



Vertex[®] Channel Emulator

Release 5.00

RPI Command Reference Manual

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1. Introduction

1.1. Overview

The Spirent Vertex® channel emulator simplifies MIMO testing for technologies such as 5G, LTE, and LTE-Advanced. These technologies rely on large numbers of antennas, higher bandwidth, and band aggregation to deliver high-speed data. The Vertex channel emulator provides integrated bi-directional RF channels and supports carrier aggregation. With high fidelity channel and long simulation repetition rates, the Vertex ensures reliable and accurate performance evaluation.

1.2. What's New in this Release

This release introduces the following new remote programming interface (RPI) commands:

- Turn ON/OFF DEE smoothing ([SYSTem]:DEE)

1.3. Documentation

To access the latest version of this document, perform the following steps:

1. Log into the Spirent Customer Service Center website (<http://support.spirent.com>) using the email address and password assigned to you by Spirent.
2. In the Search Knowledge Base box, enter **DOC10797** and click on **Search KB**.
The results list appears.
3. Click on Spirent Vertex® Channel Emulator Documentation.
The Spirent Vertex® Channel Emulator Documentation page appears.
4. Click on the link for the document in which you are interested.
The page for the selected document appears.
5. Click on the link in the Attachment area to view the corresponding PDF.

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2. RPI Command Reference

2.1. Overview

This chapter provides a complete description of each command in the Vertex RPI command set.

You should be thoroughly familiar with the information in the *Spirent Vertex® Channel Emulator User Manual* before attempting to use Vertex remote commands. The “Remote Programming Interface (RPI)” section provides the details of Vertex command message format and syntax.

2.2. RPI Command Set Descriptions

2.2.1. HELP?

Print the list of RPI commands. Refer to “doc? command_name” for details.

2.2.2. *RST

Reset all RPI parameters to their default settings.

2.2.3. *CLS

Clear instrument status

2.2.4. *IDN?

Query the identification string for the instrument

2.2.5. *OPT?

Query the supported options on the instrument.

2.2.6. [SYSTem]:ERR?

Query system error queue.

SYST:ERR?

2.2.7. [SYSTem]:OERR?

Query operational error queue which maintains asynchronous errors and warning messages.

SYST:OERR?

2.2.8. [SYSTem]:HOLD?

Set or query the hold flag in the Vertex software from updating the state of the hardware while parameters are being changed.

Vertex>HOLD TRUE

Vertex>CHM1:PATH1 ON

Vertex>CHM1:PATH1:MOD RAYL

Vertex>CHM1:PATH1:DFR 250.7

Vertex>HOLD FALSE

| ID | Range | *RST | Resolution |
|--------|-------------|-------|------------|
| (bool) | TRUE, FALSE | FALSE | -- |

2.2.9. [SYSTem]:ASA?

Query the ASA Expiration date from the Vertex instrument.

2.2.10. [SYSTem]:REFLockstatus?

Query the 10 MHz reference lock status. The query will return one of the following responses:

10MHZ_EXT - The Vertex is locked to an external reference.

10MHZ_INT - The Vertex is generating an internal reference.

10MHZ_TRANSITIONING_TO_EXT - The Vertex is in a transition from an internal reference to an external reference.

10MHZ_TRANSITIONING_TO_EXT - The Vertex is in a transition from an internal reference to an external reference.

10MHZ_UNLOCKED_EXT - The Vertex cannot lock to the external reference.

10MHZ_UNLOCKED_INT - The Vertex cannot lock to the internal reference.

10MHZ_UNKNOWN - The reference lock status is in an unknown state.

2.2.11. [SYSTem]:SYSTEM_LOCK?

Query the system GUI is LOCKED or UNLOCKED.

SYSTEM_LOCK LOCKED locks the system GUI.

SYSTEM_LOCK UNLOCKED unlocks the system GUI.

2.2.12. [SYSTem]:NUMINSTruments

Set the parameters and connect to additional instruments in a multi-instrument configuration.

From the primary instrument RPI, which is networked to the second Vertex, configure the second instrument and connect.

Vertex >NUMINST 2,192.168.0.162

Vertex >

Vertex >CON:LIB?

After the multi-instrument connection sequence is complete, the connection setup has been changed to the default multi-instrument configuration.

| ID | Range | *RST | Resolution |
|----------|------------------|------|------------|
| (int) | 1 to 2 | 1 | 1 |
| (string) | Valid IP address | | |

This is a blocking RPI command that can take more than a minute to execute.

2.2.13. [SYSTem]:[EMULation]:PLAY

Start playing channel emulation.

2.2.14. [SYSTem]: TRIGGERONPLAY

Enables Vertex to send out a trigger signal when it starts playing channel emulation.

2.2.15. [SYSTem]:DISTRIGGERONPLAY

Disables Vertex from sending out a trigger signal when it starts playing channel emulation.

2.2.16. [SYSTem]:[EMULation]:PAUSE

Pause channel emulation.

2.2.17. [SYSTem]:[EMULation]:STOP

Stop channel emulation.

2.2.18. [SYSTem]:[EMULation]:STATe?

Query the state of the system.

Returns one of the following:

PAUSED

STOPPED

PLAYING

2.2.19. [SYSTem]:[FILE]:LOAD

Load a system-setting file (.sde).

| ID | Range | *RST | Resolution |
|----------|------------------------------|------|------------|
| (string) | full valid path\filename.sde | | - |

2.2.20. [SYSTem]:[FILE]:SAVE

Save current settings into a file (.sde).

| ID | Range | *RST | Resolution |
|----------|------------------------------|------|------------|
| (string) | full valid path\filename.sde | | - |

The default save path on the embedded PC is under the FTProot public directory:

D:\FTPRoot\Spirent\ Public\.

2.2.21. [SYSTem]:FADMode

Set or query fading mode of the system.

| ID | Range | *RST | Resolution |
|----------|--|-----------|------------|
| (string) | CLASsical, GEOMETRIC, GEOMETRIC_3D, MIMO_OTA | CLASsical | - |

2.2.22. [SYSTem]:FPHCALib:APPLY

Recalculates and applies the factory phase calibration for the given carrier frequency and levels.

2.2.23. [SYSTem]:FPHCALib:CLEar

Clears the factory phase calibration (sets all calibration phases to zero).

2.2.24. [SYSTem]:FPHCALib:AUTO?

Set or query auto update mode in registry for factory phase calibration.

| ID | Range | *RST | Resolution |
|----------|-------------|-------|------------|
| (string) | TRUE, FALSE | FALSE | - |

2.2.25. [SYSTem]:PHASECAL:LOAD

Load sweep phase calibration data from a file.

Example: SYST:PHASECAL:LOAD xxx.txt

2.2.26. [SYSTem]:PHASECAL:CLEAR

Clear the sweep phase calibration data.

2.2.27. [SYSTem]:PHASECAL:DELeTe

Delete the sweep phase calibration data file from the Vertex instrument.

Example: **SYST:PHASECAL:DEL** xxx.txt

2.2.28. [SYSTem]:ENHFilt? (Future available)

NOTE:

Reserved for future support in Vertex.

Set or query the instrument to boot with enhanced Digital Filters enabled in the firmware.

| ID | Range | *RST | Resolution |
|----------|---------|------|------------|
| (string) | OFF, ON | N/A | - |

NOTE:

When the state of the Digital Filter firmware boot is changed, a reboot and firmware upgrade is required. This setting will not be reset with the *RST command. This setting will persist even after system reboot.

2.2.29. [SYSTem]:RESet:BEGiN

Soft-resets the Vertex system.

2.2.30. [SYSTem]:CONnection:NUMCHM?

Query the number of active channel models in the currently configured Connection Setup.

2.2.31. [SYSTem]:CONnection:LOSSMode

Set or query the channel loss mode of the system.

| ID | Range | *RST | Resolution |
|----------|----------------------|------------|------------|
| (string) | SET_OUTput, SET_LOSs | SET_OUTput | - |

2.2.32. [SYSTem]:CONnection:LIBrary

Apply or query a connection setup from the connection setup library.

| ID | Range | *RST | Resolution |
|----------|---------------------|------|------------|
| (string) | Valid Library Entry | | -- |

2.2.33. [SYSTem]:CONnection:LIBAvalable?

Query the available connection set up configurations.

Vertex >CON:LIBAV?

2.2.34. [SYSTem]:CONnection:RLCM

Configure or query the Radio Link compensation mode.

NORMal is standard operation, which normalizes the relative losses of the radio links to be unity gain at each output port.

UNCOMPensated does not normalize power at each port; when a radio link is disabled, the output port is lower than if all links going into that port are enabled.

| ID | Range | *RST | Resolution |
|----------|-----------------------|--------|------------|
| (string) | NORMal, UNCOMPensated | NORMal | - |

2.2.35. [SYSTem]:CONnection:IPCAL:PORTS

Configures or queries the ports over which to perform the input phase calibration.

Reset to all input ports on connection setup change.

Takes a list of ports, such as A1,A2,A3,A4. No space separations are allowed.

There must be at least 2 ports in each group.

| ID | Range | *RST | Resolution |
|---------------|---------------|------|------------|
| (string list) | List of ports | | |

2.2.36. [SYSTem]:CONnection:IPCAL:BEGin

Begins an Input Phase Calibration operation.

2.2.37. [SYSTem]:CONnection:IPCAL:STATus?

Query the status of the Input Phase Calibration operation.

Possible return values:

Idle: User has not requested an input phase calibration since this connection setup was loaded.

In Progress: Input phase calibration is currently in progress.

Completed: User has successfully calibrated input ports since this connection setup was loaded. The user may have changed the phases after the calibration.

Failed: The last calibration since this connection setup loaded has failed. This could be because the measured input power is > 20 dBm below the set input power, or for other reasons.

Aborted: The last calibration since this connection setup was loaded was aborted by the user.

2.2.38. [SYSTem]:CONnection:IPCAL:ABORT

Cancels the in-progress Input Phase Calibration operation.

2.2.39. [SYSTem]:RLINK:{AB,BA}##:[STATe]?

Set and query the state of a radio link.

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |
| (bool) | ON, OFF | ON | - |

2.2.40. [SYSTem]:RLINK:{AB,BA}##:CONNected?

Query whether a particular Radio Link is connected in the current connection setup.

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |

This is a read-only parameter that returns information about the connection setup, not the configurable Radio Link enable state.

Returns a bool {ON, OFF} to indicate whether the radio link is connected in the current connection setup.

2.2.41. [SYSTem]:RLINK:{AB,BA}##:CHMindex?

Query the index (1-based) of the channel model mapped to this radio link.

Vertex >CON:LIB DUAL_2X2_UNI

Vertex >RLINK:AB33:CHM?

2

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |

2.2.42. [SYSTem]:RLINK:{AB,BA}##:PHase?

Set digital phase of the radio link.

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |
| (real) | -180.0 to 180.0 | 0 | 0.1 |

2.2.43. [SYSTem]:RLINK:{AB,BA}##:RELPower?

Set the relative power of this radio link between the MIMO sub-channels.

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |
| (real) | -40 to 40 (dB) | 0 | 0.01 |

2.2.44. [SYSTem]:RLINK:{AB,BA}##:ABSPower?

Query the absolute power of this radio link.

| ID | Range | *RST | Resolution |
|------------|---|-----------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK: AB23:...) | | |
| (real) | | 0.1 (dBm) | |

2.2.45. [SYSTem]:RLINK:LOAD Filename

Load a phase or phase+loss matrix table file (.csv).

| ID | Range | *RST | Resolution |
|----------|------------------------------|------|------------|
| (string) | Full valid path\filename.csv | | - |

Example: [SYSTem]:RLINK:LOAD C:\PhaseFile\PhaseMatrixTableFile.csv

2.2.46. [SYSTem]:RLINK:{AB,BA}##:PHase

Vectorized command to set digital phase of the radio link.

| ID | Range | *RST | Resolution |
|------------|--|------|------------|
| (int)(int) | A index B index (e.g. A2-B3 is RLINK:AB23:...) | | |
| (real) | -180.0 to 180.0 | 0 | 0.1 |

2.2.47. [SYSTem]:RLINKENA

Enable or disable all radio links.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (bool) | False, True | True | - |

Example: To enable all radio links, enter RLINKENable true.

