# 8960-PXB HSDPA DC Baseband Fading

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## Overview

This document provides detail instructions for setting up the HSDPA DC Baseband Fading system using 8960 and PXB. It is assumed that user should be familiar with PXB and 8960 basic operations and have basic understanding about fading. Below is the list of the sections which cover setting up the system, verifying the connections and performing the fading tests:

- Equipment and devices required
- System Interconnections
- PXB Setup
- Downlink Signal quality verification (Optional)
- Call establishment verification with UE
- Specific fading profile setup and test
- Sample SCPI scripts for the fading test

## Equipment and devices required

Table 1 contains all the equipment and devise required for the 8960-PXB HSPDA DC baseband fading tests.

| Products | Description | Quantity | Visa Interface | Item No |
|---|---|---|---|---|
| E5515E | Wireless Communication Test Set | 1 | GPIB | 1 |
| N5106A | PXB Baseband Generator and Channel Emulator | 1 | Visa controller | 2 |
| N5182A | MXG Vector Signal Generator | 1 | LAN or GPIB | 3 |
| N5182A | MXG Vector Signal Generator | 1 | LAN or GPIB | 4 |
| N9020A | MXA Signal Analyzer | 1 | LAN or GPIB | 5 |
| TD_C205 | Circulator | 1 | N/A | 6 |
| SHX-GF2-2 | RF Splitter/Combiner | 2 | N/A | 7,8 |
| UE | DC-HSPA test UE | 1 | N/A | 9 |

Table 1 Equipment and Devices

NOTE:

- Specific FW versions are required for E5515E and N5106A to perform HSDPA DC baseband fading. The E5515E should be running E6785I_I_01_04 or later, and N5106A should install 2.0.0 or later.
- For the two N5182As, please ensure that they are running the same FW versions.
- The MXA is optional for the fading tests; it is used for verifying the downlink signal quality. It should include the N9073A-1FP, N9073A-2FP and N9073A-3FP options.

## System Interconnections

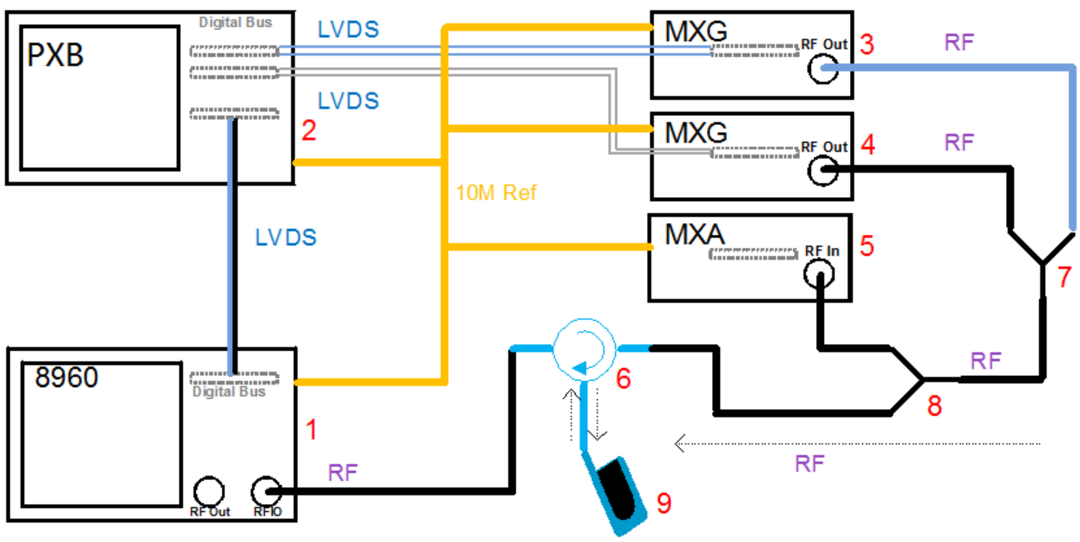



**Figure 1 8960-PXB HSDPA DC Baseband Fading System**

Figure 1 shows the system interconnections for the 8960-PXB HSDPA DC baseband fading system. 8960 sends the interleaved 2 channel IQ data over LVDS to PXB, PXB will deinterleave the 2 channels, apply fading and send faded data streams to two MXGs for upconverting to RF signals. The reason two MXG's are used is that the frequency separation between the two carriers is not predetermined, and may include dual bands. The MXA is used to demodulating the RF signals from two MXGs after combiner. The UE is connected with the RF Circulator which will route the downlink signal to UE, and UE's RF uplink to the 8960.

All instruments (PXB, 8960, 2 MXGs and MXA) should be synchronized with 10M reference clock. The typical 10M reference connection is below:

PXB 10M reference out -> 8960 10M reference in
8960 10M reference out -> MXG 1 10M reference in
MXG 1 10M reference out -> MXG 2 10M reference in
MXG 2 10M reference out -> MXA 10M reference in

With the typical 10M reference connection above, the "Ext Ref" annunciator will be shown on 8960 and MXG screen display as Figure 2 and Figure 3 below:

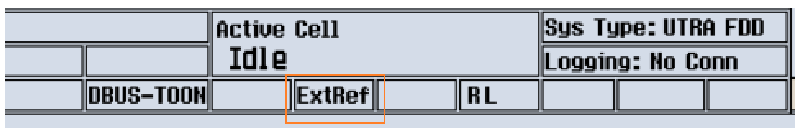



**Figure 2 8960 Ext Ref Annunciator**


**Figure 3 MXG Ext Ref Annunciator**

For other 10M reference connection, user should check whether the 10M clock is synced before performing the fading tests.

For the instrument control, 8960 should be connected with PXB via GPIB. Two MXGs can connect to PXB with either GPIB or LAN interface. The SCPI connections should also be verified by using the Agilent IO library or other VISA tools.

For simplicity, below are the external instruments configurations used in this document:

| Instrument | Description | GPIB/LAN | PXB Port | PXB Ext Instrument Name |
|---|---|---|---|---|
| E5515E | Wireless Communication Test Set | GPIB | B2 | MOM-B2 |
| N5182A | MXG Vector Signal Generator | LAN | A1 | MXG-A1 |
| N5182A | MXG Vector Signal Generator | LAN | A2 | MXG-A2 |

Table 2 PXB External Instrument Table

**NOTE**: It is highly recommended to perform the downlink signal verification first before fading tests as the whole system can be difficult for troubleshooting. If MXA is not used or other instrument used for verification, the MXA setup should be skipped and user should be responsible to make sure that downlink signal is good for fading.

**NOTE:** If PXB 10M reference in is connected with external 10M input, user should adjust PXB settings below to ensure the PXB is using the external reference from "System -> Clock and Trigger" menu; If the reference clock is detected by PXB, the "EXT REF" will be displayed in the PXB status panel.

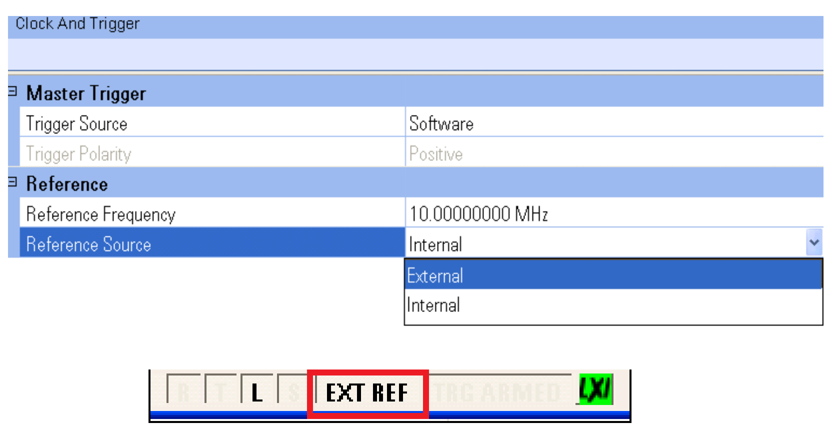



**Figure 4 PXB External Reference Input Setup**

## PXB Setup

- Follow the above system interconnection for 10M, LVDS, RF, GPIB and LAN connections.
- Power up all instruments (PXB, 8960, 2 MXGs and MXA), check the 10M reference.
- Switch 8960 to "W-CDMA" application.
- Setup PXB External instrument table accordingly (clicking the "Add" Button in the "External Instrument Table"). Be certain you know which IO port the instrument is physically connected to. The control interface can report that the instrument is connected even though the data path on the IO board is connected to the wrong instrument.

