# ETS-Lindgren Software Bulletin

## Date July, 2022

## EMQuest Highlights

5 channel carrier aggregation and blocking tests supported
5G transmitter performance metrics captured
5G A-GPS support added for Spirent GSS700
Extended Python scripting for positioners and application calls

## TILE!™ Highlights

TILE! Version 7.7.2.11 is current
Version 7.7.2.4 - New driver for EMTest CWS500n
Version 7.7.2.3 - New driver for R&S NRP series power sensors
Version 7.7.2.2 - DO-160 Version G reverberation added

## EMQuest™ - 5G FR1 Test Case Updates

Many additional features and test capabilities were added for 5GNR FR1 devices, with 5 DL carrier aggregation and assisted GPS (A-GPS) being the most important. 5 downlink component carrier aggregation is now supported on Anritsu's dual box combination of MT8821C and MT8000A with appropriate firmware and options loaded. Anritsu and R&S have moved LTE capability to the MT8000A and CMX500 respectively, eliminating the need for a second instrument in some situations. Higher order carrier aggregation and desense tests will continue to require a secondary network emulator in most cases, but ETS-Lindgren will continue development for single box emulators as technologies are added. 5G network A-GPS testing is now available using Spirent's GSS7000 as the GPS network simulator. The GSS7000 currently supports 5G assist on bands L1 and L2, with L5 support a roadmap item for EMQuest and the Spirent team.

| Brand | Model | Frequency Range | 5GNR Modes Supported | Carrier Aggregation Supported | MIMO Mode Supported |
|---|---|---|---|---|---|
| Rohde & Schwarz | CMW500 + CMX500 | FR1 & FR2 | NSA, EN-DC, SA | 4 DL CCA | 4x4 FR1 |
| Rohde & Schwarz | CMX500 LTE+5G | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Keysight | UXM-5G | FR1 & FR2 | NSA, EN-DC, SA | 4 DL CCA | 4x4 FR1<br>2x2 FR2 |
| Anritsu | MT8821C + MT8000A | FR1 & FR2 | NSA, EN-DC, SA | 5 DL CCA | 4x4 FR1 |
| Anritsu | MT8000A LTE+5G | | | | |
| StarPoint | SP9500 | FR1 | NSA & SA | | |
| Spirent | GSS7000 | L1, L2 | NSA | | |

## Anritsu MT8000A Driver Updates

The MT8000A calculates several figures of merit such as occupied bandwidth and error vector magnitude. By request, and shown below, these values can now be captured in EMQuest and recorded along with EIRP or EIS values for each frequency measured.

| Frequency (MHz) | | | |
|---|---|---|---|
| 27922.1 | Polarization | Theta | Phi |
| | Point Values | | |
| | EVM % | 7.79 | 8.16 |
| | Magnitude Error % | 5.18 | 5.41 |
| | Phase Error (°) | 3.19 | 3.35 |
| | Occupied Bandwidth (Hz) | 8.96438e+07 | 8.96438e+07 |
| | ACLR (+) (dB) | -28.54 | -28.51 |
| | ACLR (-) (dB) | -30.8 | -30.69 |
| | SEM (Pass=1, Fail-0) | 1 | 1 |

Additional measurements for the MT8000A were added in the latest release, including asymmetric channel bandwidth, TDD pattern 1 and 2, power class 1.5 and additional band filters.

## Rohde & Schwarz CMX500/CMW500 Driver Updates

Extensive capability was added to the CMX500 driver, which now supports firmware version 6.110.XX. Notably, FR2 measurements are now available on systems configured with CMXHEAD30 remote radio heads and slots support for CMX500 FR1 and FR2. EMQuest can now take advantage of CMX500's built-in early exit mechanisms for NR tests, using leading indicator data rather than completing a test with a known outcome. The CMW500 driver was also updated to add Bluetooth low energy (BLE) TIS and TRP tests.

## Keysight UXM-5G Driver Updates

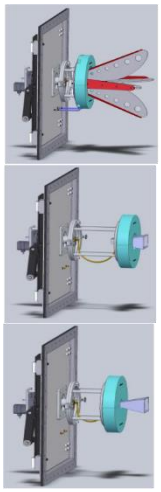
Similar to Anritsu's MT8000A, the UXM-5G measures several transmitter figures of merit that are now recovered and stored in EMQuest. Error vector magnitude (EVM), occupied bandwidth (OBW), adjacent channel leakage ratio (ACLR) and spectrum emission mask (SEM) pass/fail are captured for each frequency measured. 5G to LTE blocking tests are supported in the new driver, as is asymmetric DL/UL bandwidth selection. The driver was updated to select the 5G-LTE IRAT Mode that allows both SA and NSA mode to be signaled at the same time. UXM-5G can now turn off S1B1 to lift the constraints of reaching the maximum throughput in MIMO modes.