Example: To disable all radio links, enter RLINKENable false.

2.2.48. [SYSTem]:PORT:ANUMports?

Query the number of available ports on a particular side (A or B) of the connection setup.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.49. [SYSTem]:PORT:BNUMports?

Query the number of available ports on a particular side (A or B) of the connection setup.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.50. [SYSTem]:PORT:AWGNAUToset

Initiate an AWGN Autoset operation on all output ports.

2.2.51. [SYSTem]:PORT:{A,B}#:MODE?

Query the duplex mode of this port. Query will return INPUT, OUTPUT, BOTH, or BOTH_EXT.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.52. [SYSTem]:PORT:{A,B}#:GROUP?

Query the Port Grouping in the current connection setup. The returned string will be a list, for example, "A1,A2,A3,A4", by which all ports are connected by radio links. This grouping is used for setting parameters that apply to a group as linked in the GUI, such as Carrier Frequency, or Input Tracking parameters.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.53. [SYSTem]:PORT:{A,B}#:INPut?

Set or query expected input power level.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -50 to 15 (dBm)* | -10 | 0.01 |

**The actual range will vary based on the state of other system parameters including frequency and bidirectional connection setup*

2.2.54. [SYSTem]:PORT:{A,B}#:OUTPut?

Set the Output Level of the specified port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -110 to -20* (dBm)* | -60 | 0.01 |

**The actual range will vary based on the state of other system parameters including frequency and bidirectional connection setup*

2.2.55. [SYSTem]:PORT:{A,B}#:LOSS?

Set or query the channel loss of the specified port (applicable when Loss Mode set to SET_LOSS).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0 to 130* (dB)* | 40 | 0.1 |

**The actual range will vary based on the state of other system parameters including frequency and bidirectional connection setup*

2.2.56. [SYSTem]:PORT:{A,B}#:DIGLoss?

Set or Query digital loss set for specified port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0 to 40 (dB) | 0 | 0.1 |

2.2.57. [SYSTem]:PORT:{A,B}#:RFOUT?

Set the enable state of the Output Port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (bool) | OFF, ON | ON | - |

2.2.58. [SYSTem]:PORT:{A,B}#:INPPHase?

Set and query the RF Port Input Phase Offset.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -360.0 to 360.0 | 0 | 0.1 |

2.2.59. [SYSTem]:PORT:{A,B}#:OUTPPHase?

Set and query the RF Port Output Phase Offset.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -360.0 to 360.0 | 0 | 0.1 |

2.2.60. [SYSTem]:PORT:{A,B}#:INPDelay?

Set and query the fine delay offset on the input ports necessary for phase calibration.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0 to 50 (ns) | 0 | 0.1 ns |

2.2.61. [SYSTem]:PORT:{A,B}#:OUTPDelay?

Set and query the fine delay offset on the output ports necessary for phase calibration.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0 to 50 (ns) | 0 | 0.1 ns |

2.2.62. [SYSTem]:PORT:{A,B}#:INFREQuency?

Set and query frequency of the channel input.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 30 to 5925 | 900 | 0.001 |

Input and Output frequencies of other ports that are connected via MIMO links will be configured as well.

2.2.63. [SYSTem]:PORT:{A,B}#:OUTFREQuency?

Query the frequency of the output port (Query Only).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 30 to 5925 | 900 | 0.001 |

2.2.64. [SYSTem]:PORT:{A,B}#:INBWMax?

NOTE:

When a 4GHz RF module is installed, the Max BW is fixed at 40MHz. When a 6GHz RF module is installed, the Max BW can be set to the values listed in the table.

Set or query the maximum input bandwidth setting of the specified port.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | 40,100, 200 | 40 | - |

2.2.65. [SYSTem]:PORT:{A,B}#:CFACTOR?

Set and query the Crest Factor for a particular port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 15 to 25 (dB) | 15 | 0.1 |

2.2.66. [SYSTem]:PORT:{A,B}#:ICBLloss?

Set and Query the value representing the Cable Loss leading into the input for a particular port from a connected device.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -50 to 70 (dB) | 0 | 0.1 |

2.2.67. [SYSTem]:PORT:{A,B}#:OCBLloss?

Set and Query the value representing the Cable Loss from the output port of the Vertex to the connected device.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -50 to 70 (dB) | 0 | 0.1 |

2.2.68. [SYSTem]:PORT:{A,B}#:OVERload?

Query the overload state of the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

Off(0): No overload since last cleared.

On(1): Overload has occurred since last cleared.

2.2.69. [SYSTem]:PORT:{A,B}#:CLROVerload

Clear the Overload Indicator for the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.70. [SYSTem]:PORT:{A,B}#:INSTIndex?

Query the instrument mapped to the specified logical port.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.71. [SYSTem]:PORT:{A,B}#:PHYSName?

Query the physical port mapped to the specified logical port. This returns an integer of 1-16 mapping to the port number on the front panel of the Vertex.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

The PHYSName query is dependent on the current connection setup.

The returned value will be an integer representing the Port Number on the Vertex. For example, Port 1 will return "1".

2.2.72. [SYSTem]:PORT:{A,B}#:BAUToset

Begin the Autoset for the specified input port.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.73. [SYSTem]:PORT:{A,B}#:AABort

Abort the Autoset for the specified input port.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.74. [SYSTem]:PORT:{A,B}#:ASTatus?

Query the Autaset status for the specified port.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

Possible responses:

“Failed” - Failed to Autaset.

“Idle” - Autaset process has not yet been initiated.

“Aborted” - Autaset Aborted.

“Complete” - Autaset completed successfully.

“InProgress” - Autaset in progress.

“Averaging” - Autaset in Progress – Averaging.

“Ranging” - Autaset in Progress – Ranging.

“WaitingForTrigger” - Autaset in Progress – No triggers yet received.

2.2.75. [SYSTem]:PORT:{A,B}#:INTERferer:PORTAUToset

Initiates an AWGN Autaset operation on the specified port.

2.2.76. [SYSTem]:PORT:{A,B}#:INTERferer:[MODE]?

Set the Interferer Mode for the specified port.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | OFF, ON | OFF | - |

2.2.77. [SYSTem]:PORT:{A,B}#:INTERferer:UNITS?

Specify the Units in which AWGN will be specified on a given port.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | CTON, EBNO, NOISE | CTON | - |

2.2.78. [SYSTem]:PORT:{A,B}#:INTerferer:CTON?

Set the C/N ratio for the specified port. The corresponding query returns the set C/N ratio (in dB).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -30 to 32 (dB)* | 0 | 0.1 |

*The actual range will vary based on the state of other system parameters.

2.2.79. [SYSTem]:PORT:{A,B}#:INTerferer:EBNO?

Set the Eb/No ratio for the specified port. The corresponding query returns the set Eb/No ratio (in dB).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -4 to 58 (dB)* | 26 | 0.1 |

*The actual range will vary based on the state of other system parameters.

2.2.80. [SYSTem]:PORT:{A,B}#:INTerferer:NOISElevel?

Set the Noise Level for the specified port. The corresponding query returns the set Noise level (in dBm).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -140 to -20 (dBm)* | -60 | 0.1 |

*The actual range will vary based on the state of other system parameters.

2.2.81. [SYSTem]:PORT:{A,B}#:INTerferer:BITRate?

Set the Interferer Bit Rate of the specified channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0.1 to 100000 (kbps) | 9.6 | 0.001 |

2.2.82. [SYSTem]:PORT:{A,B}#:INTerferer:NBWidth?

Set the Interferer Bandwidth for the specified channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 1.5625, 3.125, 6.25, 12.5, 25, 50 (MHz) | 12.5 | - |

2.2.83. [SYSTem]:PORT:{A,B}#:INTerferer:RBWidth?

Set the Receiver Bandwidth for the specified channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0.1 to 100 (MHz) | 10 | 0.001 |

2.2.84. [SYSTem]:PORT:{A,B}#:INTerferer:AWGNAUTOCal?

Set or query AWGN auto-calibration settings for the specified port.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | OFF, ON | OFF | - |

2.2.85. [SYSTem]:PORT:{A,B}#:MEASure:CTON?

Query the measured C/N ratio (in dB) for the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.86. [SYSTem]:PORT:{A,B}#:MEASure:EBNO?

Query the measured Eb/No ratio (in dB) for the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.87. [SYSTem]:PORT:{A,B}#:MEASure:TTHReshold?

Set the Input Trigger Threshold for the power meter of a specified channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -50 to 0 (dBm) | -30 | 0.1 |

2.2.88. [SYSTem]:PORT:{A,B}#:MEASure:IAVGexp?

Set the number of Input averages for power meter of the specified channel. Averages will be 2^N (real).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 1 to 26 | 4 | 1 |

2.2.89. [SYSTem]:PORT:{A,B}#:MEASure:OAVGexp?

Set the number of Output averages for power meter of the specified channel. Averages will be 2^N (real).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 1 to 10 | 4 | 1 |

2.2.90. [SYSTem]:PORT:{A,B}#:MEASure:ILEVel?

Query the measured input level for the specified channel (in dBm).

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.91. [SYSTem]:PORT:{A,B}#:MEASure:OLEVel?

Query the measured output level for the specified channel (in dBm).

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |

2.2.92. [SYSTem]:PORT:{A,B}#:MEASure:ITYPE?

Set the Input Measurement type for the power meter of the specified channel.

| ID | Range | *RST | Resolution |
|----------|--|-----------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | CONTinuous, TRIGgered | TRIGgered | - |

2.2.93. [SYSTem]:PORT:{A,B}#:MEASure:TMODe?

Query or set the Input Trigger Threshold Mode as Absolute (Trigger Threshold is an absolute value in dBm) or Relative (Trigger Threshold is relative to the Set Input Power in dB).

| ID | Range | *RST | Resolution |
|----------|--|----------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | ABSolute, RELative | RELative | - |

2.2.94. [SYSTem]:PORT:{A,B}#:MEASure:OTYPE?

Set the Output Measurement type for the power meter of the specified channel.

| ID | Range | *RST | Resolution |
|----------|--|------------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | MEASured, CALCulated | CALCulated | - |

2.2.95. [SYSTem]:PORT:{A,B}#:MEASure:NOISElevel?

Query the Noise Level of the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|-------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (int) | Noise level | -60.0 | - |

2.2.96. [SYSTem]:PORT:{A,B}#:ITRACking:[MODE]?

Configure or query the Input Tracking Mode.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | OFF, AUTO, PREDicted | OFF | - |

2.2.97. [SYSTem]:PORT:{A,B}#:ITRACking:[AUTO]:PERiod?

Configure or query the Automatic Input Tracking minimum measurement period.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0.5 to 5 (seconds) | 1 | 0.1 |

2.2.98. [SYSTem]:PORT:{A,B}#:ITRACking:[AUTO]:RESolution?

Configure or query the Automatic Input Tracking resolution, which is the range over which the input level will not be adjusted.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 0.1 to 5 (dB) | 2 | 0.1 |

2.2.99. [SYSTem]:PORT:{A,B}#:ITRACking:[AUTO]:STEP?

Configure or query the Automatic Input Tracking maximum step size, which is the biggest step by which the input power can be changed to match the measured value.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | 1 to 10 (dB) | 5 | 0.1 |

2.2.100. [SYSTem]:PORT:{A,B}#:ENHFILter? (Future available)

NOTE:

Reserved for future support in Vertex.

Set or query the enhanced digital filter setting of the specified port.

NOTE:

Requires Enhanced Digital Filters option and firmware upgrade.

| ID | Range | *RST | Resolution |
|----------|---|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (string) | NONE, LTE20, LTE15, LTE10, LTE5, LTE3, SCDMA1.6, LTE1.4, CDMA1.25, WCDMA5 | NONE | - |

2.2.101. [SYSTem]:PORT:{A,B}#[CHANnel#]:INPPHase?

