

# **Vertex<sup>®</sup> Channel Emulator**

Release 4.71

RPI Command

*Reference Manual*

**© 2020 Spirent Communications, Inc. All Rights Reserved.**

All of the company names and/or brand names and/or product names referred to in this document, in particular, the name “Spirent” and its logo device, are either registered trademarks or trademarks of Spirent plc and its subsidiaries, pending registration in accordance with relevant national laws. All other registered trademarks or trademarks are the property of their respective owners. The information contained in this document is subject to change without notice and does not represent a commitment on the part of Spirent Communications. The information in this document is believed to be accurate and reliable; however, Spirent Communications assumes no responsibility or liability for any errors or inaccuracies that may appear in the document.

Page Part Number: 71-007840, Version A11

## Safety Summary

If the equipment is used in a manner not specified by the manufacturer the protection provided by the equipment may be impaired.

## Safety Symbols

The following safety symbols are used throughout this manual and may be found on the instrument. Familiarize yourself with each symbol and its meaning before operating this instrument.



Instruction manual symbol. The product is marked with this symbol when it is necessary for you to refer to the instruction manual to protect against damage to the instrument.



Frame terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Protective ground (earth) terminal. Used to identify any terminal which is intended for connection to an external protective conductor for protection against electrical shock in case of a fault, or to the terminal of a protective ground (earth) electrode.



The caution sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product or your data.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Alternating current (power line).



Symbol when movement with two people is required. When this symbol is noted on our product, two people are required to move it without accident.

## Résumé des règles de sécurité

Si le matériel est utilisé d'une façon non conforme aux spécifications du constructeur, la protection assurée par le matériel peut être mise en défaut.

## Symboles de sécurité

Les symboles suivants sont utilisés dans tout le manuel et peuvent être trouvés sur le matériel. Il est recommandé de se familiariser avec chaque symbole et sa signification avant de manipuler le matériel.



Symbole « manuel d'instruction ». Ce symbole apparaît sur le produit lorsqu'il est nécessaire de se référer au manuel d'instruction pour éviter une détérioration du matériel.



Masse. Ce symbole identifie une connexion au châssis du matériel (ce châssis inclut normalement toutes les structures métalliques exposées).



Terre : ce symbole identifie la connexion de terre chargée de protéger le matériel contre les chocs électriques. Cette connexion doit être raccordée vers un conducteur externe de protection ou vers une électrode de type terre.



Ce symbole désigne une opération ou une condition dite « sensible », qui, si elle n'est pas correctement réalisée, pourrait entraîner de sérieuses détériorations au matériel ou aux données utilisateur.



Ce symbole indique un voltage dangereux (connexion alimentée en interne par un voltage excédant 1000 volts).



Courant alternatif (ligne de puissance).



Symbole de déplacement avec deux personnes requises. Lorsque ce symbole est noté sur notre produit, deux personnes sont requises afin de le déplacer sans accident

## Table of Contents

1.	Introduction .....	18
1.1.	Overview .....	18
1.2.	Documentation .....	18
1.3.	How to Contact Us .....	19
2.	RPI Command Reference .....	20
2.1.	Overview .....	20
2.2.	RPI Command Set Descriptions .....	20
2.2.1.	HELP? .....	20
2.2.2.	*RST .....	20
2.2.3.	*CLS .....	20
2.2.4.	*IDN? .....	20
2.2.5.	*OPT? .....	20
2.2.6.	[SYSTem]:ERR? .....	20
2.2.7.	[SYSTem]:OERR? .....	21
2.2.8.	[SYSTem]:HOLD? .....	21
2.2.9.	[SYSTem]:ASA? .....	21
2.2.10.	[SYSTem]:REFLockstatus? .....	21
2.2.11.	[SYSTem]:SYSTEM_LOCK? .....	22
2.2.12.	[SYSTem]:NUMINSTuments .....	22
2.2.13.	[SYSTem]:[EMULation]:PLAY .....	22
2.2.14.	[SYSTem]: TRIGGERONPLAY .....	22
2.2.15.	[SYSTem]:DISTRIGGERONPLAY .....	22
2.2.16.	[SYSTem]:[EMULation]:PAUSE .....	22
2.2.17.	[SYSTem]:[EMULation]:STOP .....	23
2.2.18.	[SYSTem]:[EMULation]:STATE? .....	23
2.2.19.	[SYSTem]:[FILE]:LOAD .....	23
2.2.20.	[SYSTem]:[FILE]:SAVE .....	23
2.2.21.	[SYSTem]:FADMode .....	23
2.2.22.	[SYSTem]:FPHCALib:APPLY .....	23
2.2.23.	[SYSTem]:FPHCALib:CLEAr .....	24
2.2.24.	[SYSTem]:FPHCALib:AUTO? .....	24
2.2.25.	[SYSTem]:PHASECAL:LOAD .....	24
2.2.26.	[SYSTem]:PHASECAL:CLEAR .....	24