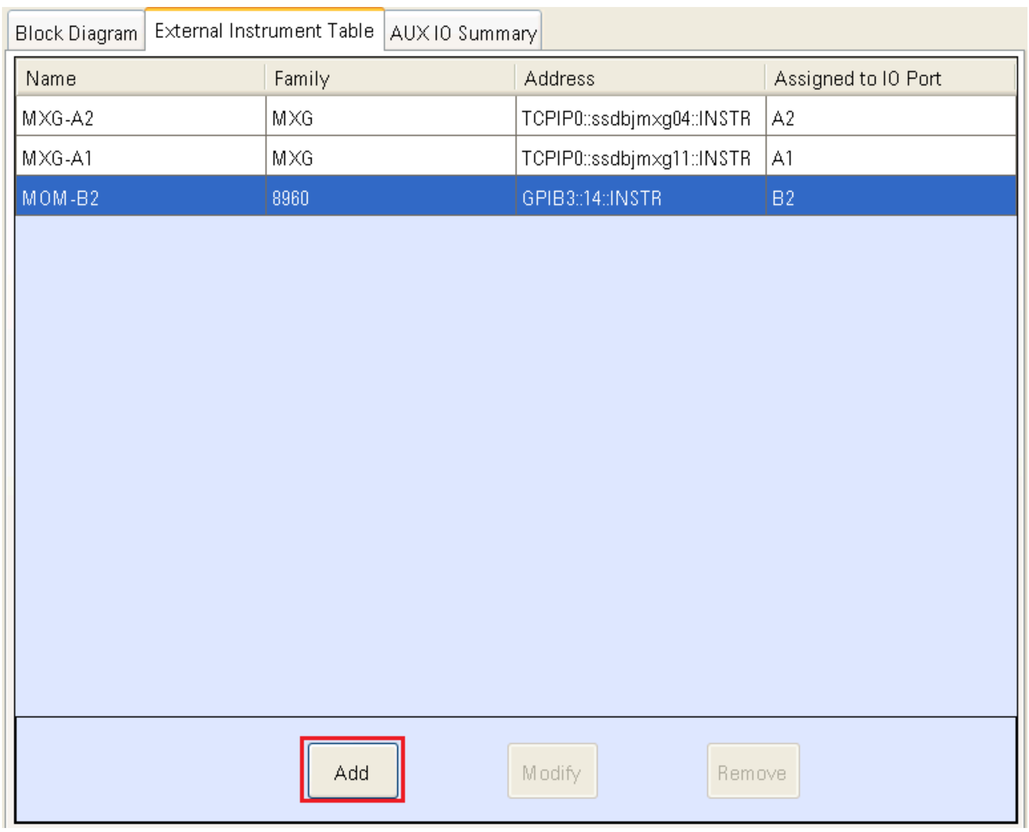



**Figure 5 PXB External Instrument Table**

**NOTE**: The MXA is optional to add as an external instrument for PXB.

**NOTE**: Select the appropriate **IO Port Name** for the 8960 and MXGs in System Interconnections based on the physical I/O port connected to the PXB through the LVDS bus. The physical I/O port location map to the **IO Port Name** is indicated below:

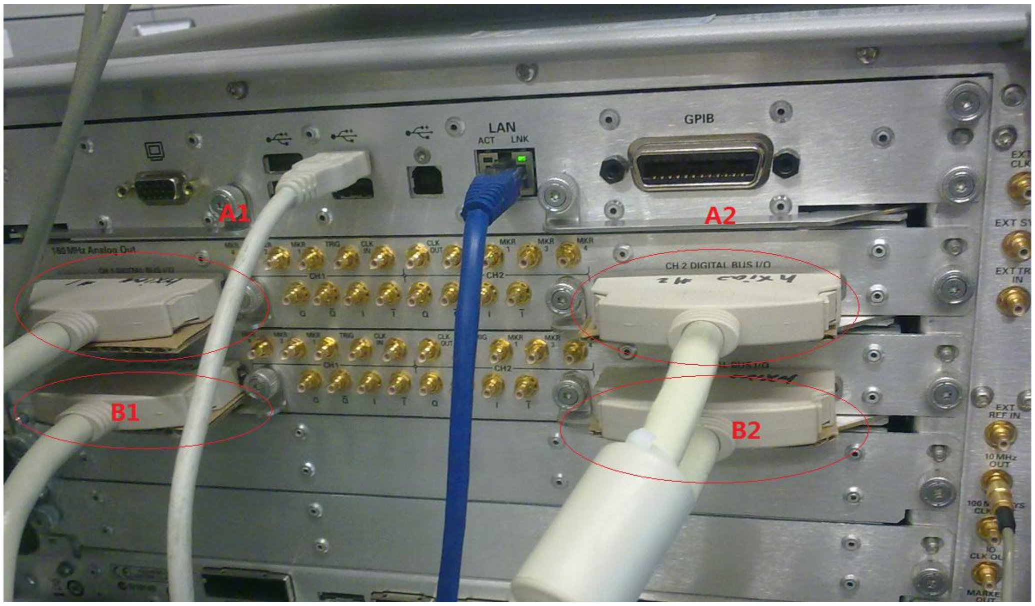



**Figure 6 PXB I/O Port Number Allocation**

➢ Select the PXB "Fade (ext in) 2 Channels" configuration, and assign external instruments to the specific IO port, and load the configuration. Assign the 8960 first, and assign the same 8960 to both input ports. Below is the screen capture after loading the configuration:

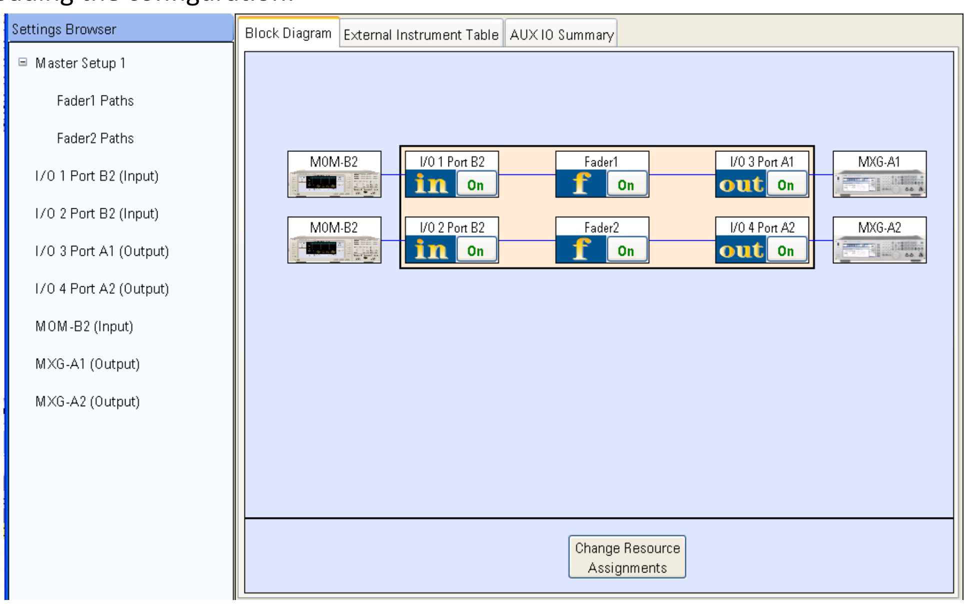



**Figure 7 PXB Fade Ext In- 2 Channels configuration loaded**

➢ Verify the external instrument connection by using the "Test Connection" button from the external instrument panel which is shown after double clicking the external instrument node (MOM-B2, MXG-A1 and MXG-A2):