Set or query the input port phase of a sub-channel in an RF port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -360.0 to 360.0 | 0 | 0.1 |

It is only used when Vertex works in >200MHz bandwidth mode.

In 400MHz bandwidth mode, there will be 2 sub-channels, so the CHANnel# range is {1,2}.

2.2.102. [SYSTem]:PORT:{A,B}#[CHANnel#]:OUTPPHase?

Set or query the output port phase of a sub-channel in an RF port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -360.0 to 360.0 | 0 | 0.1 |

It is only used when Vertex works in >200MHz bandwidth mode.

In 400MHz bandwidth mode, there will be 2 sub-channels, so the CHANnel# range is {1,2}.

2.2.103. [SYSTem]:PORT:{A,B}#[CHANnel#]:INPDelay?

Set or query the input port delay of a sub-channel in an RF port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -0 to 50ns | 0 | 0.1 |

It is only used when Vertex works in >200MHz bandwidth mode.

In 400MHz bandwidth mode, there will be 2 sub-channels, so the CHANnel# range is {1,2}.

2.2.104. [SYSTem]:PORT:{A,B}#[CHANnel#]:OUTPDelay?

Set or query the output port delay of a sub-channel in an RF port.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Ports on this side of Connection Setup | | |
| (real) | -0 to 50ns | 0 | 0.1 |

It is only used when Vertex works in >200MHz bandwidth mode.

In 400MHz bandwidth mode, there will be 2 sub-channels, so the CHANnel# range is {1,2}.

2.2.105. [SYSTem]:PORT:{A,B}#:FSHift:[VALue]?

Set or query the frequency shift value of an RF port.

| ID | Range | *RST | Resolution |
|-------|---------------------|------|------------|
| (int) | -2000000 to 2000000 | 0 | 1 |

2.2.106. [SYSTem]:PORTPHase:SAVE

Save port phase setting to the folder of "D:\FTPROOT\Spirent\PortPhase\"

Example : SYST:PORTPH:SAVE abc.txt

The folder location can not be changed.

2.2.107. [SYSTem]:PORTPHase:LOAD

Load port phase setting from the folder **D:\FTPROOT\Spirent\PortPhase**.

Example : SYST:PORTPH:LOAD abc.txt

The folder location cannot be changed.

2.2.108. [SYSTem]:CHM#:BYPass?

Enable or disable the Bypass mode of the specified channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (bool) | OFF, ON | OFF | - |

2.2.109. [SYSTem]:CHM#:BYPTYPE?

Set or query the Bypass Type configured for the given channel model.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (string) | SISO, BUTLER | SISO | - |

2.2.110. [SYSTem]:CHM#:BYPAB?

Set or query the application of Bypass in the A-->B Direction.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (bool) | OFF, ON | OFF | - |

2.2.111. [SYSTem]:CHM#:BYPBA?

Set or Query the application of Bypass in the B-->A Direction.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (bool) | OFF, ON | OFF | - |

2.2.112. [SYSTem]:CHM#:STATPHA?

Set or Query the Static Channel Phase Mode per Channel Model index.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (enum) | ZERO, BUTLER, BUTLER_UL | ZERO | - |

2.2.113. [SYSTem]:CHM#:CORRelation:LIBary?

Select and Apply correlation matrix from the correlation library.

| ID | Range | *RST | Resolution |
|----------|--|--------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (string) | Valid Library Entry | Uncorrelated | - |

2.2.114. [SYSTem]:CHM#:CORRelation:LIBAvaliable?

Query available correlation matrices in the library.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |

Only correlation library entries applicable to the current Connection Setup display.

2.2.115. [SYSTem]:CHM#:CORRelation:MATRix:[ALLpaths]

Sets the channel correlation parameters for all paths in the system.

| ID | Range | *RST | Resolution |
|-------------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (real list) | Valid Corr Mtx | | |

NOTE:

Only the lower-left triangle of the matrix (as shown in the GUI) needs to be sent. So, in the case of MIMO 2x2, the lower-left of the 4x4 correlation matrix needs to be set.

All paths example:

For the all paths command, you need to specify 12 values and all 24 path correlations get set to the same 12 values. For example:

```
Vertex>chm1:corr:matr 0.9,0,0.3,0,0.27,0,0.27,0,0.3,0,0.9,0
```

```
Vertex>err?
```

```
0, No Error
```

```
Vertex>
```

You can verify the *Correlation* window and check all the paths in the path pull-down list that all the matrices are set the same.



Figure 1. Path Correlation.

2.2.116. [SYSTem]:CHM#:CORRelation:MATRix:PATH#:[VALue]?

Sets the channel correlation parameters for a given path in the system.

| ID | Range | *RST | Resolution |
|-------------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real list) | Valid Corr Mtx | | |

NOTE:

Only the lower-left triangle of the matrix (as shown in the GUI) needs to be sent, so, in the case of MIMO 2x2, the lower-left of the 4x4 correlation matrix needs to be set.

Single path example:

Set the MIMO 2x2 matrix (a 4x4 matrix) and query it back:

```
Vertex>chm1:corr:matr:path1 0.9,0,0.9,0,0.81,0,0.81,0,0.9,0,0.9,0
```

```
Vertex>err?
```

```
0, No Error
```

```
Vertex>chm1:corr:matr:path1?
```

```
0.9,0,0.9,0,0.81,0,0.81,0,0.9,0,0.9,0
```

```
Vertex>
```

| | h11 | h21 | h12 | h22 |
|-----|------------------|------------------|------------------|------------------|
| h11 | 1.0000 + 0.0000j | 0.9000 + 0.0000j | 0.9000 + 0.0000j | 0.8100 + 0.0000j |
| h21 | 0.9000 + 0.0000j | 1.0000 + 0.0000j | 0.8100 + 0.0000j | 0.9000 + 0.0000j |
| h12 | 0.9000 + 0.0000j | 0.8100 + 0.0000j | 1.0000 + 0.0000j | 0.9000 + 0.0000j |
| h22 | 0.8100 + 0.0000j | 0.9000 + 0.0000j | 0.9000 + 0.0000j | 1.0000 + 0.0000j |

Figure 2. Verifying the Correlation.

NOTE:

The command format, explicitly, is 12 comma separated values (for this 2x2 example), I's and Q's alternating as follows:

```
chm1:corr:matr:path1 h11-h21-I, h11-h21-Q, h11-h12-I, h11-h12-Q, h21-h12-I,
h21-h12-Q, h11-h22-I, h11-h22-Q, h21-h22-I, h21-h22-Q, h12-h22-I, h12-h22-Q
```

2.2.117. [SYSTem]:CHM#:CORRelation:MATRix:SIZE?

Queries the size of the correlation matrix.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | Size of the Correlation Matrix | | |

NOTE:

The count of the elements in the lower-left triangle of the matrix (as shown in the GUI) is returned. .

2.2.118. [SYSTem]:CHM#:RLINKS?

Query available correlation matrices in the library.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (string) | List of Radio Links | | |

The output is a comma-separated list of radio links. For example, for MIMO 2X2:

Vertex>chm1:rlinks?

A1->B1,A1->B2,A2->B1,A2->B2

2.2.119. [SYSTem]:CHM#:[PROP]:LIBrary?

Set propagation conditions from the propagation conditions library for the specified channel model index.

| ID | Range | *RST | Resolution |
|----------|--|---------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (string) | Valid Library Entry | Default | - |

2.2.120. [SYSTem]:CHM#:[PROP]:LIBAVail?

Query available propagation conditions in the library.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |

The list of available propagation conditions library entries is filtered according to Fading Mode in the system.

2.2.121. [SYSTem]:CHM#:[PROP]:NUMPaths?

Query the number of paths in the specified channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 24 | 24 | 1 |

2.2.122. [SYSTem]:CHM#:[PROP]:BDEath:DBINs?

Set the Birth Death Delay Bins for the given channel.

| ID | Range | *RST | Resolution |
|-------------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (real list) | R1, R2, ... , R64 in 0 to 100 (μs) | 0 | 0.0001 |

2.2.123. [SYSTem]:CHM#:[PROP]:BDEath:NUMBins?

Query the number of active Birth Death delay bins for the given channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 64 | 11 | 1 |

2.2.124. [SYSTem]:CHM#:[PROP]:BDEath:SDURation?

Set or query the Birth Death state duration for the given channel.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (real) | 0.001 to 60 (s) | 0.001 | 0.001 |

2.2.125. [SYSTem]:CHM#:[PROP]:DIRection?

Set and query the intended Direction of the channel model mapping. This parameter is specifically used in GCM fading mode when using a UniDirectional Connection Setup with external circulators. Appropriately differentiating the channel model mappings as Downlink or Uplink guarantees the reciprocity of the BiDirectional MIMO channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (enum) | DOWNLINK, UPLINK | | |

2.2.126. [SYSTem]:CHM#:[PROP]:BULKdelay:[VALue]?

Set and query the bulk delay for all the paths in a Channel Model Propagation Conditions. The max is dependent on the selected delay mode.

Normal delay mode = 4000 MAX
 Extended delay mode = 2000000 for 40MHz BW mode MAX
 1000000 for all other BW modes MAX

| ID | Range (Normal/Extended Delay Mode) | *RST | Resolution |
|--------|--|----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (real) | 6.5 to 4000 (μs)/2000000(40MHz) and 1000000(other BW) (μs) | 6.5 (μs) | |

2.2.127. [SYSTem]:CHM#:[PROP]:BULKdelay:STATe?

Set or query the enable state of bulk delay.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (bool) | ON, OFF | OFF | |

2.2.128. [SYSTem]:CHM#:[PROP]:GCM:PATH#:AOA?

Set or query the mean Angle of Arrival for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -180 to 180 (deg) | 0 | 0.0001 |

2.2.129. [SYSTem]:CHM#:[PROP]:GCM:PATH#:AOD?

Set or query the mean Angle of Departure for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -180 to 180 (deg) | 0 | 0.0001 |

2.2.130. [SYSTem]:CHM#:[PROP]:GCM:PATH#:BSAS?

Set or query the BS Angle Spread for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 1 to 75 (deg) | 2 | 0.0001 |

2.2.131. [SYSTem]:CHM#:[PROP]:GCM:PATH#:BSPAS?

Set or query the BS Power Azimuth Spectrum for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (enum) | LAPLacian, GAUSSian, UNIFORM | LAPL | - |

2.2.132. [SYSTem]:CHM#:[PROP]:GCM:PATH#:DElay:[VALue]?

Set or query the fixed delay for the given path. The max is dependent on selected mode.

Normal delay mode = 100 MAX

Extended delay mode = 350 MAX

| ID | Range (Normal/Extended Delay Mode) | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 0 to 100 (μs)/350 (μs) | 0 | 0.0001 |

2.2.133. [SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:AOA?

Set or query the Angle of Arrival of the LoS component for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -180 to 180 (deg) | 0 | 0.01 |

2.2.134. [SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:AOD?

Set or query the Angle of Departure of the LoS component for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -180 to 180 (deg) | 0 | 0.01 |

2.2.135. [SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:DOPPler?

Query the LoS doppler for the given path. Returns a real value that is the calculated Doppler frequency of the LoS component in Hz.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |

2.2.136. [SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:KFACTOR?

Set or query the K Factor of the LoS component for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -30 to 30 (dB) | | 0.1 |

2.2.137. [SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:[STATe]?

Set or query the state of LoS component for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (bool) | OFF, ON | OFF | - |

2.2.138. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#:EXCDelay?

Set or query the Excess Delay for the given MidPath of the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 0 to 0.2 | 0 | 0.0001 |

2.2.139. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#:NUMScatterers?

Query the number of scatterers for the given MidPath of the given path.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (int) | 1 to 4 | | |

2.2.140. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#:RELPower?

Query the Relative Power for the given MidPath of the given path. Returns a real value.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (int) | 1 to 4 | | |

2.2.141. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPATHS:[STATe]?

Set or query the state of MidPaths for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (bool) | OFF, ON | OFF | - |

2.2.142. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MODulation?