2.2.27.	[SYSTem]:PHASECAL:DELeTe .....	24
2.2.28.	[SYSTem]:ENHFilt? (Future available) .....	24
2.2.29.	[SYSTem]:RESet:BEgin.....	24
2.2.30.	[SYSTem]:CONNection:NUMCHM? .....	25
2.2.31.	[SYSTem]:CONNection:LOSSMode .....	25
2.2.32.	[SYSTem]:CONNection:LIBrary .....	25
2.2.33.	[SYSTem]:CONNection:LIBAValable? .....	25
2.2.34.	[SYSTem]:CONNection:RLCM.....	25
2.2.35.	[SYSTem]:CONNection:IPCAL:PORTS .....	25
2.2.36.	[SYSTem]:CONNection:IPCAL:BEgin .....	26
2.2.37.	[SYSTem]:CONNection:IPCAL:STATUs?.....	26
2.2.38.	[SYSTem]:CONNection:IPCAL:ABORt .....	26
2.2.39.	[SYSTem]:RLINK:{AB,BA}##:[STATe]?.....	26
2.2.40.	[SYSTem]:RLINK:{AB,BA}##:CONNeCted?.....	26
2.2.41.	[SYSTem]:RLINK:{AB,BA}##:CHMindex? .....	27
2.2.42.	[SYSTem]:RLINK:{AB,BA}##:PHAsE? .....	27
2.2.43.	[SYSTem]:RLINK:{AB,BA}##:RELPower? .....	27
2.2.44.	[SYSTem]:RLINK:{AB,BA}##:ABSPower?.....	27
2.2.45.	[SYSTem]:PORT:ANUMports? .....	27
2.2.46.	[SYSTem]:PORT:BNUMports? .....	28
2.2.47.	[SYSTem]:PORT:AWGNAUToset .....	28
2.2.48.	[SYSTem]:PORT:{A,B}#:MODE? .....	28
2.2.49.	[SYSTem]:PORT:{A,B}#:GROUP? .....	28
2.2.50.	[SYSTem]:PORT:{A,B}#:INPut? .....	28
2.2.51.	[SYSTem]:PORT:{A,B}#:OUTPut? .....	29
2.2.52.	[SYSTem]:PORT:{A,B}#:LOSS? .....	29
2.2.53.	[SYSTem]:PORT:{A,B}#:DIGLoss? .....	29
2.2.54.	[SYSTem]:PORT:{A,B}#:RFOUT? .....	29
2.2.55.	[SYSTem]:PORT:{A,B}#:INPPHAsE? .....	30
2.2.56.	[SYSTem]:PORT:{A,B}#:OUTPPHAsE? .....	30
2.2.57.	[SYSTem]:PORT:{A,B}#:INPDelay? .....	30
2.2.58.	[SYSTem]:PORT:{A,B}#:OUTPDelay? .....	30
2.2.59.	[SYSTem]:PORT:{A,B}#:INFREQuency? .....	31
2.2.60.	[SYSTem]:PORT:{A,B}#:OUTFREQuency? .....	31
2.2.61.	[SYSTem]:PORT:{A,B}#:INBWMax? .....	31