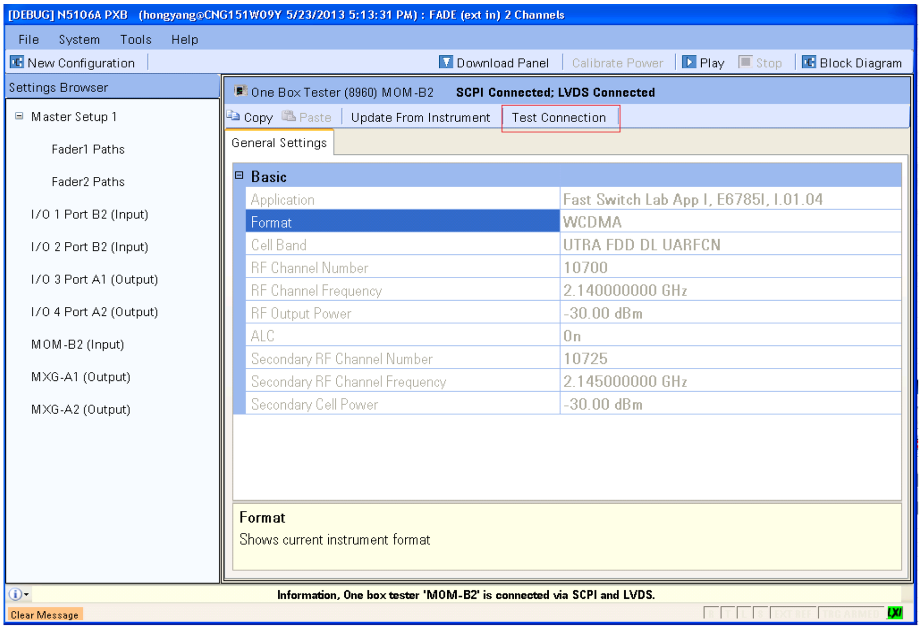



**Figure 8 PXB Check instrument connection – MOM-B2**

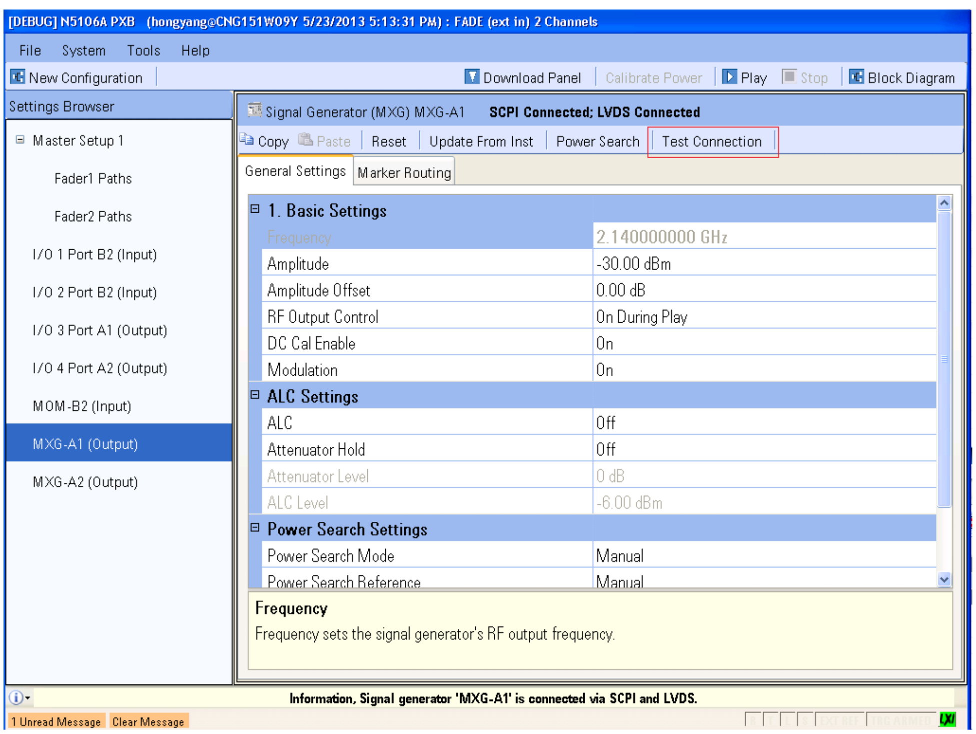



**Figure 9 PXB Check instrument connection –MXG-A1**

**NOTE**: The 8960 and two MXGs should be checked to make sure that they are all connected via SCPI and LVDS. If there are errors during the check, it means that there are some connection problems either with SCPI or with LVDS. The connection problem should be resolved before proceeding. Potential causes include LVDS cable, LAN cable, GPIB cables and instrument hardware issue.

To facilitate diagnosing the LVDS connection issues, a few error messages will be generated when there are some errors/exceptions during the coordinating the external instruments and PXB. These errors will pop up in the GUI and also available with the "SYSTEM:ERROR?" query.
Error ID: 107
Diagnose External Instrument Digital Interface Error:  Digital cable on I/O port {0} diagnose failed. <Specific failure information>
For <Specific failure information>, some actions may be helpful to recovery:

- MXG
  - Signal Generator Input Setup failure : Preset or power cycle MXG
  - LVDS alignment failure: check LVDS cable, Preset or power cycle MXG
  - DCM Reset failure: check LVDS cable, Preset or power cycle MXG
  - ARM failure: Preset or power cycle MXG/EXG
- 8960 (E5515E)
  - LVDS alignment failure: check LVDS cable,  Preset or power cycle 8960

**NOTE**: When the instruments are moved or cables are replaced, it is highly recommended that user should re-verify the external instrument connection before the fading tests.

➢ Config PXB fader with “Pass Through” for two channels

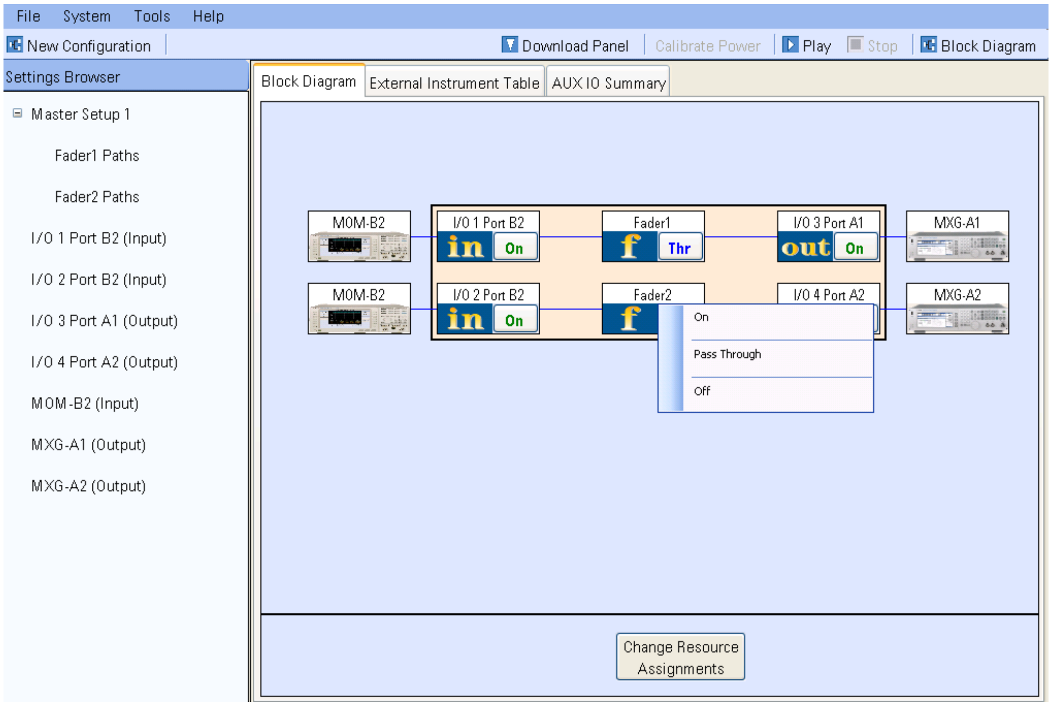



**Figure 10 PXB Fader “Pass Through”**

➢ Config two MXGs for correct RF output power. Start with a higher output power than normal, to be certain you can establish a connection with the phone.

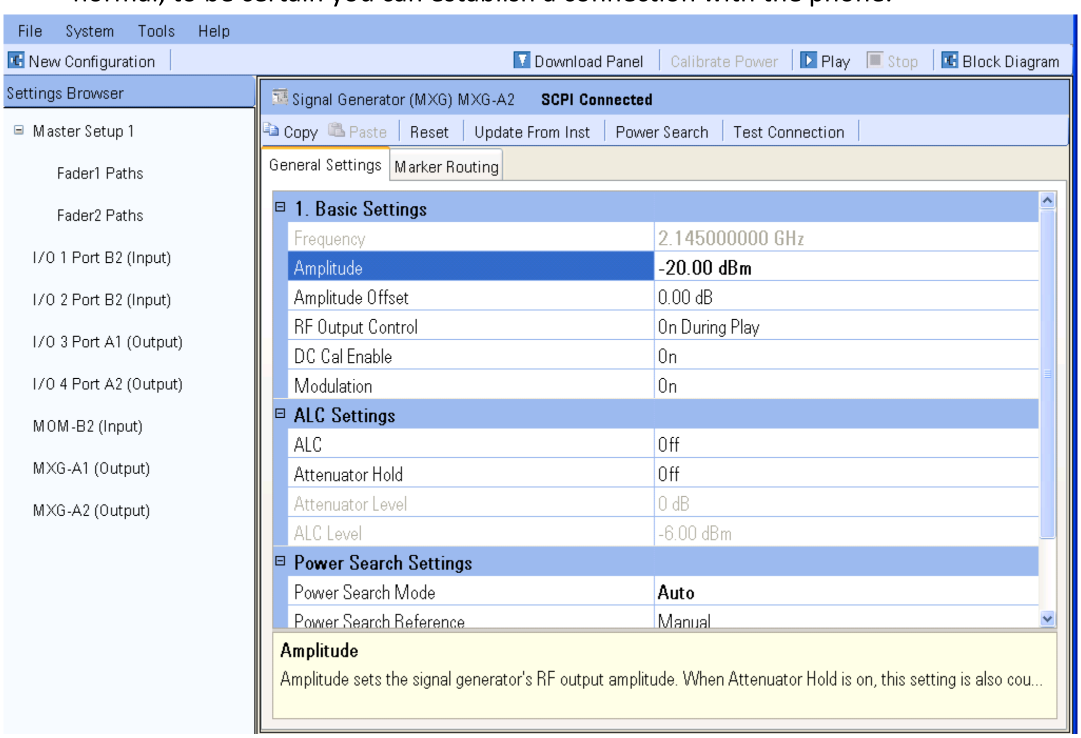



**Figure 11 MXG RF output power setup**

- Play the configuration to see all instruments are setup correctly and functional.