Set or query the Modulation type for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (enum) | NONE, RAYLeigh | NONE | - |

2.2.143. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MSAS?

Set or query the MS Angle Spread for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 1 to 75 (deg) | 35 | 0.0001 |

2.2.144. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MSDirection?

Set the angle of MS velocity with respect to the MS broadside for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | -180 to 180 | 0 | 0.01 |

2.2.145. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MSPAS?

Set or query the MS Power Azimuth Spectrum for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | LAPLacian, GAUSSian, UNIFORM | LAPL | - |

2.2.146. [SYSTem]:CHM#:[PROP]:GCM:PATH#:MSVelocity?

Set or query the MS Velocity for the given path.

| ID | Range | *RST | Resolution |
|--------|---|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | Range depends upon set Center frequency* (km/h) | 10 | 0.01 |

*The corresponding Doppler frequency not exceeding 4000 Hz.

2.2.147. [SYSTem]:CHM#:[PROP]:GCM:PATH#:NUMMidpaths?

Set or query the number of MidPaths for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 3, 4 | 3 | 1 |

2.2.148. [SYSTem]:CHM#:[PROP]:GCM:PATH#:NUMScatterers?

Query the number of scatterers for the given path.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |

2.2.149. [SYSTem]:CHM#:[PROP]:GCM:PATH#:RPLoss?

Set or query the Relative Path Loss for the given path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | |
| (real) | 0 to 32 (dB) | 0 | 0.1 |

2.2.150. [SYSTem]:CHM#:[PROP]:GCM3D:XPR?

Set or query the XPR value of 3DGCM model.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 0 to 200 | 9dB | 0.1 |

2.2.151. [SYSTem]:CHM#:[PROP]:GCM3D:MSVUNITs

Set or query the mobile station (MS) velocity units.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | MPS, KPH, MPH | MPS | |

MPS means meters per second.

KPH means kilometers per hour.

MPH means miles per hour.

2.2.152. [SYSTem]:CHM#:[PROP]:GCM3D:MSVelocity

Set or query the velocity of the mobile station (MS).

| ID | Range | *RST | Resolution |
|----------|---|------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | For MPS: 0 to 500 For KPH: 0 to 1800 For MPH: 0 to 118.47 | 20 for MPS | 0.1 |

2.2.153. [SYSTem]:CHM#:[PROP]:GCM3D:PHIDOT

Set or query the Phi DOT angle.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 120 | 0.1 |

2.2.154. [SYSTem]:CHM#:[PROP]:GCM3D:THETADOT

Set or query the Theta DOT angle.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 90 | 0.1 |

2.2.155. [SYSTem]:CHM#:[PROP]:GCM3D:LOS:[STATe]?

Set or query the LOS state.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | ON, OFF | OFF | |

2.2.156. [SYSTem]:CHM#:[PROP]:GCM3D:LOS:KFACMethod?

Set or query the method to calculate the K factor of the LOS path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | AP, P1O, RP | AP | |

AP means All paths.

P1O means Path1 only.

RP means Ray power.

2.2.157. [SYSTem]:CHM#:[PROP]:GCM3D:LOS:KFACTOR?

Set or query the K factor.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -100 to 100 | 9 | 0.1 |

2.2.158. [SYSTem]:CHM#:[PROP]:GCM3D:LOS:RPLOS?

Set or query the Ray power LOS.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -100 to 0 | -0.3 | 0.1 |

2.2.159. [SYSTem]:CHM#:[PROP]:GCM3D:LOS:RPNLOS?

Set or query the Ray power NLOS.

| ID | Range | *RST | Resolution |
|----------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -100 to 0 | -24.7 | 0.1 |

2.2.160. [SYSTem]:CHM#:[PROP]:GCM3D:MODEL?

Set or query the modeling type.

| ID | Range | *RST | Resolution |
|----------|--|--------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | 36.873, 38.901 | 36.873 | |

2.2.161. [SYSTem]:CHM#:[PROP]:GCM3D:PAS?

Set or query the power angle spectrum.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | LAP | LAP | |

LAP means Laplacian.

2.2.162. [SYSTem]:CHM#:[PROP]:GCM3D:ZEROLOSPHase?

Set or query the zero LOS phase.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (bool) | True, False | False | |

2.2.163. [SYSTem]:CHM#:[PROP]:GCM3D: STREETWidth

Set or query the street width.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 5 to 50 | 20 | 0.1 |

The unit is meters.

2.2.164. [SYSTem]:CHM#:[PROP]:GCM3D: BUILDHeight

Set or query the average building height.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 5 to 50 | 20 | 0.1 |

The unit is meters.

2.2.165. [SYSTem]:CHM#:[PROP]:GCM3D: DIMension

Set or query the type of dimension.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | 2D, 3D | 3D | |

2.2.166. [SYSTem]:CHM#:[PROP]:GCM3D:USEPOLPHasefile

Set or query whether to use polarity phase file.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (bool) | True, False | False | |

2.2.167. [SYSTem]:CHM#:[PROP]:GCM3D:POLPHasefile

Load polarity phase file.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | "File path and name" | " " | |

2.2.168. [SYSTem]:CHM#:[PROP]:GCM3D:SPASSIGNment

Set the sub-path assignment type.

| ID | Range | *RST | Resolution |
|----------|--|--------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | RANDom, READfile, LINear | RANDom | |

2.2.169. [SYSTem]:CHM#:[PROP]:GCM3D:SPASSIGNFILE

Load sub-patch assignment file.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | "File folder and name" | " " | |

2.2.170. [SYSTem]:CHM#:[PROP]:GCM3D:USESPANGlesfile

Set whether to use sub-path angles file.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (bool) | True, False | False | |

2.2.171. [SYSTem]:CHM#:[PROP]:GCM3D:SPANGlesfile

Load the sub-path angles file.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | "File folder and name" | " " | |

2.2.172. [SYSTem]:CHM#:[PROP]:GCM3D:USEMPMAPfile

Set whether to use mid-path mapping file.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (bool) | True, False | False | |

2.2.173. [SYSTem]:CHM#:[PROP]:GCM3D:MPMAPfile

Load the mid-path mapping file.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | "File folder and name" | " " | |

2.2.174. [SYSTem]:CHM#:[PROP]:GCM3D:CLUSTDSpread

Set or query the cluster delay spread.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 0.0 to 300.0 | 3.9 | 0.1 |

Unit is ns.

2.2.175. [SYSTem]:CHM#:[PROP]:GCM3D:DIST3D

Set or query the distance of 3D.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 0.0 to 300.0 | 100 | 0.1 |

Unit is meters.

2.2.176. [SYSTem]:CHM#:[PROP]:GCM3D:DSScaling

Set delay spread scaling.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (string) | ON, OFF | OFF | |

2.2.177. [SYSTem]:CHM#:[PROP]:GCM3D:DSDESired

Set or query desired delay spread.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | 0.0 to 4000.0 | 100 | 0.1 |

Unit is ns.

2.2.178. [SYSTem]:CHM#:[PROP]:GCM3D:ASADESired

Set or query desired ASA.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -1 to 180 | -1 | 0.1 |

Unit is degrees.

2.2.179. [SYSTem]:CHM#:[PROP]:GCM3D:ASDDESired

Set or query desired ASD.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -1 to 180 | -1 | 0.1 |

Unit is degrees.

2.2.180. [SYSTem]:CHM#:[PROP]:GCM3D:ZSADESired

Set or query desired ZSA.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -1 to 180 | -1 | 0.1 |

Unit is degrees.

2.2.181. [SYSTem]:CHM#:[PROP]:GCM3D:ZSDDESired

Set or query desired ZSD.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -1 to 180 | -1 | 0.1 |

Unit is degrees.

2.2.182. [SYSTem]:CHM#:[PROP]:GCM3D:AOAOffset

Set or query AOA offset.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.183. [SYSTem]:CHM#:[PROP]:GCM3D:ASDOFFset

Set or query AOD offset.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.184. [SYSTem]:CHM#:[PROP]:GCM3D:ZOAOFFset

Set or query ZOA offset.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.185. [SYSTem]:CHM#:[PROP]:GCM3D:ZODOFFset

Set or query ZOD offset.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.186. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:STATe

Set or query the path state.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (string) | ON, OFF | OFF | |

The default state of Path 1 is ON.

2.2.187. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:DELay:[VALue]

Set or query the delay value a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | 0.0 to 99.0 | 0.0 | 0.1 |

Unit is μ s.

2.2.188. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:RPLoss

Set or query the relative path loss of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | 0.0 to 32 | 0.0 | 0.1 |

Unit is dB.

2.2.189. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPATHS:[STATe]

Set or query mid-path state.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (string) | ON, OFF | OFF | |

2.2.190. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:NUMMidpaths?

Query the number of mid-path.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (int) | Read only | 3 | |

2.2.191. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#:NUMScatters

Query the number of sinusoids per mid-path.

| ID | Range | *RST | Resolution |
|----------|--|--------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (int) | 1 to 3 | 1 | 1 |
| (string) | Read only | (50, 30, 20) | |

2.2.192. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#:RELPower

Query the relative power per mid-path.

| ID | Range | *RST | Resolution |
|----------|--|-----------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (int) | 1 to 3 | 1 | 1 |
| (string) | Read only | (0.5, 0.3, 0.2) | |

Unit is dB.

2.2.193. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#:EXCDelay

Query the excess delay per mid-path.

| ID | Range | *RST | Resolution |
|----------|--|--------------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (int) | 1 to 3 | 1 | 1 |
| (string) | Read only | (0.0, 0.005, 0.01) | |

Unit is μ s.

2.2.194. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:AOA

Set or query AOA of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.195. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:AOD

Set or query AOD of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 0 | 0.1 |

Unit is degrees.

2.2.196. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ASA

Set or query ASA of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 35 | 0.1 |

Unit is degrees.

2.2.197. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ASD

Set or query ASD of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 5.0 | 0.1 |

Unit is degrees.

2.2.198. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZOA

Set or query ZOA of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 90.0 | 0.1 |

Unit is degrees.

2.2.199. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZOD

Set or query ZOD of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 90.0 | 0.1 |

Unit is degrees.

2.2.200. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZSA

Set or query ZSA of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 0.0 | 0.1 |

Unit is degrees.

2.2.201. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZSD

Set or query ZSD of a path.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1 to 24 | 1 | 1 |
| (double) | -180 to 180 | 0.0 | 0.1 |

Unit is degrees.

2.2.202. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:PATternfile#

Load Antenna pattern file.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (int) | 1 to # of antenna | 1 | 1 |
| (string) | "File path and name" | " " | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.203. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCX

Set or query location of X value.

| ID | Range | *RST | Resolution |
|----------|--|----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | -10000.0 to 10000.0 | 0 or 850 | 0.1 |

Unit is meters.

ANT1 means base station (BS). Default location X value is 0.

ANT2 means mobile station (MS). Default location X value is 850.

2.2.204. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCY

Set or query location of Y value.

| ID | Range | *RST | Resolution |
|----------|--|----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | -10000.0 to 10000.0 | 0 or 500 | 0.1 |

Unit is meters.

ANT1 means base station (BS). Default location Y value is 0.

ANT2 means mobile station (MS). Default location Y value is 500.

2.2.205. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCZ

Set or query location of Z value.

| ID | Range | *RST | Resolution |
|----------|--|-----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 1.0 to 10000.0 | 10 or 1.5 | 0.1 |

Unit is meters.

ANT1 means base station (BS). Default location Z value is 10.

ANT2 means mobile station (MS). Default location Z value is 1.5.

