support

It is also now possible to test YouTube with YouTube 18.49.36 for Streaming and OTT Media Video Streaming activities.

Due to changes made by Google, users can no longer select a specific resolution for the streaming session. While the available resolutions are still displayed on the YouTube App, Google has removed the UI component identifier for each resolution option. Hence, the UI Automator is unable to differentiate between the options available.



Hence, if Video Quality is set to a specific resolution (i.e. 2160p, 1440p etc.), the test will now fail.

For Streaming activity, two additional *Video Quality* options have been added to the Script Designer:

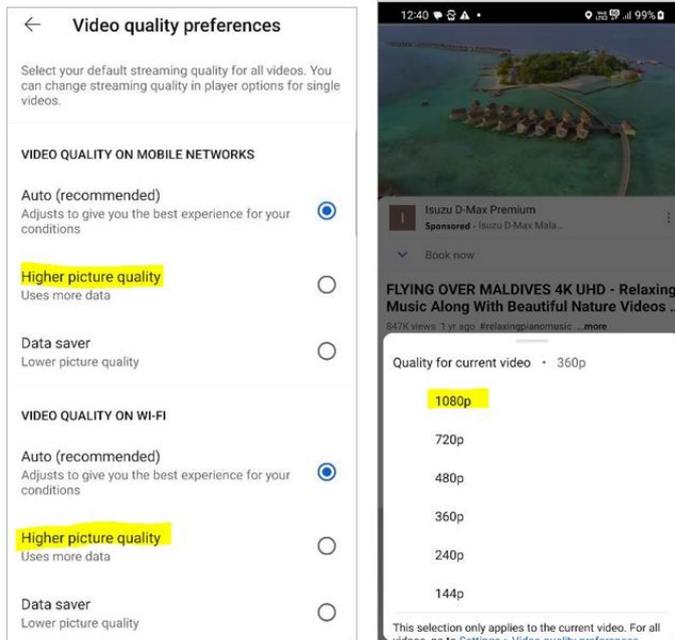
- Higher Picture Quality
- Highest Available Option

For OTT Media Video Streaming activity, the *video quality (-vq)* parameter supports these two additional options:

- HigherPictureQuality
- HighestAvailableOption

For Streaming activity (and Streaming Configuration activity), when *Higher Picture Quality* is selected, if *Clear Cache* is set to True, Video Quality Preferences for Mobile Networks and Wi-Fi will be set to Higher picture quality. If *Clear Cache* is set to False, nothing will be performed.

For OTT Media Streaming activity, Video Quality Preferences for Mobile Networks and Wi-Fi will be set to Higher picture quality if *-vq HigherPictureQuality* is set.



When *Highest Available Option* is selected, the first available resolution option from the top in the *Quality for current video* list will be selected. Since YouTube displays the resolution options in descending order with the highest resolution being at the top, the highest resolution option will thus be selected.

YouTube 18.49.36 support requires On-device 1.245 or later to be installed on the device.

3.4.13 Streaming

The two subjective MOS scores for video streaming, VSQI Instant and VSQI Session are now officially available for YouTube, Netflix, TikTok and Facebook.

VSQI Instant is a network-centric and video clip content-independent subjective MOS score for troubleshooting that is based on the most sensitive content and will be calculated every second after prebuffering. Inputs are resolution, frame rate, and streaming state.

VSQI Session is a network-centric and video clip content-independent subjective MOS score for benchmarking that will be calculated once per session after 30 seconds of video playout. Inputs are prebuffering, rebuffering and average VSQI Instant.

3.4.14 Check Network Access Event

The Check Network Access event has been added to indicate when ODM starts checking for Network Access. The new KPI Trigger will provide additional insights when there are delays between Network Access checking and the DNS request and TCP handshakes.

3.4.15 Refined Events

The following refined events definitions have been added:

- Email Receive Data Transfer Cutoff
- Email Receive First Data
- Email Send Data Transfer Cutoff
- Email Send First Data
- Facebook Logoff Success
- Facebook Logon Success
- Facebook Operation Success
- First ACK
- First HTTP Get
- First HTTP Post
- First Packet with Content
- First SYN
- First SYN ACK
- First DNS Request
- FTP Service Command
- HTTP Connection Initiation
- HTTP Minimum Payload Reached
- HTTP Time to first byte
- HTTP Post Connection Initiation
- Last Fin
- Last Rst
- Skype Logoff Duration
- Skype Logon Duration
- Skype Operation Duration

3.4.16 PCTEL NR Bands

- Added new NR Band n104 & n105 support for Gflex. Validated with Gflex firmware version 5.0.0.0.
- Added new NR Band n105 support for HBflex/IBflex. Validated with HBflex/IBflex firmware version 3.10.0.0.

3.4.17 Rohde & Schwarz TSME6 API Updates

- Upgraded Rohde & Schwarz Vicom API 23.0 for Rohde & Schwarz TSME6/TSME scanner. Note Rohde & Schwarz TSMW scanner support has been removed from this API version.

3.4.18 e-SIM

e-SIM capable devices can now be used in TEMS Investigation with no restrictions compared to devices with physical SIM slots only. Any *single* physical SIM slot or e-SIM can be used with full functionality of diagnostics, service testing and control functions.