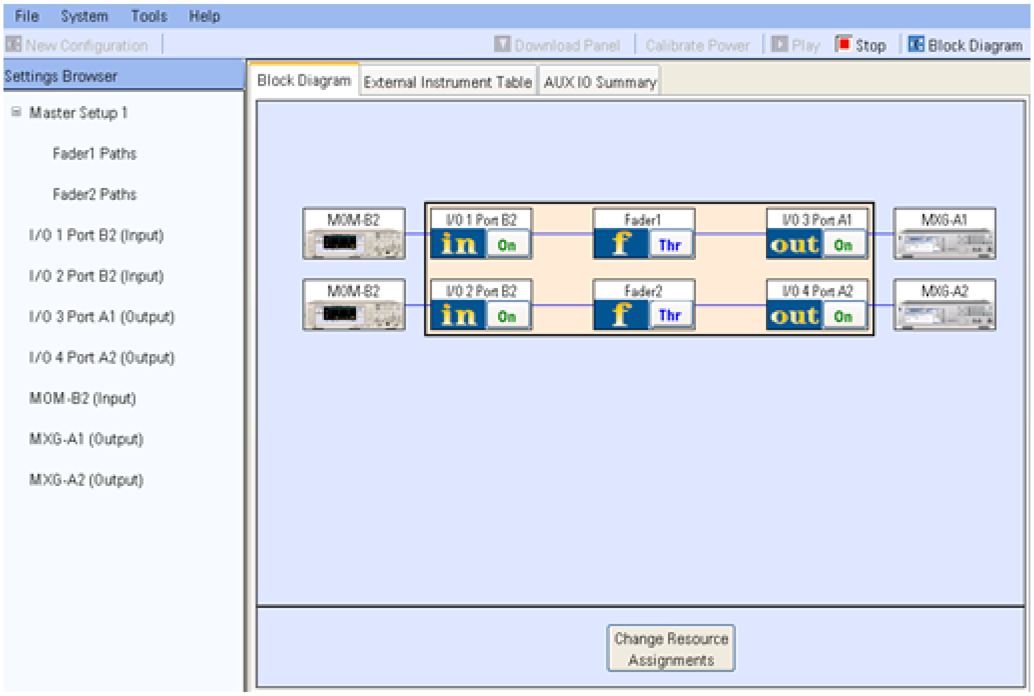



**Figure 12 PXB play the configuration**

**NOTE**: If play failure occurs, there may be some hardware related issues with either external instruments or PXB. Please retry after power cycle the external instrument and PXB.

- Stop the playing by clicking the “Stop” button.

## Downlink Signal quality verification (optional)

This step is optional but highly recommended. It is used to verify that the downlink signal is good after PXB processing. 8960 is sending the HSDPA DC signal over LVDS to PXB, and MXA is used to verify the downlink DC signal demodulation.

- Config 8960 for HSDPA DC in FDD test mode:
  - Set Operating Mode to Cell Off [call:oper:mode off]
  - Set up DC-HSDPA working mode per test required. For example, using Preset Call Configurations to setup a DC-HSDPA mode from the front panel of the 8960. Push 8960 CALL SETUP Button, select page 1 of 3 of **Call Parms** soft key menu and set **Call Parms -> 34.121 Preset Call Configs → 6.3C:DC-HSDPA:16QAM**
  - Set **Operating Mode** to FDD Test [call:oper:mode fddt]
  - Enable DC-HSDPA FRC H-Set 6A by selecting **HSPA Parameters → HSDPA Parameters → HS-DSCH Parameters → FDD Test FRC Type → H-Set 6A 16QAM** in page 1 of 3 of **Call Parms** soft key menu

- Play the PXB
- After the play is successful, use MXA to demodulate the downlink 2 channels using the EVM measurement.
  - The first check is the spectrum of the two channels, set the MXA center frequency to 2.14G and Span to 20MHz, and measure the channel power, two channels should be shown as below:

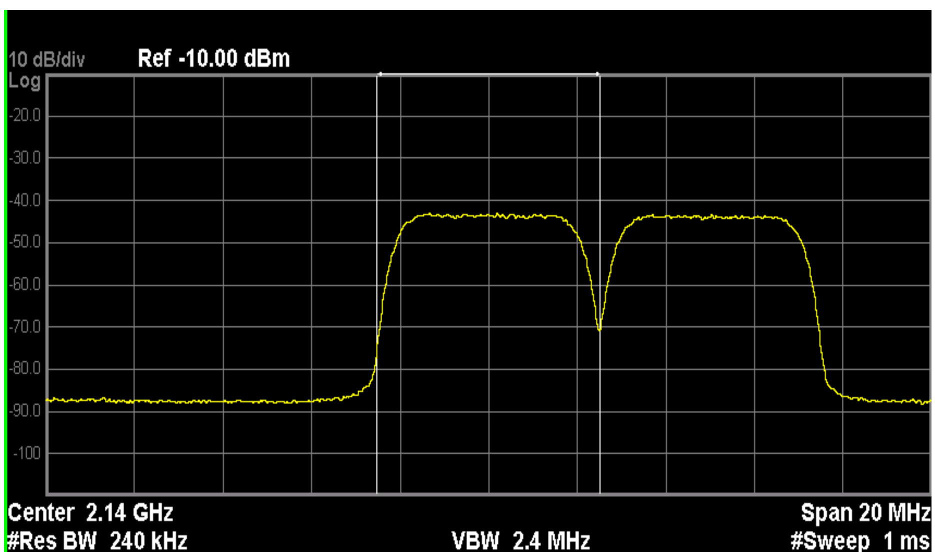



**Figure 13 MXA Channel power measure with HSDPA DC**

  - Next measure the EVM of the first channel at 2.14G using the Mod Accuracy measurement

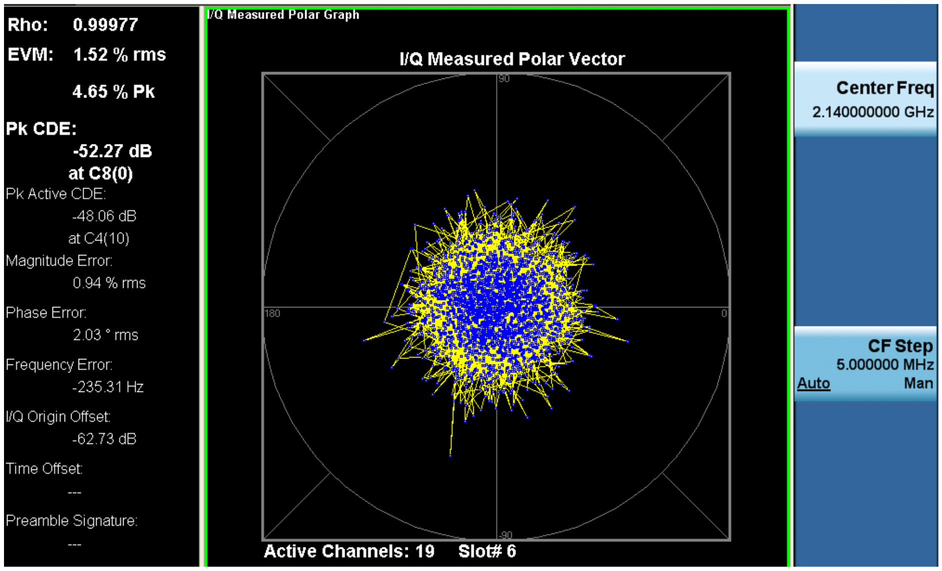



**Figure 14 MXA Demodulation for the first channel @2.14G**

- Set the measurement parameter "P-Scramble Code" to "2", and measure the EVM of the second channel at 2.145G using the Mod Accuracy measurement

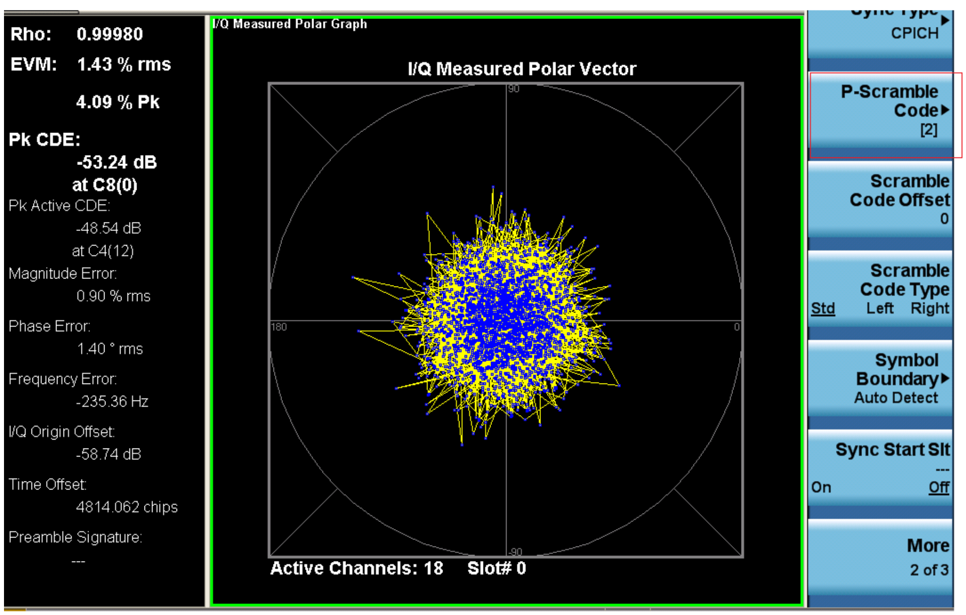



**Figure 15 MXA Demodulation for the first channel @2.145G**

➢ Stop playing the PXB

**NOTE**: If the average EVM is quite high (> 3%), it may be caused by the incorrect MXA setup for the input attenuator or bad RF cable.