2.2.206. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:THETATilt

Set or query Theta Tilt value.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 180.0 | 90.0 | 0.1 |

Unit is degrees.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.207. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:THETADTilt

Set or query Theta downTilt value.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | -90.0 to 90.0 | 0.0 | 0.1 |

Unit is degrees.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.208. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:PHIROtation

Set or query Phi rotation value.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | -180.0 to 180.0 | 0.0 | 0.1 |

Unit is degrees.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.209. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:ANTLOCations

Set or query antenna locations.

| ID | Range | *RST | Resolution |
|----------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | ARbitrary, ARRay | ARRay | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.210. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:ENABSECSlant

Set the second slant of antenna.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | True | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.211. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:POLVECTor#

Set or query polarization vector.

| ID | Range | *RST | Resolution |
|----------|--|-----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | -180.0 to 180.0 | 45 or -45 | 0.1 |

Unit is degrees.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.212. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:NROWS

Set or query the number of antenna rows.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (int) | 1 to 16 | 1 | 1 |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.213. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:NCOLs

Set or query the number of antenna columns.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (int) | 1 to 16 | 1 | 1 |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.214. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:DISTUNITs

Set or query the unit of antenna distance.

| ID | Range | *RST | Resolution |
|----------|--|--------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | LAMbda, METer | LAMbda | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.215. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:DISTY

Set or query distance between antennas at Y axial.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 1000.0 | 0.5 | 0.1 |

Unit is lambda or meters.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.216. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:DISTZ

Set or query distance between antennas at Z axial.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 1000.0 | 0.5 | 0.1 |

Unit is lambda or meters.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.217. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCVECX

Set or query location vector of antennas at X axial.

| ID | Range | *RST | Resolution |
|----------|--|--------------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | 0.0 to 1000.0 | 0.0, 1.0, 0.0, 1.0 | |

Unit is lambda or meters.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.218. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCVECY

Set or query location vector of antennas at Y axial.

| ID | Range | *RST | Resolution |
|----------|--|--------------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | 0.0 to 1000.0 | 0.0, 0.0, 1.6, 1.6 | |

Unit is lambda or meters.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.219. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:LOCVE CZ

Set or query location vector of antennas at Z axial.

| ID | Range | *RST | Resolution |
|----------|--|--------------------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | 0.0 to 1000.0 | 1.5, 1.5, 1.5, 1.5 | |

Unit is lambda or meters.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.220. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:SLANTStart

Set or query the start slant.

| ID | Range | *RST | Resolution |
|----------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | FIRST, SECOND | FIRST | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.221. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:COUNTStyle

Set or query the count style.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | IO, SSF | IO | |

IO means in order.

SSF means same slant first.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.222. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:FIRSTVALue

Set or query the first value.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (string) | ONE, ZERO | ONE | |

ONE means start at one.

ZERO means start at zero.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.223. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:ARRAYCENTer

Set or query the center element of the array.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (int) | -1 or first value to numRows*numcolumns+First value -1 | -1 | 1 |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.224. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:NORMVERTGAIN

Set to normalize the gain or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.225. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:REMSELFNORMalization

Set to remove self-normalization or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.226. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:FORCEAODstozero

Set to force AOD to zero or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.227. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:FORCEZODstoninety

Set to force ZOD to 90 degrees or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.228. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:FORCEUNCORRelated

Set to force uncorrelated or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.229. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:NORMOUTputpower

Set to normalize output power or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.230. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:NORMPOWerpertap

Set to normalize power per tap or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.231. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:OUTPOWSCALFactor

Set or query output power scale factor.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 100.0 | 1.0 | 0.1 |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.232. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:PATTeRn:[STATe]

Set to apply antenna pattern or not.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (bool) | True, False | False | |

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.233. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:THETa

Set or query theta beam width 3dB.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 360.0 | 65.0 | 0.1 |

Unit is degrees.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.234. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:AM

Set or query maximum attenuation.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 100.0 | 30.0 | 0.1 |

Unit is dB.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.235. [SYSTem]:CHM#:[PROP]:GCM3D:ANT#:GAIN

Set or query maximum directional gain.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | 1 | 1 |
| (int) | 1, 2 | 1 | 1 |
| (double) | 0.0 to 100.0 | 8.0 | 0.1 |

Unit is dB.

ANT1 means base station (BS).

ANT2 means mobile station (MS).

2.2.236. [SYSTem]:CHM#:[PROP]:PATH#:DElay:[VALue]?

Set the Fixed Delay for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 100 (μs) | 0 | 0.0001 |

2.2.237. [SYSTem]:CHM#:[PROP]:PATH#:DElay:MODE?

Set the Delay Mode for the given path of the given channel.

| ID | Range | *RST | Resolution |
|----------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (string) | FIXed, SDElay, BDEath | FIXed | - |

2.2.238. [SYSTem]:CHM#:[PROP]:PATH#:DElay:MOVProp:DMIN?

Set the moving propagation Delay Minimum for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 100 (μs) | 0 | 0.0001 |

2.2.239. [SYSTem]:CHM#:[PROP]:PATH#:DELay:MOVProp:DMAX?

Set the moving propagation Delay Maximum for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 100 (μs) | 0 | 0.0001 |

2.2.240. [SYSTem]:CHM#:[PROP]:PATH#:DELay:MOVProp:ORATe?

Set the moving propagation rate of oscillation for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0.001 to 32.767 (rad/s) | 0.001 | 0.0001 |

2.2.241. [SYSTem]:CHM#:[PROP]:PATH#:DELay:MOVProp:PERiod?

Query the moving propagation Delay Period for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | | | |

2.2.242. [SYSTem]:CHM#:[PROP]:PATH#:DELay:MOVProp:PHINitial?

Sets or queries the moving propagation Initial Phase for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | -360.0 to 360.0 | 0 | 0.1 |

2.2.243. [SYSTem]:CHM#:[PROP]:PATH#:DELay:MOVProp:DIInitial?

Sets or queries the moving propagation Initial Delay for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | DMIN to DMAX | 0 | 0.0001 |

2.2.244. [SYSTem]:CHM#:[PROP]:PATH#:DFRequency?

Set or query the Fading Doppler Frequency for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | -2000 to -0.1, 0.1 to 2000 (Hz) | 41.7 | 0.01 |

2.2.245. [SYSTem]:CHM#:[PROP]:PATH#:DVELocity?

Set or query the Fading Doppler Velocity for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|---|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | Range depends upon set Center frequency* (km/h) | 50 | 0.001 |

**The corresponding Doppler frequency not exceeding 4000 Hz.*

2.2.246. [SYSTem]:CHM#:[PROP]:PATH#:SPFRequency?

Set or query the Spike Frequency (component due to Moving Vehicle) used when Fading Spectrum Shape is set to Bell-Spike (802.11).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 133 Hz | | |

2.2.247. [SYSTem]:CHM#:[PROP]:PATH#:SPVELocity?

Set or query the Spike Velocity (component due to Moving Vehicle) used when Fading Spectrum Shape is set to Bell-Spike (802.11).

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | * depends on Carrier Frequency | | |

2.2.248. [SYSTem]:CHM#:[PROP]:PATH#:FSHAPe?

Set or query the Fading Spectrum Shape for the given path of the given channel.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (string) | C3DB, C6DB, ROUND, FLAT, R12DB, BELL, BELLSP | C6DB | - |

2.2.249. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:[VALue]?

Set or query the Frequency Shift for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | -2000 to 2000 (Hz) | 0 | 0.01 |

2.2.250. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:MODE?

Set or query the Frequency Shift Mode.

| ID | Range | *RST | Resolution |
|----------|--|-------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (string) | FIXed, HST | FIXed | - |

2.2.251. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:HST:INIDs?

Set or query the High Speed Train Ds (m) for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 1 to 2000 | 300 | 0.1 |

2.2.252. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:HST:DMIN?

Set or query the High Speed Train Dmin (m) for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 1 to 200 | 2 | 0.1 |

2.2.253. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:HST:VELocity?

Set or query the High Speed Train Velocity (km/h) for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 10 to 500 | 300 | 0.001 |

2.2.254. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:HST:MAXDoppler?

Set or query the High Speed Train fd (Hz) i.e. maximum Doppler for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 2000 | 1150 | 0.01 |

2.2.255. [SYSTem]:CHM#:[PROP]:PATH#:FSHift:HST:PERiod?

Query the period (s) for the High Speed Train frequency shift for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | | | |

2.2.256. [SYSTem]:CHM#:[PROP]:PATH#:LOGNormal:RATE?

Set or query the Log Normal rate for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 20 | 0 | 0.001 |

2.2.257. [SYSTem]:CHM#:[PROP]:PATH#:LOGNormal:SDEVIation?

Set or query the Log Normal standard deviation for the given path of the given channel.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 0 to 12 | 0 | 1 |

2.2.258. [SYSTem]:CHM#:[PROP]:PATH#:LOGNormal:[STATe]?

Set or query the Log Normal state for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|----------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (bool) | DISABLED, ENABLED | DISABLED | - |

2.2.259. [SYSTem]:CHM#:[PROP]:PATH#:LOS:AOA?

Set or query the LOS angle of arrival for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 360 (deg) | 90 | 0.1 |

2.2.260. [SYSTem]:CHM#:[PROP]:PATH#:LOS:DOPPler?

Query the LOS Doppler for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | -2000 to 2000 (Hz) | 0 | 0.1 |

2.2.261. [SYSTem]:CHM#:[PROP]:PATH#:LOS:KRICian?

Set or query the Rician K factor for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | -30 to 30 (dB) | 0 | 0.1 |

2.2.262. [SYSTem]:CHM#:[PROP]:PATH#:MODulation?

Set or query the Modulation Type for the given path of the given channel.

| ID | Range | *RST | Resolution |
|----------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (string) | NONE, RAYLeigh, RICian | NONE | - |

2.2.263. [SYSTem]:CHM#:[PROP]:PATH#:PHSHift?

Set or query the Phase Shift for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 360 (deg) | 0 | 0.1 |

2.2.264. [SYSTem]:CHM#:[PROP]:PATH#:RPLoss?

Set or query the Relative Path Loss for the given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (real) | 0 to 32 (dB) | 0 | 0.1 |

2.2.265. [SYSTem]:CHM#:[PROP]:PATH#:[STATe]?

Enable, disable, or query the state of a given path of the given channel.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (bool) | OFF, ON | OFF | - |

2.2.266. [SYSTem]:CHM#:[PROP]:PATH#:CLMODELing:[STATe]?

NOTE:

Reserved for future support in Vertex.

Set or query the enable state of cluster modeling calculations on a particular path.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |

2.2.267. [SYSTem]:CHM#:[PROP]:PATH#:CLMODELing:CLUSTER#:[STATe]?

NOTE:

Reserved for future support in Vertex.

Set or query the enable state of a cluster mapped to a particular path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (bool) | ON, OFF | OFF | |

2.2.268. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng:CLUSTer#:POWER?

NOTE:

Reserved for future support in Vertex.

Sets or queries the relative power of the clusters mapping onto the specified path.

| ID | Range | *RST | Resolution |
|--------|--|---------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (real) | -50 to 0 (dBm) | 0 (dBm) | |

2.2.269. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng:CLUSTer#:AOA?

NOTE:

Reserved for future support in Vertex.

Set or query the angle of arrival on a specific cluster mapping onto a single path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (real) | -360 to 360 | 0 | 0.01 |

2.2.270. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng:CLUSTer#:AOD?

NOTE:

Reserved for future support in Vertex.

Set or query the angle of departure on a specific cluster mapping onto a single path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (real) | -360 to 360 | 0 | 0.01 |

2.2.271. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng:CLUSTer#:ASRX?

NOTE:

Reserved for future support in Vertex.

Set or query the angle spread (receive, AOA) on a specific cluster mapping onto a single path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (real) | 0 to 360 | 10 | 0.001 |

2.2.272. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng:CLUSTer#:ASTX?

NOTE:

Reserved for future support in Vertex.

Set or query the angle spread (transmit, AOD) on a specific cluster mapping onto a single path.

| ID | Range | *RST | Resolution |
|--------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |
| (int) | 1 to 24 | | - |
| (int) | 1-10 | | |
| (real) | 0 to 360 | 10 | 0.001 |

2.2.273. [SYSTem]:CHM#:[PROP]:CLMDeIng:[USERnumber]?

NOTE:

Reserved for future support in Vertex.

Defines the user number for multi-user scenarios.

| ID | Range | *RST | Resolution |
|-------|--|------|------------|
| (int) | 1 to #Channel Models in Connection Setup | | |

2.2.274. [SYSTem]:CHM#:[PROP]:DPReFereNce?