3.4.19 Configurable Timing on Information Elements

Selected information elements have been improved with regards to configurable update intervals. There are now 4 different categories of intervals that can be configured to 0.5s / 1.0s / 2.0s, each category consisting of a set of information elements in NR and LTE technologies:

- **Radio throughput:** throughputs and byte counts for PDSCH/PUSCH/MAC/RLC/PDCP layers
- **Layer 1 metrics:** MCS, Modulation, Rank, Transport Block details
- **Cell measurements:** Serving cell measurements for RSRP, RSRQ, RSSI, etc.
- **Media metrics:** (TBD)

This work will continue to evolve over coming releases, with more information elements added to these categories over time.

3.4.20 New Information Elements and Events

New information elements:

General:

- Device Connection Type

5G NR UE:

- Allowed NSSAI Slice Differentiator
- Allowed NSSAI Slice Service Type
- PDU Session QoS Flows
- PDU Session S-NSSAI Slice Differentiator
- PDU Session S-NSSAI Slice Service Type

Data:

- OTT Video Call Configuration Phase Duration
- OTT Video Call Operation Duration
- OTT Video Call Test Phase Duration
- OTT Video Call Total Reconnecting Duration
- OTT Video Call Success Ratio (%)
- OTT Supplementary Action Configuration Phase Duration
- OTT Supplementary Action Operation Duration
- OTT Supplementary Action Test Phase Duration
- OTT Supplementary Action First to Last Action Duration
- OTT Supplementary Action Success Ratio (%)

Wi-Fi:

- Link Layer DL Throughput
- Link Layer DL Byte Count
- Link Layer UL Throughput
- Link Layer UL Byte Count

- Wifi Active Network BSSID
- Wifi Active Network Capabilities
- Wifi Active Network Channel
- Wifi Active Network Frequency
- Wifi Active Network RSSI
- Wifi Active Network SSID
- Wifi Connection Status

New events:

- Inter-System Redirection to NR Attempt
- Inter-System Redirection to NR Failure
- Inter-System Redirection to NR
- Inter-System Redirection to LTE Attempt
- Inter-System Redirection to LTE Failure
- Inter-System Redirection to LTE
- Check Network Access
- OTT Video Call Attempt
- OTT Video Call Configuration Phase Complete
- OTT Video Call End
- OTT Video Call Error
- OTT Video Call Reconnect Attempt
- OTT Video Call Reconnect Complete
- OTT Video Call Start
- OTT Video Call State Changed
- OTT Video Call Success
- OTT Video Call Test Phase Complete
- OTT Video Call UI Automation Action
- OTT Supplementary Action Attempt
- OTT Supplementary Action Configuration Phase Complete
- OTT Supplementary Action End
- OTT Supplementary Action Error
- OTT Supplementary Action Miscellaneous Event
- OTT Supplementary Action Start
- OTT Supplementary Action State Changed
- OTT Supplementary Action Success
- OTT Supplementary Action Test Phase Complete
- OTT Supplementary Action UI Automation Action

3.5 Deprecated Features

The following features are deprecated and will be removed with TEMS Investigation 27.0

- .CEL file format (used for GSM/WCDMA only cell files)
- Script activities for Social Networking listed below, to be replaced with OTT Media Supplementary Services:
 - Facebook

- Facebook Logoff
- Facebook Logon
- Facebook Snippet
- Instagram
- Instagram Logoff
- Instagram Logon
- Instagram Snippet
- Twitter
- Twitter Logoff
- Twitter Logon
- Twitter Snippet
- Script activities for Social Networking listed below:
 - Skype
 - Skype Logoff
 - Skype Logon
 - Skype Snippet
 - WhatsApp
- Script activities for Video list below, to be replaced with OTT Media Supplementary Services:
 - Netflix Logoff
 - Netflix Logon
 - Netflix Snippet

3.6 Removed Features

- CDMA and Ev-Do mobile system, data collection and post processing of logfiles
- Intel based phones, data collection and post processing of logfiles
- PCTEL MX, data collection and post processing of logfiles
- iPhone 4S to iPhone 11
- RAS Network Connect
- YouTube scripting activity.
 - YouTube testing with python is supported by OTT Media using OTT Video Streaming media type.
- WhatsApp scripting activity
 - WhatsApp testing with python is supported with OTT Media.

4 Known Bugs and Limitations

4.1 Device Related

- When running Samsung Exynos based devices with Samsung's TCP/IP logbank enabled, PDCP DL and PDSCH PHY Throughput values can be delayed and may arrive after the actual service is finished.
- If using the Huawei Mate 20 X 5G EVR-AN00 in GSM or WCDMA networks, voice calls may not be executed correctly.
- LTE Signal Scan settings for Rohde & Schwarz do not support Automatic Bandwidth detection.

4.2 TEMS Investigation Professional Related

4.2.1 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 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.)

4.2.2 Application Use

- 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 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 temporary 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.

- Service Control Designer: If multiple Service Control Designers are open simultaneously, a script run from one of them could fail.
- Service Control Designer: Problems may arise during script execution if a participating device is detached from Windows, whether due to user interaction or to device instability. One thing that may occur in this situation is duplicate recording of data in multiple logfiles.
- Service Control Designer: The Wait For activity cannot be triggered by an activity that is inside a different while loop.
- WCDMA SCH timeslot scans are not scriptable.
- The information element "Frequent AQM Score Downlink" is not populated when loading a logfile where uplink PESQ data has been merged in.
- When doing WhatsApp voice calls, both MT and MO side must run from a TEMS™ Investigation script. Otherwise, the call will fail.
- Serving Cell SSB SNR/Serving Cell SS SNR IE's will be reported as "Not valid" from Qualcomm devices.

5 Contact Information

Please visit our website at www.infovista.com for contact and support information.