## Call establishment verification with UE

- Config 8960 for HSDPA DC in active cell mode.
  - Set Operating Mode to Cell Off [call:oper:mode off]
  - Set up DC-HSDPA working mode per test required. For example, using Preset Call Configurations to setup a DC-HSDPA mode from the front panel of the 8960. Push 8960 CALL SETUP Button, select page 1 of 3 of **Call Parms** soft key menu and set **Call Parms -> 34.121 Preset Call Configs → 6.3C:DC-HSDPA:16QAM**
  - Set **Operating Mode** to FDD Test [call:oper:mode fddt]
  - Enable DC-HSDPA FRC H-Set 6A by selecting **HSPA Parameters → HSDPA Parameters → HS-DSCH Parameters → FDD Test FRC Type → H-Set 6A 16QAM** in page 1 of 3 of **Call Parms** soft key menu
  - Set **Operating Mode** to Active Cell [call:oper:mode call]

- Play the PXB
- After the play is successful, use MXA to demodulate the first channel @2.14G as detailed in the “Downlink Signal Quality Verification”. This is optional.
- Configure UE
  - Switch on UE
  - Wait for UE to register
- Call establishment with UE
  - Originate a Call[call:orig]
  - Wait till the call status changing to ‘Connected’

- HSDPA BLER measurement to verify the throughput
  - Now we are able to start any DC-HSDPA test required. For example, We can use the real-time results to check the ACKs, NACKs and throughput, or the HSDPA BLER measurement (**Meas Selection → HBLER**) to look the BLER and throughput result over a specific number of blocks as shown in Figure :

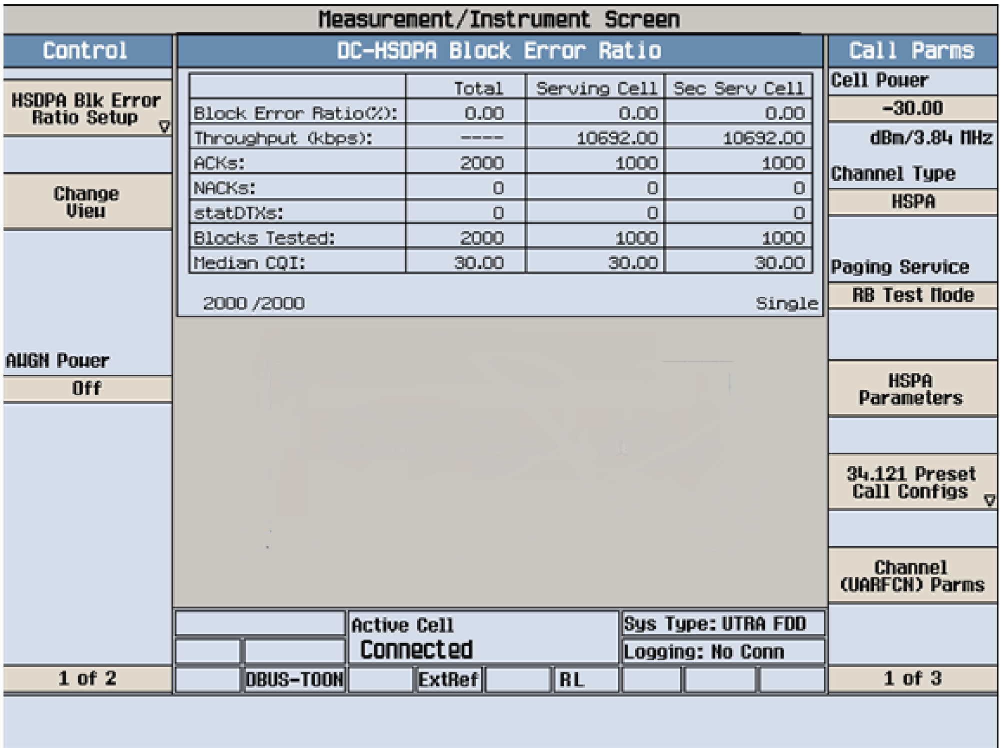



**Figure 16 Typical HBLER DC-HSDPA Measurement Results without fading and AWGN**

**NOTE:** As no fading and AWGN is added, the BLER for both serving cell and second serving cell should be 0 and the throughput should be the maximum accordingly to the setup if UE can support. The power levels of the serving and secondary serving cells will also affect the throughput and stability of the tests.

- Stop playing the PXB

## Specific fading profile setup and test

If all above steps are all performed successfully, it means all instruments (PXB, 8960, MXG and UE) are functional and all the cables are good. So we go ahead with the specific fading tests.

Due to the fact that the combiners and splitter are used for RF downlink and uplink, calibration is required if some parametric fading tests are performed.

For the downlink calibration, bypass the fader in the PXB, and send an unfaded signal to the MXGs. Finally, use a spectrum analyzer or VSA to measure the channel power of each MXG output at the UE's Rx antenna port connector. The downlink path loss is the difference between MXG's output amplitude and VSA measured value, and could be compensated by adjusting the MXG's amplitude:

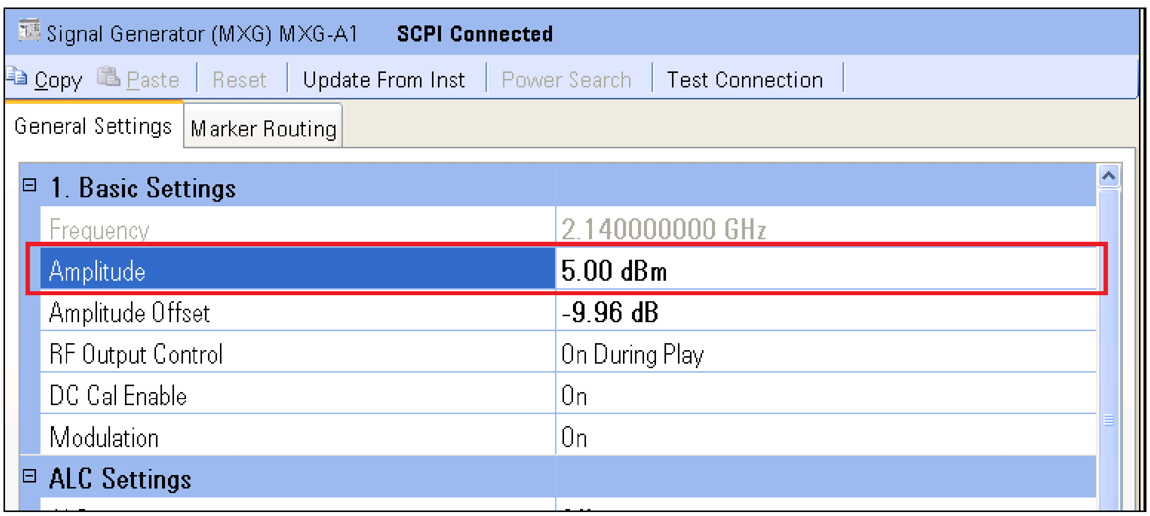



**Figure 17 RF path loss compensate - downlink**

For the uplink path loss, it could be compensated by setting the 8960 amplitude offset table which is accessible by pressing System Config Button → **RF In/Out Amptd Offset → RF In/Out Amptd Offset Setup:**

- The "RF Amptd Offset" should be set to "On" to enable the amplitude offset
- The "Frequency X"/ "Offset X" pair indicates the amplitude offset value at the specified frequency

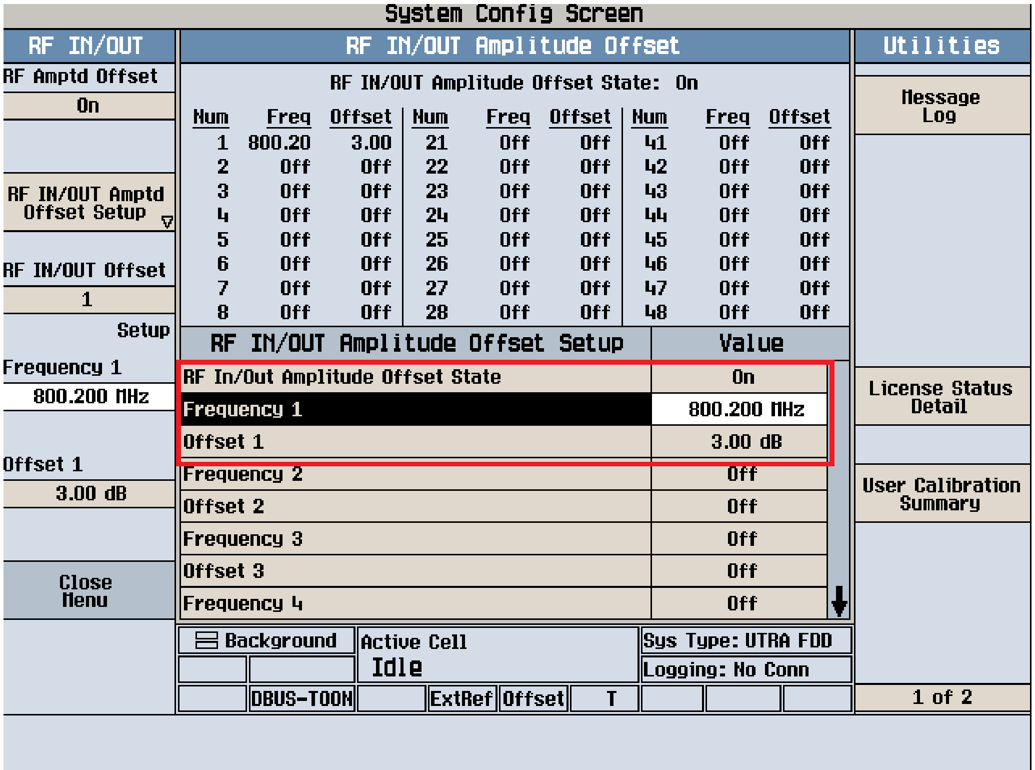



**Figure 18 RF path loss compensate - uplink**

The Îor to Ioc ratio defined in the 3GPP test standard can then be set using the two channels **SNR**. All the signal power and noise spectral density can be set using the **I/O 3 Port A2 (Output) -> AWGN** and **I/O 4 Port A2 (Output) -> AWGN** settings. In these AWGN setting tables, you can set the **AWGN Power** and **Signal Power** directly based on the test requirements.