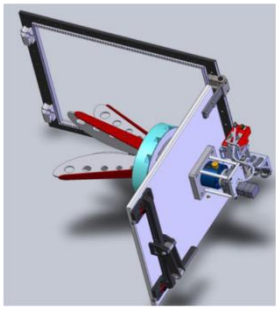
Starpoint SP9500 Driver Updates
The Starpoint SP9500 driver added support for RSSI, channel switch and handover mechanisms.

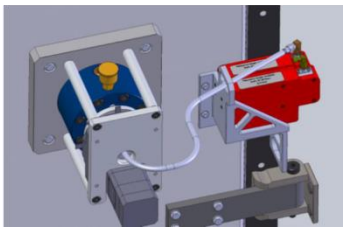
## EMQuest - 5G FR2 SISO Test Updates

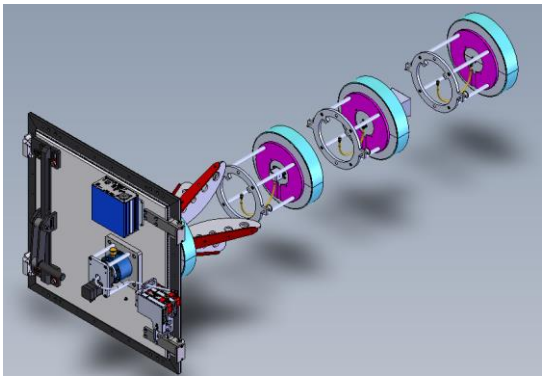
As noted in the CMX500 driver update, 5G FR2 measurements are now supported on the R&S instruments. This advancement means all three FR2 capable 5G network emulators are now operating on chambers driven by EMQuest. ETS-Lindgren leads the market in providing this unique instrument flexibility to our customer base, even allowing you to move between instrument vendors as needed to optimize throughput or utilization.

Substantial additions for FR2 tests using UXM-5G were made around polarization and beam peak search in the latest release. EMQuest now supports dual polarization test functions, meaning that two remote radio heads, one for each polarity, can be connected to UXM-5G and measurements will be performed for H and V at each sample point. This will provide a substantial speed advantage for users with systems instrumented in this manner. Some additional flexibility was added surrounding this dual polarity capability; it is now possible to use only one link polarization in transmit beam peak search (TXBPS) and to use RSSI instead of sensitivity when searching for receive beam peak search (RXBPS). Adding dual polarity capability for Anritsu's MT8000A and the R&S CMX500 is being explored.EMQuest - Radiated Spurious Emissions
Did you know that EMQuest has a test module for radiated spurious emission (RSE) and out-of-band (OOB) emissions? EMQ-107 is a specialized option that provides RSE, adjacent, and OOB emissions measurements for transmitter conformance documentation. If you are familiar with these measurements you know how an automated system will save days of test time









compared to manually setting up the dozens of channel and bandwidth combinations while the adjacent spectrum is scanned. You may also want to check if Jari's new quick change antenna assembly (shown below) is compatible with your chamber. The spurious band test requires several measurement antenna changes to cover the full range, so EMQ-107 can be matched with the quick change antenna assembly to cover 400 MHz to 40 GHz. The assembly includes the antenna door hatch, antennas and mounts for 400 MHz – 40 GHz, polarizing motor, 40 GHz rotary joint, low noise amplifiers and cables.

EMQ-107 was modified in the latest release to take advantage of the real-time RMS measurement option on Keysight's X series analyzers that offer RMS-average detectors. Notch filters and associated switching can also be added to EMQ-107 to achieve the best possible system dynamic range.

## EMQuest – Python Script and Ancillary App Launcher

By popular request, an application launcher has been added to EMQuest that allows a trigger point to be added to the test flow. This trigger point can pause the flow of the test and call an external program like Python to perform an action on the DUT, trigger another test instrument, or perform an analysis or calculation on early data. When the external action is completed, the trigger is resolved and the test flow resumes. EMQuest users can place the application launch trigger at any point within the test flow in order to build a campaign of tests with band changes or mode comparisons, for example. We believe this will be a valuable addition and look forward to feedback on this feature.

## TILE! Version 7.7

The latest TILE! Version is 7.7.2.11 and the change log is always available on the support portal found at https://support.ets-lindgren.com/tile/downloads?Page=downloads. The change log can also be provided upon request from your sales contact in case you want to verify an issue or bug you are seeing has been fixed in a later version. TILE! Version 7.7 issued in October, 2021 and five revisions since have occurred. Each is summarized in the following table.

| TILE! Version | Release Date | Change Summary |
|---|---|---|
| 7.7.2.11 | June 23, 2022 | Extended support for EMSense40, EMSwitch cards |
| 7.7.2.4 | April 26, 2022 | Additional CWS500-N, Agilent X & S series scope driver changes |
| 7.7.2.3 | March 14, 2022 | CWS500-N, R&S LAN and USB power sensors updates |
| 7.7.2.2 | February 19, 2022 | DO160-G Reverb levels and methods added |
| 7.7.1.5 | January 6, 2022 | Keysight, Rigol, F&S spectrum analyzer drivers added |
| 7.7.0.2 | October 6, 2021 | Scripting examples added, new Siglent SSA3000x driver |
| 7.6.2.10 | September 2021 | ZNx driver, scripting and immunity actions expanded |

| | | |
|---|---|---|
| 7.6.2.2 | July 2021 | Additions to reverb method tests and scripting capacity |

Version 7.7.0.2 introduced a driver for the Siglent SSA 3000x series spectrum analyzers and added several examples and updates to the TILE! Scripting Guide.