Set or query the Doppler preference for the given channel model.

| ID | Range | *RST | Resolution |
|----------|---------------------|----------|------------|
| (string) | FREQuency, VELOCITY | VELOCITY | - |

2.2.275. [SYSTem]:RPI:TCPEcho?

Enable TCP/IP Echo for the RPI.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (bool) | False, True | True | - |

2.2.276. [SYSTem]:RPI:MONMMsg?

Enable Monitor Messages for the RPI View.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (bool) | False, True | True | - |

2.2.277. [SYSTem]:DEE:[STATe]?

Query, enable or disable DEE.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (bool) | OFF, ON | OFF | - |

2.2.278. [SYSTem]:DEE:MODE?

Set the DEE Playback Mode to loop continuously, to loop once, or to loop a specific number of times.

| ID | Range | *RST | Resolution |
|----------|--------------------------|------|------------|
| (string) | WRAParound, ONCE, NUMber | ONCE | - |

2.2.279. [SYSTem]:DEE:TYPE?

Set or query the DEE Trigger Mode to Free Run, HW Triggered, or State Triggered.

| ID | Range | *RST | Resolution |
|----------|------------------------------------|---------|------------|
| (string) | FREErun, TRIGgered, STATetriggered | FREErun | - |

2.2.280. [SYSTem]:DEE: SMOOTHing?

Enable DEE Smoothing for the RPI.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (bool) | OFF, ON | OFF | - |

2.2.281. [SYSTem]:DEE:INPut?

Set or query the DEE Input mode, which will allow or not allow changes during DEE emulation. An input mode of STATic will not allow input changes during DEE, while an input mode of DYNamic will allow input changes during DEE.

| ID | Range | *RST | Resolution |
|----------|-----------------|--------|------------|
| (string) | STATic, DYNamic | STATic | - |

2.2.282. [SYSTem]:DEE:CSTATE?

Query the current DEE state number.

2.2.283. [SYSTem]:DEE:CLOOP?

Query the current DEE loop number.

2.2.284. [SYSTem]:DEE:ETIME?

Query the current DEE elapsed time.

2.2.285. [SYSTem]:DEE:NUMSTates?

Query the number of DEE states.

2.2.286. [SYSTem]:DEE:NUMLoops?

Set the number of loops to play DEE when DEE:MODE is set to NUMber.

| ID | Range | *RST | Resolution |
|-------|------------|------|------------|
| (int) | 1 to 65535 | 1 | 1 |

2.2.287. [SYSTem]:DEE:COMPIle:ABORt

Abort the DEE compile.

2.2.288. [SYSTem]:DEE:COMPIle:BEGin

Begin a DEE compile.

2.2.289. [SYSTem]:DEE:COMPile:FILE?

Set and query the DEE emulation file for the given unit. Use " " to quote the file name if it contains spaces.

| ID | Range | *RST | Resolution |
|----------|----------------------|------|------------|
| (string) | valid path\file name | | - |

Example: DEE:COMPile:FILE "C:\Users\LteDual2x2Uni 1.0.vstb"

2.2.290. [SYSTem]:DEE:COMPile:PROGress?

Query the DEE compile progress for the given unit.

| ID | Range | *RST | Resolution |
|-------|----------|------|------------|
| (int) | 0 to 100 | 0 | 1 |

2.2.291. [SYSTem]:DEE:COMPile:STATus?

Query the DEE compile status.

Possible Responses:

- "Not Started"
- "Aborted"
- "Failed"
- "Completed"
- "Compiling"

2.2.292. [SYSTem]:DEE:PAUSE?

Pause DEE fading or query DEE pause state.

Returns bool {ON, OFF}.

2.2.293. [SYSTem]:DEE:PAUSEOnstate

Pause DEE at a user specified state.

| ID | Range | *RST | Resolution |
|----------|---------------------|------|------------|
| (UInt32) | 1 to last DEE state | | |

2.2.294. [SYSTem]:DEE:RESume

Resume normal DEE operation if DEE is paused.

2.2.295. [SYSTem]:DEE:ADVance

Move a DEE operation to the next state.

2.2.296. [SYSTem]:IQP:COMPile:FILE?

Load and query the IQ Playback file for the given Vertex unit. Use " " at the beginning and end of the path/file name as shown in the example.

| ID | Range | *RST | Resolution |
|----------|----------------------|------|------------|
| (string) | valid path\file name | | - |

Example: IQP:COMPile:FILE "C:\inetpub\ftproot\Spirent\FDP\2x4UNI.txt"

Query response: C:\inetpub\ftproot\Spirent\FDP\2x4UNI.txt

2.2.297. [SYSTem]:IQP:COMPile:BEG

Compile the IQ Playback file.

2.2.298. [SYSTem]:IQP:COMPile:PROGress?

Query the current progress of IQ Playback file compilation (percentage value).

| ID | Range | *RST | Resolution |
|-------|----------|------|------------|
| (int) | 0 to 100 | 0 | 1 |

2.2.299. [SYSTem]:IQP:COMPile:ABORt

Aborts the IQP compilation process. When you invoke this command during IQ Playback compilation, the compilation process is terminated immediately.

2.2.300. [SYSTem]:IQP:COMP:STATUS?

Query the status of compiling the IQ Playback file.

| ID | Range | *RST | Resolution |
|----------|-----------------------|------|------------|
| (string) | COMPLETE, IN_PROGRESS | - | - |

2.2.301. [SYSTem]:IQP?

Query or set the IQ Playback ON (Enable IQ Playback) or OFF (Disable IQ Playback).

| ID | Range | *RST | Resolution |
|----------|---------|------|------------|
| (string) | ON, OFF | OFF | - |

Example: To enable IQ Playback, enter: IQP ON

Example: To query IQ Playback status, enter: IQP?

2.2.302. [SYSTem]:IQP:MODE?

Set or query the IQ Playback Mode to Wraparound or Playduration.

| ID | Range | *RST | Resolution |
|----------|--------------------------|------------|------------|
| (string) | WRAPAROUND, PLAYDURATION | WRAPAROUND | - |

2.2.303. [SYSTem]:IQP: NUMMilliseconds

Set the time duration (in milliseconds) to play IQP for Play duration.

| ID | Range | *RST | Resolution |
|-------|-------|------|------------|
| (int) | >1 | 0 | 1 |

2.2.304. [SYSTem]: IQP:TYPE?

Set or query IQP Trigger Mode to Free Run or HW Triggered.

| ID | Range | *RST | Resolution |
|----------|--------------------|---------|------------|
| (string) | FREErun, TRIGgered | FREErun | - |

2.2.305. [SYSTem]:IQP:CLOOP?

Queries the current number of times the fading scenario has wrapped around.

| ID | Range | *RST | Resolution |
|-------|------------------------------|------|------------|
| (int) | 0 to maximum number of loops | 0 | - |

2.2.306. [SYSTem]:IQP:CSAMPLE?

Queries the current number of samples played in the IQ file .

| ID | Range | *RST | Resolution |
|-------|---|------|------------|
| (int) | 0 to total number of samples in the IQ file | 0 | 1 |

2.2.307. [SYSTem]:IQP:NUMSAMPles?

Query the total number of IQ samples in the input IQ playback file.

| ID | Range | *RST | Resolution |
|-------|--------|------|------------|
| (int) | >10000 | 0 | 1 |

2.2.308. [SYSTem]:IQP:ETIME?

Queries the Current Playback Duration.

Response: xx:xx:xx (Time duration in Hour:minute:Second)

2.2.309. [SYSTem]:ENSEmble:[STATe]?

NOTE:

Reserved for future support in Vertex.

Set or query the state Ensemble Mode. Number of Instruments and their associated IP addresses need to be configured before turning on Ensemble Mode. This mode should only be set to ON from the primary instrument in the chain.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (bool) | ON, OFF | OFF | - |

Example:

To configure an ensemble with 2 additional instruments (3 total):

ENS:NUMINST 2

ENS:IPAD1 192.168.0.99

ENS:IPAD2 192.168.0.133

ENS ON

2.2.310. [SYSTem]:ENSEmble:IPADdress#?

NOTE:

Reserved for future support in Vertex.

Set or query the IP Address configured for each additional instrument in the ensemble.

| ID | Range | *RST | Resolution |
|----------|------------------|---------------|------------|
| (int) | 1-3 | | - |
| (string) | Valid IP Address | 192.168.0.152 | - |

2.2.311. [SYSTem]:ENSEmble:NUMINSTruments?

NOTE:

Reserved for future support in Vertex.

Set or query the number of additional instruments configured in the ensemble.

| ID | Range | *RST | Resolution |
|-------|--------|------|------------|
| (int) | 1 to 3 | 1 | - |

NOTE:

This number does not include the primary instrument, only the additional instruments in the ensemble.

2.2.312. [SYSTem]:HARDWAREBANDwidth

Sets or queries the bandwidth of the Vertex instrument.

| ID | Range | *RST | Resolution |
|-------|--------------|-------------|------------|
| (int) | 40, 100, 200 | [no effect] | -- |

2.2.313. [SYSTem]:XD:A:ATTNMODE?

Set or query the XD5-A attenuation mode.

| ID | Range | *RST | Resolution |
|----------|-----------------------------|--------|------------|
| (string) | NORMAL, MATCH_DOWNLINK_LOSS | NORMAL | - |

2.2.314. [SYSTem]:XD:B:ATTNMODE?

Set or query the XD5-B attenuation mode.

| ID | Range | *RST | Resolution |
|----------|-----------------------------|--------|------------|
| (string) | NORMAL, MATCH_DOWNLINK_LOSS | NORMAL | - |

2.2.315. [SYSTem]:XD:A:CONnect?

Query the connect state of an XD5-A instrument.

| ID | Range | *RST | Resolution |
|--------|-------------|-------|------------|
| (bool) | True, False | False | - |

2.2.316. [SYSTem]:XD:B:CONnect?

Query the connect state of an XD5-B instrument.

| ID | Range | *RST | Resolution |
|--------|-------------|-------|------------|
| (bool) | True, False | False | - |

2.2.317. [SYSTem]:XD:A:ATTN#?

Set or query the attenuation through the XD5-A.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0 to 95.5 * | 0 | - |

NOTE:

The XD5 Attenuation is defined from port to port of the XD5 in the uplink direction. For different configurations, the internal losses vary and are compensated using the range of the uplink attenuators. For this reason, the available range on the attenuation varies based on the configuration.

2.2.318. [SYSTem]:XD:B:ATTN#?

Set or query the attenuation through the XD5-B.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0 to 95.5 * | 0 | - |

NOTE:

The XD5 Attenuation is defined from port to port of the XD5 in the uplink direction. For different configurations, the internal losses vary and are compensated using the range of the uplink attenuators. For this reason, the available range on the attenuation varies based on the configuration.

2.2.319. [SYSTem]:XD:A:ATTNOFFset#?

Set or query the Attenuation offset applied to the XD5-A attenuators.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0.0 to 20.0 | 0.0 | 0.01 |

2.2.320. [SYSTem]:XD:B:ATTNOFFset#?

Set or query the Attenuation offset applied to the XD5-B attenuators.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0.0 to 20.0 | 0.0 | 0.01 |

2.2.321. [SYSTem]:XD:A:INTATTNOFFset#?

Set or query the Internal Attenuation offset applied to the XD5-A internal attenuators.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0.0 to 50.0 | 0.0 | 0.01 |

2.2.322. [SYSTem]:XD:B:INTATTNOFFset#?

Set or query the Internal Attenuation offset applied to the XD5-B internal attenuators.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0.0 to 50.0 | 0.0 | 0.01 |

2.2.323. [SYSTem]:XD:A:CONF#?

Set or query the XD5-A configuration.

| ID | Range | *RST | Resolution |
|----------|--|--------|------------|
| (string) | UNUSED, DL_1X1_UL_1X1, DL_1X2_UL_1X1, DL_2X1_UL_1X1, DL_2X1_UL_1X2, DL_2X2_UL_1X2, DL_2X2_UL_2X2, DL_4X2_UL_2X2, DL_4X2_UL_1X4 | UNUSED | - |

2.2.324. [SYSTem]:XD:B:CONF#?