Below are detail instructions for performing fading tests:

- Config 8960 for HSDPA DC in active cell mode. Refer to details in "Call establishment verification with UE".
- Config PXB fading channel mode and fader path.
  - Select **Master Setup 1 → Fader 1 Channel Model → HSDPA →Base Station → Case 1 → 3 kph – Bands I,II,III,IV and IX**
  - Select **Master Setup 1 → Fader 2 Channel Model → HSDPA → Base Station → Case 1 → 3 kph – Bands I,II,III,IV and IX**
  - Select **Master Setup 1 → Fader 1 Mode → Pass Through**
  - Select **Master Setup 1 → Fader 2 Mode → Pass Through**

**NOTE**: For the Fader Mode, it should be set to "Pass Through" to make sure that call establishment is not affected by the fading.

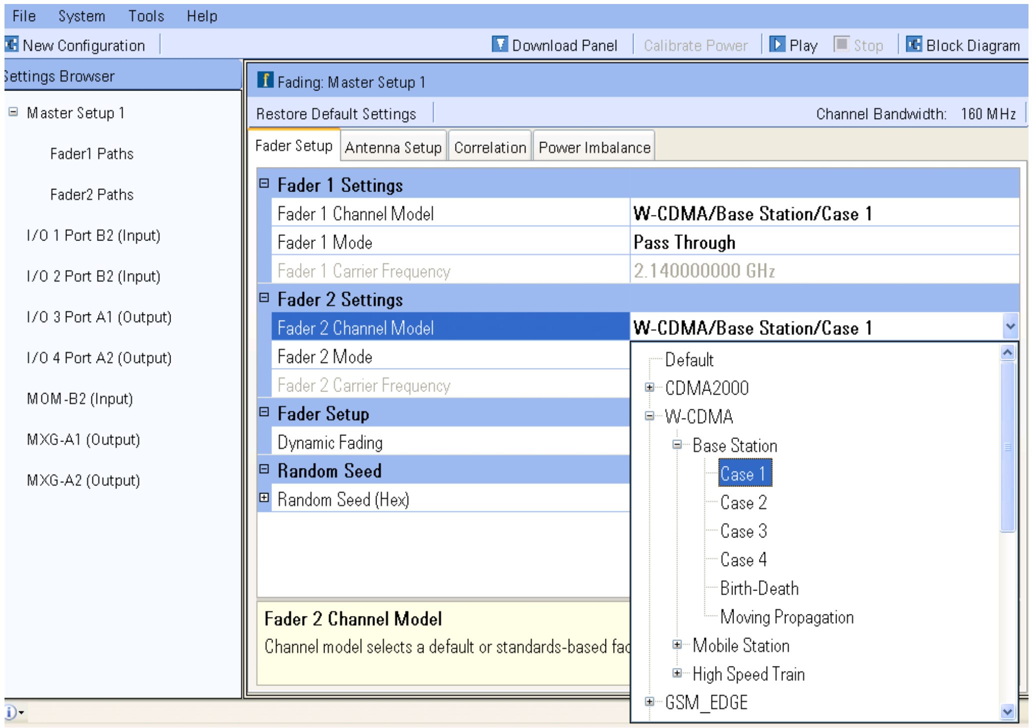



**Figure 19 PXB Fading Channel Model**

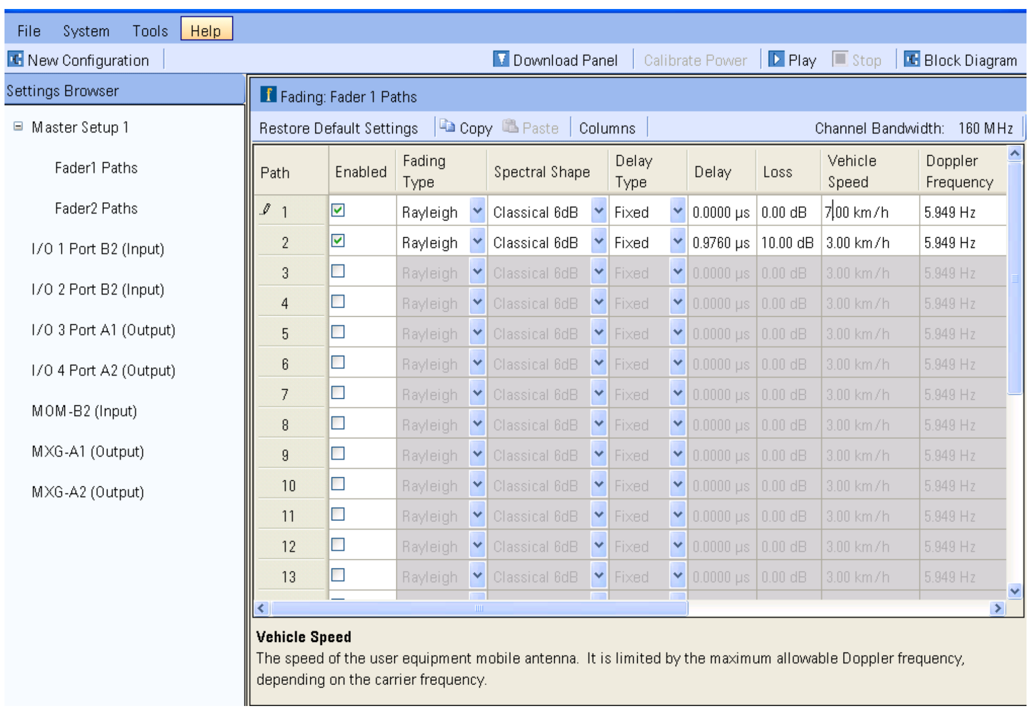



**Figure 20 PXB Fading Path Settings**

- Config PXB AWGN settings for the output IO port (IO 3 and IO 4):.
  - Select **I/O 3 Port A1 (Output) → AWGN Settings**

- ◆ **AWGN Enabled: On**
- ◆ **Output MUX: Signal**
- ◆ **AWGN Integration Bandwidth: 5MHz**
- ◆ **Flat Noise Bandwidth: 5MHz**

■ Select **I/O 4 Port A2 (Output) → AWGN Settings**

- ◆ **AWGN Enabled: On**
- ◆ **Output MUX: Signal**
- ◆ **AWGN Integration Bandwidth: 5MHz**
- ◆ **Flat Noise Bandwidth: 5MHz**

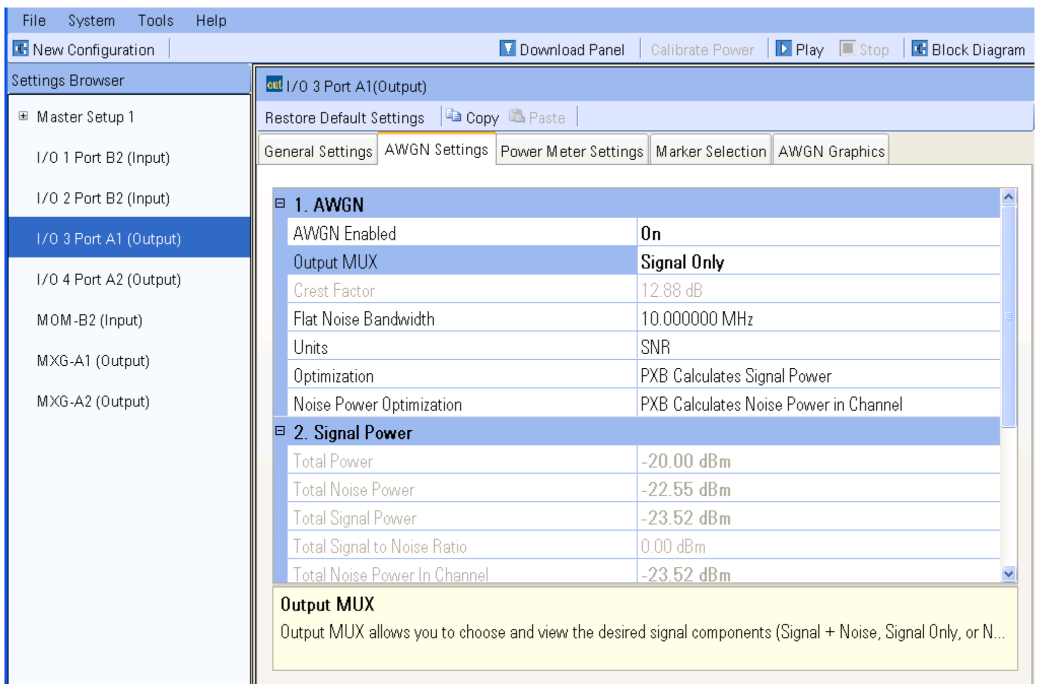



**Figure 21 PXB Output AWGN Settings**

**NOTE**: The AWGN enable should be set to "On" and Output MUX set to "Signal Only" if AWGN tests are needed after call establishment.

