Throughput Test System Setup

Instruments

1. N9020A's (MXAs) with firmware version of A.02.06 with option B25 (25 MHz bandwidth) and 526 (Frequency range 20 Hz to 26.5 GHz).

2. Signal Sources: either ESGs or MXGs

- E4438C's (ESGs) with firmware version of C.05.23 and basic option 506 (Frequency rage from 250k to 6 GHz). We don't require any signal studio option to generate signals. We use LTE library to generate signals.
- N5182A's (MXGs) with firmware version A.01.44 and basic option 506 (Frequency rage from 250k to 6 GHz).

Cables and connectors

- Two RF cables (N male - male) to connect ESG RF outputs to DUT and DUT toMXA RF inputs
- Two BNC cables (male – male), one is for Reference Frequecy and another is for triggering.

Software Installation

1. A Windows XP platform with 4 G RAM required.
2. Agilent 89600 VSA software version 11.0 or up
3. Agilent IO library version 15 or up
4. SystemVue
5. LTE library
6. LTE_FDD_UL_Throughput.wsv and LTE_TDD_UL_Throughput.wsv with set files: ltefdd_mxg.set, lte_ul_fdd.set, ltetdd_mxg.set, lte_ul_tdd.set.

Hardware setup

1. Make sure ESG Amplitude-> ALC off
2. ESG Event 1 connects to MXA Trigger
3. ESG 10 MHz Reference Out connects to MXA reference in.
4. Two RF cables (N male - male) to connect ESG RF outputs to DUT and DUT toMXA RF inputs

Test procedures

1. Run Agilent IO library using connection expert to connect the PC with ESG/PSA/MXG and MXA/PSA/VSA
2. Run Agilent 89600 VSA software. In the VSA menu select Utilities->Hardware; make sure the right PSA/MSA/VSA has been connected to the PC.
3. From SV main window, Open LTE_FDD_UL_Throughput.wsv or LTE_TDD_UL_Throughput.wsv
4. Open signal generation design, LTE_FDD_UL_SRC and then modify parameters

as needed for your test. By default parameter setting, we are doing FRC A1-3 test based on 3GPP TS 36.141.
    - For ESG Sinks in the design, the Instrument parameter must be reset to specify instrument ip address (for example, 141.121.239.205) for connection of your ESG/MXG/PSG.
5. Execute the signal generation design. You can see data from SV are downloaded to ESG/MXG/PSG.
6. Open the signal analysis design, LTE_FDD_UL_Receiver or LTE_TDD_UL_Receiver and then modify parameters as needed for your test.
    - Review all parameters to make sure all parameters settings are OK for your test.
    - By Default, we have set the parameter "***Pause***" to YES for observing data caught by the MXA/VSA/PSA.
7. Execute the signal analysis design.
    - For 2x2 MIMO tests, when the VSA software window pops up, you need to play the waveform to make sure data in both channels are synchronized.
8. When simulation finishes, the results can be loaded and displayed in Data Display window.

Appendix I – Max recording length for VSA, PSA, MXA

If the specified signal analysis length greater than the VSA max recording length, it will cause the throughput test problem.

To explain this, referring to Agilent 89600 Series Data Sheet, Max Recording Length for VSA, Wideband PSA, PSA, MXA and ESA under typical settings are listed in ***Table 1***.

Table 1. Max Recording Length for VSA, PSA, MXA and ESA

	VSA	Wideband PSA	PSA	MXA	ESA
Max Capture Size	48/96/192 Msa	134 Msa	4 Msa	4 Msa	4 Msa
Max capture span	36 MHz	80/40 MHz	8 MHz	10/25 MHz	10 MHz
Max capture time	>= 1 sec	1.34 sec	60 msec	266/88 msec	266 msec

For MXA with 25 MHz bandwidth, you only have 88 msec max recording length. In the LTE FDD UL receiver design, If we specified a 200 msec data and require the VSA to record 210 mdec data, your MXA will be out of handle.

At this moment, you could set the sub-frames to 80 msec. You will see 100% throughput.

To support 210 msec data, you need to limited the bandwidth to 10 MHz or less, then you will have 266 msec recording length.

Appendix II. Troublesooting

MXA

1. Login with administrator if this is a MXA got from Demostock.
2. Turn off Firewall.
3. Make sure the MXA software is running.

1. Control Throughput measurement using number of sub-frames

Your are concerning the simulation control parameter of the measurement Sinks.

For Throughput measurement, we don't use number of bits to control it. Instead, we use number of sub-frames to control the LTE_Throughput Sink because the Throughput measurement is based on the statistics of number of sub-frames. The Throughput is defined by

Throughput = number of error sub-frames/ Total tested sub-frames.

In the Throughput wsv, you can find a parameter called SubframeStop that is for set the Total tested sub-frames as seen from the following Fig.