Set or query the XD5-B configuration.

| ID | Range | *RST | Resolution |
|----------|--|--------|------------|
| (string) | UNUSED, DL_1X1_UL_1X1, DL_1X2_UL_1X1, DL_2X1_UL_1X1, DL_2X1_UL_1X2, DL_2X2_UL_1X2, DL_2X2_UL_2X2, DL_4X2_UL_2X2, DL_4X2_UL_1X4 | UNUSED | - |

2.2.325. [SYSTem]:XD:SETNode

Configure an XD5 to Node A or B.

XD:SETN A

2.2.326. [SYSTem]:ANTenna:BSAConfig?

Set or query the Base Station antenna configuration.

| ID | Range | *RST | Resolution |
|--------|----------------|----------|------------|
| (enum) | VERTical, XPOL | VERTical | - |

2.2.327. [SYSTem]:ANTenna:BSASpacing:MM?

Set or query the antenna spacing in mm.

| ID | Range | *RST | Resolution |
|--------|-------------------|---------------------------|------------|
| (real) | 0.1 to 10,000,000 | 1153.05 (BS), 576.52 (MS) | 0.01 |

2.2.328. [SYSTem]:ANTenna:BSASpacing:LAMbda?

Set or query the antenna spacing in lambda.

| ID | Range | *RST | Resolution |
|--------|------------|-----------------|------------|
| (real) | 0.1 to 100 | 10 (BS), 5 (MS) | 0.01 |

2.2.329. [SYSTem]:ANTenna:MSASpacing:MM?

Set or query the antenna spacing in mm.

| ID | Range | *RST | Resolution |
|--------|-------------------|---------------------------|------------|
| (real) | 0.1 to 10,000,000 | 1153.05 (BS), 576.52 (MS) | 0.01 |

2.2.330. [SYSTem]:ANTenna:MSASpacing:LAMbda?

Set or query the antenna spacing in lambda.

| ID | Range | *RST | Resolution |
|--------|------------|-----------------|------------|
| (real) | 0.1 to 100 | 10 (BS), 5 (MS) | 0.01 |

2.2.331. [SYSTem]:ANTenna:MSAConfig?

Set or query the Mobile Station antenna configuration.

| ID | Range | *RST | Resolution |
|--------|----------------------|----------|------------|
| (real) | VERTical, XPOL, PLUS | VERTical | - |

2.2.332. [SYSTem]:ANTenna:PATtern:AM?

Set or query the maximum attenuation of the antenna pattern.

| ID | Range | *RST | Resolution |
|--------|-------------|------|------------|
| (real) | 0 to 30(dB) | 20 | 0.1 |

2.2.333. [SYSTem]:ANTenna:PATtern:[STATe]?

Enable or disable the antenna pattern.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (bool) | OFF, ON | OFF | - |

2.2.334. [SYSTem]:ANTenna:PATtern:THETa?

Set or query the Theta 3dB for the antenna pattern.

| ID | Range | *RST | Resolution |
|--------|---------------|------|------------|
| (real) | 0 to 180(deg) | 65 | 0.1 |

2.2.335. [SYSTem]:ANTenna: BSPAT#?

Set or query the Base Station Antenna Pattern filename.

| ID | Range | *RST | Resolution |
|----------|------------------------------|------|------------|
| (int) | 1 to 2 (file 1 or 2) | | |
| (string) | full valid path\filename.txt | "" | - |

2.2.336. [SYSTem]:ANTenna:MSPAT#?

Set or query the Mobile Station Antenna Pattern filename.

| ID | Range | *RST | Resolution |
|----------|------------------------------|------|------------|
| (int) | 1 to 2 (file 1 or 2) | | |
| (string) | full valid path\filename.txt | "" | - |

2.2.337. [SYSTem]:ANTenna:COUPMATRix

Sets the Virtual OTA 2x2 Coupling Matrix.

| ID | Range | *RST | Resolution |
|-------------|------------------------|------|------------|
| (real list) | Valid 2x2 Coupling Mtx | | |

The command format, explicitly, is 8 comma-separated values for the 2x2 matrix, I's and Q's alternating as follows:

chm1:corr:matr:path1 e11-I, e11-Q, e21-I, e21-Q, e12-I, e12-Q, e22-I, e22-Q

Example:

ant:coupmatr 1.8371, 2.2793, -0.1160, -0.5828, 0.4156, -0.4123, 0.1712, 0.8602

| E | 1 | 2 |
|---|------------------|-------------------|
| 1 | 1.8371 + 2.2793j | -0.1160 - 0.5828j |
| 2 | 0.4156 - 0.4123j | 0.1712 + 0.8602j |

NOTE:

The Coupling Matrix can be reset to the default identity matrix with the following command:
ant:coupmatr 1,0,0,0,0,0,1,0

2.2.338. [SYSTem]:XA:INST#:CONnect?

NOTE:

Reserved for future support in Vertex.

Set or query the connect state of an XA instrument.

| ID | Range | *RST | Resolution |
|--------|-------------|-------|------------|
| (int) | 1-4 | - | - |
| (bool) | True, False | False | - |

2.2.339. [SYSTem]:XA:INST#:RF#:OUTATT?

NOTE:

Reserved for future support in Vertex.

Set or query the RF1 uplink attenuation of an XA5 instrument.

NOTE:

Only RF1 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|------------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 1 | - | - |
| (real) | 0 to 95 dB | 30 | 1 dB |

2.2.340. [SYSTem]:XA:INST#:MSW?

NOTE:

Reserved for future support in Vertex.

Set or query the XA switch to implement the Quad 2x2 MIMO application.

| ID | Range | *RST | Resolution |
|----------|---------|------|------------|
| (int) | 1-4 | - | - |
| (string) | OFF, ON | OFF | - |

2.2.341. [SYSTem]:XA:INST#:SSW?

NOTE:

Reserved for future support in Vertex.

Set or query the XA switch to implement the Ocaal SISO application.

| ID | Range | *RST | Resolution |
|----------|---------|------|------------|
| (int) | 1-4 | - | - |
| (string) | OFF, ON | OFF | - |

2.2.342. [SYSTem]:XA:INST#:RF#:OUTATTA?

NOTE:

Reserved for future support in Vertex.

Set or query the RF1_A uplink attenuation of an XA5 instrument.

NOTE:

Only RF1 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|------------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 1 | - | - |
| (real) | 0 to 95 dB | 0 | 1 dB |

2.2.343. [SYSTem]:XA:INST#:RF#:UPBANDATT?

NOTE:

Reserved for future support in Vertex.

Set or query the attenuation of upper-band WiFi path (4.9-6.0 GHz) to RF2.

NOTE:

Only RF2 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|------------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 2 | - | - |
| (real) | 0 to 95 dB | 0 | 1 dB |

2.2.344. [SYSTem]:XA:INST#:RF#:UPBANDSW?

NOTE:

Reserved for future support in Vertex.

Set or query the selection of upper-band WiFi path (4.9-6.0 GHz) to RF2.

NOTE:

Only RF2 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 2 | - | - |
| (real) | OFF, ON | OFF | - |

2.2.345. [SYSTem]:XA:INST#:RF#:LOWBANDATT?

NOTE:

Reserved for future support in Vertex.

Set or query the attenuation of lower-band WiFi path (2.2-2.5 GHz) to RF2.

NOTE:

Only RF2 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|------------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 2 | - | - |
| (real) | 0 to 95 dB | 0 | 1 dB |

2.2.346. [SYSTem]:XA:INST#:RF#:LOWBANDSW?

NOTE:

Reserved for future support in Vertex.

Set or query the selection of lower-band WiFi path (2.2-2.5 GHz) to RF2.

NOTE:

Only RF2 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 2 | - | - |
| (real) | OFF, ON | OFF | - |

2.2.347. [SYSTem]:XA:INST#:RF#:ATT?

NOTE:

Reserved for future support in Vertex.

Set or query the attenuation of cellular path to RF3.

NOTE:

Only RF3 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|------------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 3 | - | - |
| (real) | 0 to 95 dB | 0 | 1 dB |

2.2.348. [SYSTem]:XA:INST#:RF#:SW?

NOTE:

Reserved for future support in Vertex.

Set or query the selection of cellular path to RF3.

NOTE:

Only RF3 is supported for this command.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (int) | 1-4 | - | - |
| (int) | 3 | - | - |
| (real) | OFF, ON | OFF | - |

2.2.349. [SYSTem]:XA:INST#:INAMPSW?

NOTE:

Reserved for future support in Vertex.

Set or query the selection of whether the amplifier is present in the RF1 uplink path.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (int) | 1-4 | - | - |
| (real) | OFF, ON | OFF | - |

2.2.350. [SYSTem]:XA:INST#:INAMPSWA?

NOTE:

Reserved for future support in Vertex.

Set or query the selection of whether the amplifier is present in the RF1_A uplink path.

| ID | Range | *RST | Resolution |
|--------|---------|------|------------|
| (int) | 1-4 | - | - |
| (real) | OFF, ON | OFF | - |

2.2.351. [SYSTem]:FRANGMAX?

Set or query the maximum frequency range of Vertex in MHz.

| ID | Range | *RST | Resolution |
|-------|-----------|------|------------|
| (int) | 3850-6000 | 5925 | 1 |

2.2.352. [SYSTem]:DOPPLERFREQ?

Set or query the maximum Doppler frequency mode of Vertex in KHz.

| ID | Range | *RST | Resolution |
|-------|-------|------|------------|
| (int) | 4, 12 | 4 | |

2.2.353. [SYSTem]:DSPBType?

Query the type of DSP board.

Range : 1 - DSPM1
 2 - DSPM2

2.2.354. [SYSTem]:HSRPI:MODE?

Set or query the High Speed RPI state.

| ID | Range | *RST | Resolution |
|----------|---------------------|------|------------|
| (string) | 1, (On) 0, (OFF) | OFF | |

2.2.355. [SYSTem]:RTDEE[:STATe]?

Set or query the live streaming DEE state.

| ID | Range | *RST | Resolution |
|----------|---------|------|------------|
| (string) | On, OFF | OFF | |

2.2.356. [SYSTem]:RTDEE:PMMode?

Set or query the path modulation for live streaming DEE mode. You must use this command prior to enabling LSDEE mode.

| ID | Range | *RST | Resolution |
|----------|--------------------------|--------|------------|
| (string) | Static, Rician, Rayleigh | Static | |

2.2.357. [SYSTem]:RTDEE:LOG:TTHreshold?

Set or query the timing threshold for state emulation command execution in live streaming DEE mode. You must use this command prior to enabling LSDEE mode.

| ID | Range | *RST | Resolution |
|-------|------------|------|------------|
| (int) | 0 to 10000 | 250 | 1 |

Unit is ms.

2.2.358. [SYSTem]:RTDEE:LOG:EVENTs?

Query LSDEE event log.

| ID | Range | *RST | Resolution |
|----------|-----------|------|------------|
| (string) | Read only | | 1 |

2.2.359. [SYSTem]:RTDEE:LOG:EVENTs:CLEAr

Clear LSDEE event log.

| ID | Range | *RST | Resolution |
|----------|-------|------|------------|
| (string) | N/A | | |

2.2.360. [SYSTem]:HFC:A:CONF?

Query or configure HFC.

| ID | Range | *RST | Resolution |
|----------|---|--------|------------|
| (string) | UNUSED, HFC_4CH_7GHZ, HFC_4CH_11GHZ, HFC_4CH_27GHZ, HFC_4CH_39GHZ | UNUSED | |

2.2.361. [SYSTem]:MEB:CMB:LIBrary?

Query the name of the current Chamber Setup library entry.

2.2.362. [SYSTem]:MEB:CMB: LIBAvaliable?

Return the list of chamber setup entries available in the Chamber Setup library.

2.2.363. [SYSTem]:MEB:CHANCOUNT?