- ➢ Play the PXB
- ➢ Configure UE
  - ■ Switch on UE
  - ■ Wait for UE to register
- ➢ Call establishment with UE
  - ■ Originate a Call[call:orig]
  - ■ Wait till the call status changing to 'Connected'
- ➢ Add PXB fading and AWGN
  - ■ For adding fading, switch the fader mode from "Pass Through" to "On"

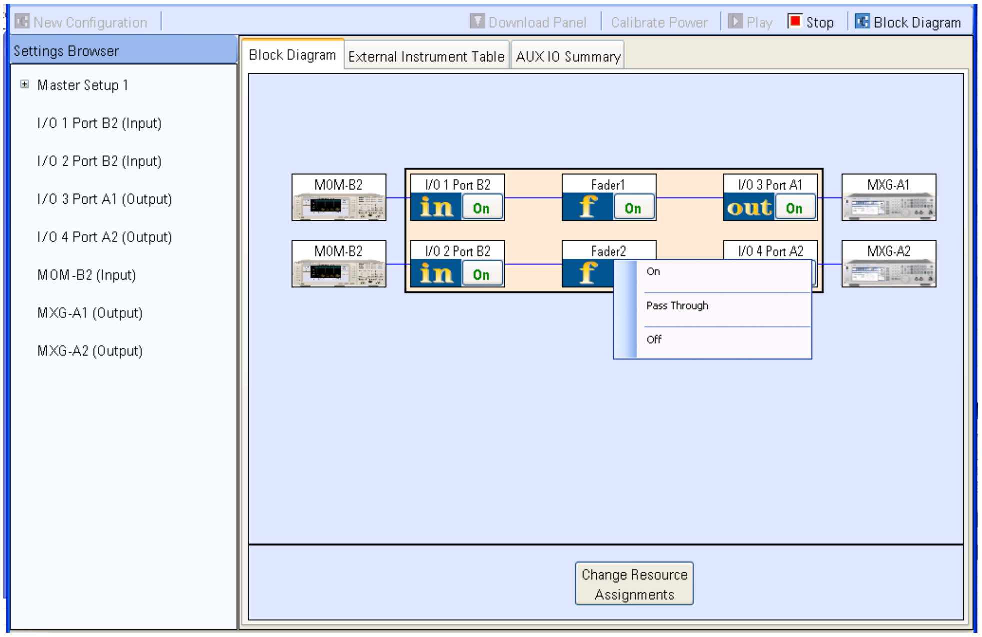



**Figure 22 PXB Fading Mode "On"**

- For adding AWGN, switch the AWGN Output MUX from "Signal Only" to "Signal + Noise" for I/0 3 and I/0 4 ports:

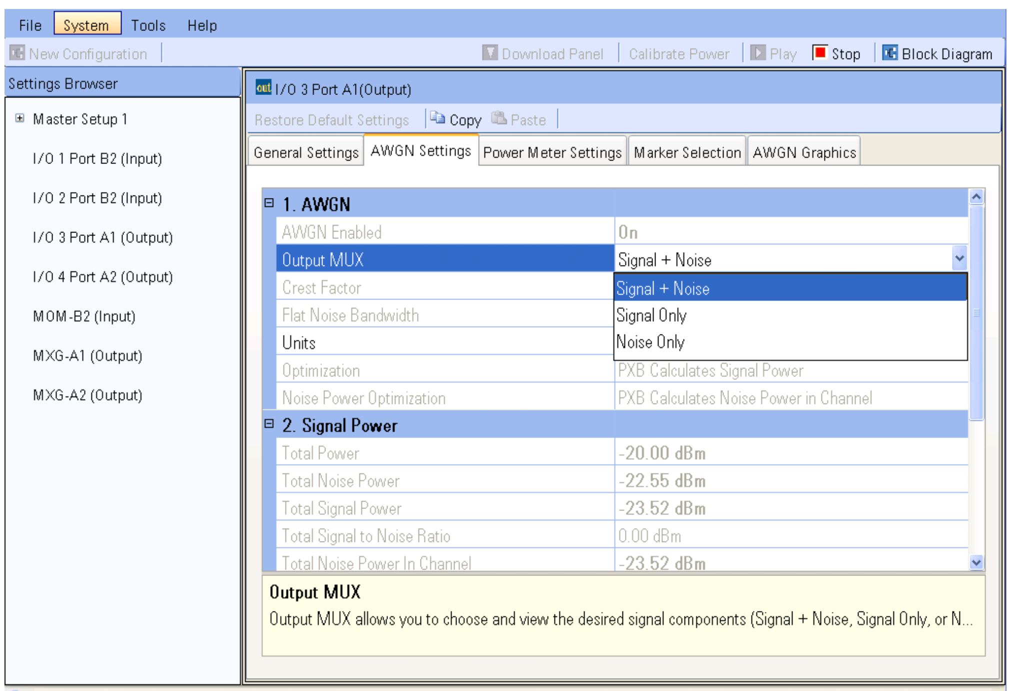
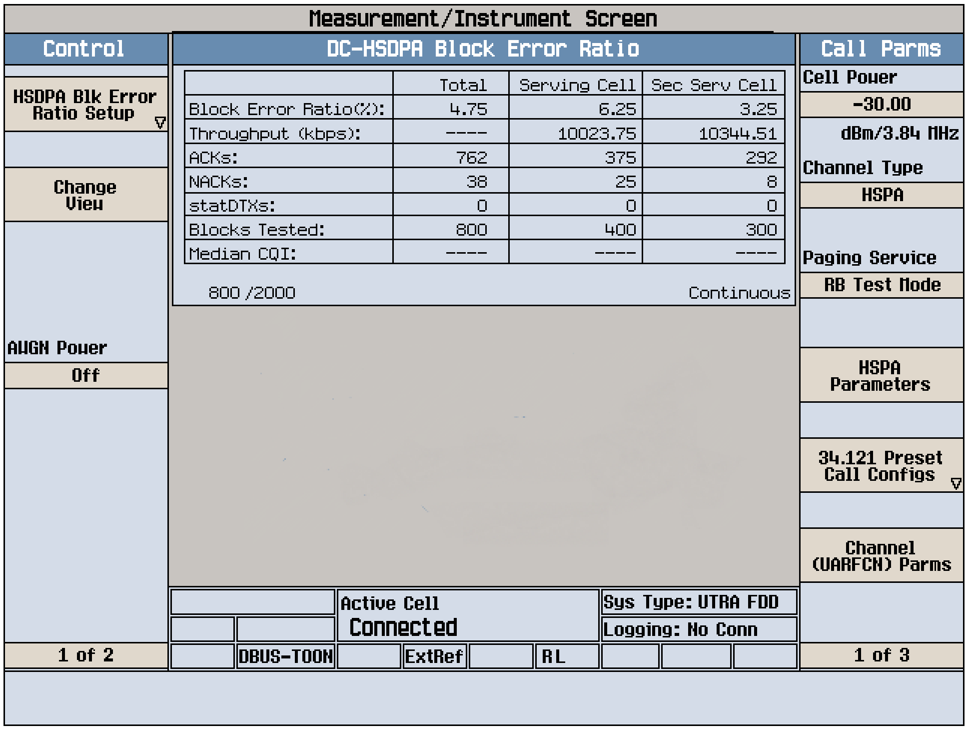



**Figure 23 PXB add AWGN to output**

- HSDPA BLER measurement to verify the throughput
    - Now we are able to start any DC-HSDPA test required. For example, We can use the real-time results to check the ACKs, NACKs and throughput, or the HSDPA BLER measurement (**Meas Selection → HBLER**) to look the BLER and throughput result over a specific number of blocks as shown below:




| | Total | Serving Cell | Sec Serv Cell |
|---|---|---|---|
| Block Error Ratio(%): | 4.75 | 6.25 | 3.25 |
| Throughput (kbps): | ---- | 10023.75 | 10344.51 |
| ACKs: | 762 | 375 | 292 |
| NACKs: | 38 | 25 | 8 |
| statDTXs: | 0 | 0 | 0 |
| Blocks Tested: | 800 | 400 | 300 |
| Median CQI: | ---- | ---- | ---- |

**Figure 24 HBLER DC-HSDPA Measurement Results after fading or AWGN**

**NOTE**: After adding fading and noise, the BLER is increased to some value great than zero. If some tests are followed with configurations in 34.121 -1-960 Figure A.35, which is proposal for Dual cell tests with Multi-path Fading propagation for DC-HSDPA and DB-DC-HSDPA type 2 performance requirements, the RF path loss should be calibrated and compensated first before such tests.

**NOTE**: If call drops after adding fading or AWGN, it may be caused by poor SNR received by UE. Try to adjust AWGN settings like SNR or Fading settings like path loss, Doppler frequency…

Sometimes the call cannot be re-established with fading and AWGN active.