In Version 7.7.1.5, new drivers for Keysight's series N932xC, Rigol RSA5000 series, and R&S FPC1000 series spectrum analyzers were added. In addition, features were added to the Door Check immunity test action to improve safety and address additional options for ensuring the chamber door is secured during immunity tests. Continuous improvements drove changes to instrument_set and instrument_do scripting functions and updates to the SCPI Server logging and performance. Lastly, several user interface improvements were made to the way tabular data is displayed within TILE! and exported outside of TILE!.

The February, 2022 release of Version 7.7.2.2 added features centered on supporting DO-160-G Reverb Immunity tests. The G version of DO-160 drove TILE! changes to zero span mode, adjusted some target power equations, and updated speed options for reverb paddle control in step and stir modes. DO-160-G specific signal generator modulation pulse trains and triggering required driver updates for the R&S SMB100a and Keysight/Agilent N518x series generators. All these new DO160-G features and functions were also added in the scripting functions, so if you utilize reverb immunity this update and version is for you.

Instrument driver changes dominated Version 7.7.2.3 that dropped March, 2022. EMTest's CWS500-N versions can be driven with TILE! using a newly developed driver that replaces an old A version driver. Changes to R&S LAN and USB power sensor drivers and the associated NRP VISA driver were updated to support new features and to differentiate between standard VISA TCPIP and NRP VISA installation requirements. The *Instrument Interactive Control* dialog and *Explore Driver* dialog received UI and functionality improvements in this release.

Version 7.7.2.4 added additional EMTest CWS500-N capability and took advantage of the newer firmware to improve command efficiency and state flags. Some rework was also done on Keysight/Agilent X and S series scope driver to improve the FFT mode and better inquire what capabilities are present on the scope and disallow combinations of parameters not supported.

TILE!'s current Version 7.7.2.11 changed the ETS_EMMonitor driver to support our latest EMSense40 electric field probe covering the range of 10 MHz – 40 GHz on a single probe (shown below). Several new switching cards for the EMCenter chassis have been developed and they gain TILE! support in this version. EMSwitch modules are available for direct sale as well as included in a custom test system designed by ETS-Lindgren, so if generic switching is needed for your special project, keep these units in mind.

TILE! version turns happen on nearly a monthly basis, driven primarily by the vast driver list of supported instrumentation. Your feedback is that this is a key feature in favor of TILE! along with the flexibility to switch instruments as current test conditions dictate. All of these benefits are unlocked for customers in maintenance, along with quick technical support, feature and new drivers by request, and many more, so we remind you this is how these fees are spent and return value to you as a license holder.

## TILE! User Resources

Larry Sheridan administers the TILE! LinkedIn page. We continue to build up this resource area for TILE! users, in combination with the YouTube page. Video highlights communicate software Q&A quicker than written documents, so just link to the page and hit “request to join.” https://www.linkedin.com/groups/2040739/

ETS-Lindgren’s YouTube channel is another source of software information, training resources and short videos. Expect some TILE! short topic videos in the coming months to appear on this channel. Instead of writing we plan to shift to voice narrated screen grabs and other ways to highlight important software related items. They can be found here: https://www.youtube.com/c/etslindgrenvideo

## TILE! User Group Meeting

It was decided to keep the TILE! Users Group (TUG) meeting virtual for another year rather than trying to fit it in during the 2022 IEEE EMC Symposium in Spokane, WA USA. The virtual format included additional participants that would not have been able to join the live meetings, or could only send one representative per company. TUG presentations, meeting notes, action items, and even a recording will be posted on the TILE! Support Portal when possible. We hope more TILE! gurus can participate in the next TUG wherever you may be. Expect a date announcement soon for the second half 2022 meeting, likely to occur after the vacation season winds down in September or October. The agenda and discussion topics are wide open, so feel free to email tilesupport@ets-lindgren.com with your suggestions.

## TILE! Basics University

Due to customer demand, our TILE! experts are preparing an on-demand TILE! Software Basics Training Series that is 100% free and online! This course, served up in 10 easy-to-view modules, is perfect for any beginner as well as those looking for a refresher of the basics. The Basics University classes live on the TILE! Support Portal and are available on demand.

For those times when you just need to speak to someone:
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