Query or specify the count of MIMO OTA channels. Range of Values: 1 and 2.

MEB:CHANCOUNT 2 means two MIMO OTA channels like dual 2x16.

2.2.364. [SYSTem]:MEB:PORT:MAP?

Specify the order that Vertex logical outputs are mapped to physical ports (that is, output ports 5, 6, 3, 4, 13, 14, 11, and 12). Note that vertical/horizontal ports are output in consecutive pairs (for example, B1 & B2, B3 & B4, ...).

Default Value: B1,B2,B3,...,Bn.

Range of Values: B1 to Bn, where **n** is the number of logical outputs.

2.2.365. [SYSTem]:MEB:PORT:GETMAP? Channel

Query the port mapping.

MEB:PORT:GETMAP? 1 queries the port mapping of MOTA channel 2.

2.2.366. [SYSTem]:MEB:PORT:SETMAP Channel#, portMAP

Specify the portMAP for channel #.

2.2.367. [SYSTem]:MEB: PORT:RESET

Restore the default port map (B1, B2, B3, ...Bn).

2.2.368. [SYSTem]:MEB:ENV:GETALG? Channel#

Query the algorithm type.

Range of values: PRECISION, REALTIME.

2.2.369. [SYSTem]:MEB:ENV:SETALG algType, channel#

Set the algorithm type.

MEB:ENV:SETALG REALTIME, 0

2.2.370. [SYSTem]:MEB:ENV:GETFREQ? Channel#

Query carrier frequency.

MEB:ENV:GETFREQ? 1 gets the frequency of MIMO OTA channel 2.

2.2.371. [SYSTem]:MEB:ENV:SETOUTP power,channel#

Set output power (on if the Algorithm type is REALTIME).

MEB:ENF SETOUTP -30,1 sets the MIMO OTA channel 2 output level to -30dBm.

2.2.372. [SYSTem]:MEB:ENV:GETOUTP? Channel#

Query output power.

2.2.373. [SYSTem]:MEB:PORT:ROTate?

Logically shifts the probe outputs (for example, V/H pairs) N probe positions around the circle. A positive value indicates a counter-clockwise rotation, and a negative value indicates a clockwise rotation. The value 0 (zero) clears any rotation and restores the default positions.

NOTE:

This command is only available for circular chamber layouts.

Default Value: 0

Range of Values: 0 to the number of probe positions.

2.2.374. [SYSTem]:MEB:CAL:LIBrary?

Query the name of the current Calibration library entry.

2.2.375. [SYSTem]:MEB:CAL:LIBAvaliable?

Return the list of Calibration entries available in the Calibration library.

2.2.376. [SYSTem]:MEB:CAL:SEND? channel# (optional)

Set the Amplitude Calibration values. This command can be used only in real-time mode. It is the same as MEB:ENV:SENDER channel#.

2.2.377. [SYSTem]:MEB:PHCAL

Execute the Input Phase Calibration procedure with a blocking call.

NOTE:

This command locks the RPI interface, preventing other commands from being executed.

2.2.378. [SYSTem]:MEB:PHCAL:BEgin

Begin a non-blocking execution of the Input Phase Calibration procedure.

2.2.379. [SYSTem]:MEB:PHCAL:STATus?

Query the status of the Input Phase Calibration procedure.

Response: IDLE, COMPuting

2.2.380. [SYSTem]:MEB:PHCAL:ABORT

Abort the Input Phase Calibration procedure.

2.2.381. [SYSTem]:MEB:ENV:LIBrary?,Channel# (optional)

Query the name of the current environment file.

The following command loads the ENV file for one MIMO OTA channel configuration:

MEB:ENV:LIB libraryName

The following commands load the ENV file for two MIMO OTA channel configuration (MEB:CHANCOUNT 2 must be issued):

MEB:ENV:LIB Library Name,0 loads the ENV file name of the first channel.

MEB:ENV:LIB Library Name,1 loads the ENV file name of the second channel.

2.2.382. [SYSTem]:MEB:ENV:LIBAvaliable?

Return the list of environment entries available in the Environment library.

2.2.383. [SYSTem]:MEB:ENV:NUMProbes?

Query the specified Environment library entry and return the number of probes in its chamber setup.

Range of Values: 4, 8, 16.

2.2.384. [SYSTem]:MEB:ENV:LAYOut?

Query the specified Environment library entry and return its chamber layout.

Range of Values: Circular, Sector.

2.2.385. [SYSTem]:MEB:ENV:ANGLEs?

Query the specified Environment library entry and return the list of probe angles.

2.2.386. [SYSTem]:MEB:ENV:ANTConfig?

Query the specified Environment library entry and return its antenna configuration.

Range of Values: Vertical only separated, Vert+Horiz co-located, Vert+Horiz separated, Slant 45 deg, co-located, and Slant 45 deg separated.

2.2.387. [SYSTem]:MEB:ENV:OUTMode?

Specify whether the output power level (OUTP) is the nominal output from each probe or the total combined power at the device under test. This command can only be used in real-time mode.

Range of Values: NOMINAL, TOTAL.

2.2.388. [SYSTem]:MEB:ENV:FREQ?,Channel# (Optional)

Query or set the carrier frequency in MHz. This command can be used only in real-time mode.

Range of Values: 380.0 to 6000.0.

MEB:ENV:FREQ 2500,1 sets the MIMO OTA channel 2 frequency to 2500 MHz.

2.2.389. [SYSTem]:MEB:ENV:SENCAL channel#

Set the Amplitude Calibration values. This command can be used only in real-time mode.

2.2.390. [SYSTem]:MEB:ENV:DOT?

Set the MS direction of travel in degrees for all paths. This command can be used in real-time mode.

Default Value: 0.

Range of Values: -180.0 to 180.0.

2.2.391. [SYSTem]:MEB:ENV:EXPPower? Channel# (optional)

Query the second column values on the Details tab in the MEB GUI.

2.2.392. [SYSTem]:MEB:ENV:PATHGAIN?

Set the path gain value for a chamber setup. This command is only valid in real-time mode.

2.2.393. [SYSTem]:MEB:ENV:OUTPower<value>

This command can only be used in real-time mode.

Range of Values: -110.0 to -20.0.

2.2.394. [SYSTem]:MEB:ENV:SETPower? channel# (optional)

Return a comma-separated list of set power levels for each of the Vertex output ports used in the current MIMO OTA environment. This command can be used only in real-time mode.

2.2.395. [SYSTem]:MEB:ENV:VEL vel,channel# (optional)

Set the velocity if the Algorithm Type is REALTIME.

2.2.396. [SYSTem]:MEB:ENV:BUILD channel# (optional)

Build the environment.

2.2.397. [SYSTem]:MEB:BST:LIBrary<Library>

Load the provided base station configuration. The Vertex must be in MIMO_OTA Fading mode.

2.2.398. [SYSTem]:MEB:BST:LIBrary?

Query the current base station configuration loaded. The Vertex must be in MIMO_OTA Fading mode.

2.2.399. [SYSTem]:MEB:BST:LIBAvaliable?

Query all available base station configurations. The Vertex must be in MIMO_OTA Fading mode.

2.3. Vectorized RPI Command

Vertex supports the structure for changing multiple instances of a parameter within a single command. This can speed up automation scripts tremendously when iterating over parameters on each step of the automation. For instance, changing the RF output power of all ports to a common value, or each to different values, can be accomplished in a single line.

To change all ports to a single value:

```
Vertex> PORT:B(1-8):OUTP -43
```

To change all ports to individual values:

```
Vertex> PORT:B(1-8):OUTP -30,-37,-42,-41,-66,-84,-64,-77
```

Within this vectorized syntax, you can selectively index ports using a valid index string including a combination of comma separated values and hyphen separated ranges, strictly increasing. For instance, ports 3, 4, 5, 7, and 9 can be indexed using:

```
Vertex> PORT:B(3-5,7,9):OUTP -43
```

The above command will set the outputs of these ports to -43 and leave the outputs of all the other ports unaffected.

2.3.1. Nested Loops

For commands that have multiple indices in the mnemonic (such as CHM#:PATH#...), multiple vector indexing is supported by way of nested looping. The leftmost index will comprise the outer loop, with each inner loop built from the vectorized indexing moving right in the command. For example, the following command:

```
Vertex> CHM(1-3):PATH(1-2):RPL 1,2,3,4,5,6
```

is equivalent to the following sequence of RPI commands:

```
Vertex> CHM1:PATH1:RPL 1
```

```
Vertex> CHM1:PATH2:RPL 2
```

```
Vertex> CHM2:PATH1:RPL 3
```

```
Vertex> CHM2:PATH2:RPL 4
```

```
Vertex> CHM3:PATH1:RPL 5
```

```
Vertex> CHM3:PATH2:RPL 6
```

2.3.2. Supported Commands

The following commands are supported in the vectorized indexing format:

[SYSTem]:PORT:{A,B}#:INPut
[SYSTem]:PORT:{A,B}#:OUTPut
[SYSTem]:PORT:{A,B}#:LOSS
[SYSTem]:PORT:{A,B}#:RFOUT
[SYSTem]:PORT:{A,B}#:INPPHase
[SYSTem]:PORT:{A,B}#:OUTPPHase
[SYSTem]:PORT:{A,B}#:INPDelay
[SYSTem]:PORT:{A,B}#:OUTPDelay
[SYSTem]:PORT:{A,B}#:INFREQuency
[SYSTem]:PORT:{A,B}#:CFACtor
[SYSTem]:PORT:{A,B}#:ICBLloss
[SYSTem]:PORT:{A,B}#:OCBLloss
[SYSTem]:PORT:{A,B}#:INTerferer:[MODE]
[SYSTem]:PORT:{A,B}#:INTerferer:CTON
[SYSTem]:PORT:{A,B}#:INTerferer:EBNO
[SYSTem]:PORT:{A,B}#:INTerferer:NOISElevel
[SYSTem]:PORT:{A,B}#:INTerferer:BITRate
[SYSTem]:PORT:{A,B}#:INTerferer:NBWidth
[SYSTem]:PORT:{A,B}#:INTerferer:RBWidth
[SYSTem]:PORT:{A,B}#:MEASure:TTHReshold
[SYSTem]:PORT:{A,B}#:MEASure:IavgExp
[SYSTem]:PORT:{A,B}#:MEASure:OavgExp
[SYSTem]:CHM#:BYPass
[SYSTem]:CHM#:BYPAB
[SYSTem]:CHM#:BYPBA
[SYSTem]:CHM#[PROP]:BULKdelay:[VALue]
[SYSTem]:CHM#[PROP]:BULKdelay:STATe
[SYSTem]:CHM#[PROP]:GCM:PATH#:AOA
[SYSTem]:CHM#[PROP]:GCM:PATH#:AOD
[SYSTem]:CHM#[PROP]:GCM:PATH#:BSAS
[SYSTem]:CHM#[PROP]:GCM:PATH#:DELay:[VALue]

[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:AOA
[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:AOD
[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:KFACtor
[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:[STATe]
[SYSTem]:CHM#:[PROP]:GCM:PATH#:MODulation
[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSAS
[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSDirection
[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSVelocity
[SYSTem]:CHM#:[PROP]:GCM:PATH#:RPLoss
[SYSTem]:CHM#:[PROP]:PATH#:DELay:[VALue]
[SYSTem]:CHM#:[PROP]:PATH#:DFRequency
[SYSTem]:CHM#:[PROP]:PATH#:DVELocity
[SYSTem]:CHM#:[PROP]:PATH#:FSHift:[VALue]
[SYSTem]:CHM#:[PROP]:PATH#:LOS:AOA
[SYSTem]:CHM#:[PROP]:PATH#:LOS:KRICian
[SYSTem]:CHM#:[PROP]:PATH#:MODulation
[SYSTem]:CHM#:[PROP]:PATH#:PHSHift
[SYSTem]:CHM#:[PROP]:PATH#:RPLoss
[SYSTem]:CHM#:[PROP]:PATH#::[STATe]
[SYSTem]:RLINK:{A,B}#:PHAs#