- Stop playing the PXB

## Sample SCPI scripts for HSDPA DC fading test

**NOTE**: The sample SCPI shows how to configure 8960 and PXB for the HSDPA DC fading tests. The specific instrument name and address should be updated accordingly to match the real user setup. The comments are lines started with "#". The lines in red refer to some settings may need adjustment according to UE's capability or user test requirements.

```
## SCPI sent to 8960 ##
## prepare 8960 to WCDMA format and HSDPA DC configuration##############
*RST
# switch to 'WCDMA'
SYSTem:APPLication:FORMat "WCDMA"
SYST:LOG:UI:GPIB:STAT ON
RFG:OUTP OUT
CALL:OPERating:MODE OFF
*opc?

# Channel code assignment
CALL:PICHannel:CCODe:CODE 4
CALL:AICHannel:CCODe:CODE 5

CALL:CELL:DPCH:KSPS15:CCODe:CODE 2
CALL:DPCHANNEL:KSPS120:CCODE:CODE 20

CALL:CELL:DPCH:KSPS15:CCODe:CODE:HSDPa 2
CALL:CELL:EAGChannel:CCODe:CODE 3
CALL:CELL:EHIChannel:CCODe:CODE 6
CALL:HSDPa:SERVice:RBTest:HSPDschannel:CCODe:CODE 1
CALL:HSSCchannel1:CCODe:CODE 3
CALL:HSSCchannel2:CCODe:CODE 4
CALL:SSCell:PICHannel:CCODe:CODE 4
CALL:HSDPa:SSCell:RBTest:HSPDschannel:CCODe:CODE 1
CALL:SSCell:HSSCchannel1:CCODe:CODE 4

CALL:CELL:OCNSource:CCODe:CODE 16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31
CALL:CELL:OCNSource:CCODe:CODE:HSDPa 7,8,9,10,11,12
CALL:SSCell:OCNSource:CCODe:CODE 7,8,9,10,11,12

CALL:CELL:CCPChannel:SECondary:CONNected:CONFig:STATe 0

CALL:HSSCchannel1:CONFig:STATe 1
CALL:HSSCchannel2:CONFig:STATe 1
CALL:HSSCchannel3:CONFig:STATe 0
```

CALL:HSSCchannel4:CONFig:STATe 0
CALL:SSCell:HSSCchannel1:CONFig:STATe 1
CALL:SSCell:HSSCchannel2:CONFig:STATe 1
CALL:SSCell:HSSCchannel3:CONFig:STATe 0
CALL:SSCell:HSSCchannel4:CONFig:STATe 0

CALL:CELL:OCNSource:CONFig:STATe:HSDPa 1,0,0,0,0,0
CALL:SSCell:OCNSource:CONFig:STATe:HSDPa 1,0,0,0,0,0

# Channel Level
CALL:CONNected:HSSCchannel1:LEVel -11
CALL:CONNected:HSSCchannel2:LEVel -11
CALL:CONNected:HSPDschannel:LEVel -2
CALL:CONNected:PICHannel:STATe:HSPA OFF
CALL:CONNected:DPCHannel:LEVel:HSPA -20
CALL:CONNected:HSPDschannel:LEVel:HSPA -2
CALL:CONNected:CPIChannel:LEVel:HSPA -11
CALL:CONNected:CCPChannel:PRIMary:LEVel:HSPA -12
CALL:CONNected:HSSCchannel1:LEVel:HSPA -10
CALL:CONNected:HSSCchannel2:LEVel:HSPA -10

CALL:SSCell:CONNected:CPIChannel:LEVel:HSPA -10
CALL:SSCell:CONNected:PICHannel:STATe:HSPA OFF
CALL:SSCell:CONNected:CCPChannel:PRIMary:STATe:HSPA OFF
CALL:SSCell:CONNected:HSPDschannel:LEVel:HSPA -2
CALL:SSCell:CONNected:HSSCchannel1:LEVel:HSPA -10
CALL:SSCell:CONNected:HSSCchannel2:LEVel:HSPA -10

# Power Level for two cells
CALL:POWer -22
CALL:SSCell:POWer -22

# RB Test Mode settings
CALL:HSDPa:SERVice:RBTest:HSDSchannel:CONFig:TYPE UDEFined
CALL:HSDPa:SERVice:RBTest:UDEFined:HSDSchannel:MAC EHSPeed
CALL:HSDPa:SERVice:RBTest:UDEFined:MS:IREDundancy:BUFFer:ALLocation IMPLicit
CALL:HSDPa:SERVice:RBTest:UDEFined:HARQ:PROCess:COUNt 6
CALL:HSDPa:SERVice:RBTest:UDEFined:DCHSdpa:STATe On

CALL:HSDPa:SERVice:RBTest:UDEFined:QAM64:STATe 1
CALL:HSDPa:SERVice:RBTest:UDEFined:HSPDschannel:COUNt 15
CALL:HSDPa:SERVice:RBTest:UDEFined:TBSize:INDex 62

```
CALL:HSDPa:SERVice:RBTest:UDEFined:MODulation:TYPE QAM64
CALL:HSDPa:SERVice:RBTest:UDEFined:ITTI:INTerval 1

CALL:HSDPa:SSCell:RBTest:UDEFined:QAM64:STATe 1
CALL:HSDPa:SSCell:RBTest:UDEFined:HSPDschannel:COUNt 15
CALL:HSDPa:SSCell:RBTest:UDEFined:TBSize:INDex 62
CALL:HSDPa:SSCell:RBTest:UDEFined:MODulation:TYPE QAM64
CALL:HSDPa:SSCell:RBTest:UDEFined:ITTI:INTerval 1

CALL:OPERating:MODE CALL
CALL:CELL1:RLC:REEStablish OFF
CALL:SERVice:RBTest:RAB HSPA


## SCPI sent to PXB ##
## configure PXB ######################
CONT:PLAY OFF
*OPC?
*RST
*WAI

# Select Ext Fading (2 Ch) configuration
CONT:CONF EFAD,'2Ch'

# Assign instrument to the port, the instrument name is case sensitive
*WAI
CONTrol:CONFig:IO1:DIGital:RDEVice:PORT 'B2','MOM-B2'
*WAI
CONTrol:CONFig:IO2:DIGital:RDEVice:PORT 'B2','MOM-B2'
*WAI
CONTrol:CONFig:IO3:DIGital:RDEVice:PORT 'A1','MXG-A1'
*WAI
CONTrol:CONFig:IO4:DIGital:RDEVice:PORT 'A2','MXG-A2'
*WAI

# Apply configuration
CONT:CONF:APPL
*WAI
*OPC?
pxb < 1

## Verify connections ####################################
```

```
## Before sending the query, set the PXB timeout to 30 seconds to avoid timeout error
## Should return "Pass" IO1 - Mom-B2; IO3 – MXG-A1 #
## IO4 – MXG-A2                              #
CONTrol:CONFig:IO1:DIGital:RDEVice:DIAGnostic?
pxb < "Pass"
CONTrol:CONFig:IO3:DIGital:RDEVice:DIAGnostic?
pxb < "Pass"
CONTrol:CONFig:IO4:DIGital:RDEVice:DIAGnostic?
pxb < "Pass"

## Config PXB Fading #########################
FSIM1:FAD1:STAN:TECH HSDPA
FSIM1:FAD1:STAN:SCEN CAS1
FSIM1:FAD1:STAN:LINK BASE
FSIM1:FAD1:STAN:FBAN 1
FSIM1:FAD1:VSPeed 3
FSIM1:FAD1:MODE THR
FSIM1:FAD2:STAN:TECH HSDPA
FSIM1:FAD2:STAN:SCEN CAS1
FSIM1:FAD2:STAN:LINK BASE
FSIM1:FAD2:STAN:FBAN 1
FSIM1:FAD2:VSPeed 3
FSIM1:FAD2:MODE THR

## Config PXB AWGN ###################
CONTrol:IO3:OUTPut:AWGN:ENABle 1
CONTrol:IO3:OUTPut:AWGN:MUX SIGN
CONTrol:IO3:OUTPut:AWGN:IBANdwidth 5000000
CONTrol:IO3:OUTPut:AWGN:NBANdwidth 5000000
CONTrol:IO3:OUTPut:AWGN:OPTimization Noise
CONTrol:IO3:OUTPut:AWGN:SNR 0
CONTrol:IO3:OUTPut:AWGN:SPOWER -22

CONTrol:IO4:OUTPut:AWGN2:ENABle 1
CONTrol:IO4:OUTPut:AWGN2:MUX SIGN
CONTrol:IO4:OUTPut:AWGN2:IBANdwidth 5000000
CONTrol:IO4:OUTPut:AWGN2:NBANdwidth 5000000
CONTrol:IO4:OUTPut:AWGN2:OPTimization Noise
CONTrol:IO4:OUTPut:AWGN2:SNR 0
CONTrol:IO4:OUTPut:AWGN2:SPOWER -22

## Play configuration ###
```

```
CONT:PLAY ON
*WAI
*OPC?
pxb < 1
# Check PXB play status
:CONTrol:PLAY:STATe?
pxb < 1

## SCPI sent to 8960 ##
## setup call connection with UE
[usr > setup call connection, then continue]
call:orig

 ## SCPI sent to PXB ##
## enable PXB Fading and AWGN #####################
FSIM1:FAD1:MODE ON
FSIM1:FAD2:MODE ON
CONTrol:IO3:OUTPut:AWGN:MUX SUM
CONTrol:IO4:OUTPut:AWGN2:MUX SUM

## SCPI sent to 8960 ##
## enable 8960 HBLER measurement #####################
SETup:HBLerror:COUNt 10000
SETup:HBLerror:COUNt:DCHSdpa:STATe On
SETup:HBLerror:CONTinuous OFF
INITiate:HBLerror
INITiate:DONE?
FETCh:HBLerror?
```

Below attachment is the sequence which can be played by Agilent Command Expert. Agilent Command Expert is free and available at: http://www.agilent.com/find/CommandExpert.
To run the below sequence, you need to follow the instructions below:

- Setup the test system and interconnect all the devices, check 10M reference clock
- Power up all instruments (PXB, 8960, 2 MXGs)
- Setup PXB External Instrument Table according to the setup
- Run Agilent Command Expert, and load the Sequence file below
- Update the Instruments' name, address and connections in the sequence
- Play the sequence

PXB_8960_DC_BB_Fading.iseq