2.2.62.	[SYSTem]:PORT:{A,B}#:CFACtor?	31
2.2.63.	[SYSTem]:PORT:{A,B}#:ICBLloss?	32
2.2.64.	[SYSTem]:PORT:{A,B}#:OCBLloss?	32
2.2.65.	[SYSTem]:PORT:{A,B}#:OVERload?	32
2.2.66.	[SYSTem]:PORT:{A,B}#:CLROVerload	32
2.2.67.	[SYSTem]:PORT:{A,B}#:INSTindex?	32
2.2.68.	[SYSTem]:PORT:{A,B}#:PHYSname?	33
2.2.69.	[SYSTem]:PORT:{A,B}#:BAUToset	33
2.2.70.	[SYSTem]:PORT:{A,B}#:AABort	33
2.2.71.	[SYSTem]:PORT:{A,B}#:ASTatus?	33
2.2.72.	[SYSTem]:PORT:{A,B}#:INTerferer:PORTAUToset	34
2.2.73.	[SYSTem]:PORT:{A,B}#:INTerferer:[MODE]?	34
2.2.74.	[SYSTem]:PORT:{A,B}#:INTerferer:UNITS?	34
2.2.75.	[SYSTem]:PORT:{A,B}#:INTerferer:CTON?	34
2.2.76.	[SYSTem]:PORT:{A,B}#:INTerferer:EBNO?	34
2.2.77.	[SYSTem]:PORT:{A,B}#:INTerferer:NOISElevel?	35
2.2.78.	[SYSTem]:PORT:{A,B}#:INTerferer:BITRate?	35
2.2.79.	[SYSTem]:PORT:{A,B}#:INTerferer:NBWidth?	35
2.2.80.	[SYSTem]:PORT:{A,B}#:INTerferer:RBWidth?	35
2.2.81.	[SYSTem]:PORT:{A,B}#:INTerferer:AWGNAUTOCal?	35
2.2.82.	[SYSTem]:PORT:{A,B}#:MEASure:CTON?	36
2.2.83.	[SYSTem]:PORT:{A,B}#:MEASure:EBNO?	36
2.2.84.	[SYSTem]:PORT:{A,B}#:MEASure:TTHReshold?	36
2.2.85.	[SYSTem]:PORT:{A,B}#:MEASure:Iavgexp?	36
2.2.86.	[SYSTem]:PORT:{A,B}#:MEASure:Oavgexp?	36
2.2.87.	[SYSTem]:PORT:{A,B}#:MEASure:ILEVel?	36
2.2.88.	[SYSTem]:PORT:{A,B}#:MEASure:OLEVel?	37
2.2.89.	[SYSTem]:PORT:{A,B}#:MEASure:ITYPE?	37
2.2.90.	[SYSTem]:PORT:{A,B}#:MEASure:TMODE?	37
2.2.91.	[SYSTem]:PORT:{A,B}#:MEASure:OTYPE?	37
2.2.92.	[SYSTem]:PORT:{A,B}#:MEASure:NOISElevel?	37
2.2.93.	[SYSTem]:PORT:{A,B}#:ITRACKing:[MODE]?	38
2.2.94.	[SYSTem]:PORT:{A,B}#:ITRACKing:[AUTO]:PERiod?	38
2.2.95.	[SYSTem]:PORT:{A,B}#:ITRACKing:[AUTO]:RESolution?	38
2.2.96.	[SYSTem]:PORT:{A,B}#:ITRACKing:[AUTO]:STEP?	38

2.2.97.	[SYSTem]:PORT:{A,B}#:ENHFILter? (Future available).....	39
2.2.98.	[SYSTem]:PORT:{A,B}#[CHANnel#]:INPPHase? .....	39
2.2.99.	[SYSTem]:PORT:{A,B}#[CHANnel#]:OUTPPHase? .....	39
2.2.100.	[SYSTem]:PORT:{A,B}#[CHANnel#]:INPDelay? .....	40
2.2.101.	[SYSTem]:PORT:{A,B}#[CHANnel#]:OUTPDelay? .....	40
2.2.102.	[SYSTem]:PORTPHase:SAVE .....	40
2.2.103.	[SYSTem]:PORTPHase:LOAD .....	40
2.2.104.	[SYSTem]:CHM#:BYPass? .....	41
2.2.105.	[SYSTem]:CHM#:BYPTYPE? .....	41
2.2.106.	[SYSTem]:CHM#:BYPAB? .....	41
2.2.107.	[SYSTem]:CHM#:BYPBA? .....	41
2.2.108.	[SYSTem]:CHM#:STATPHA? .....	42
2.2.109.	[SYSTem]:CHM#:CORRelation:LIBrary? .....	42
2.2.110.	[SYSTem]:CHM#:CORRelation:LIBAVailable? .....	42
2.2.111.	[SYSTem]:CHM#:CORRelation:MATRix:[ALLpaths] .....	43
2.2.112.	[SYSTem]:CHM#:CORRelation:MATRix:PATH#[VALue]? .....	44
2.2.113.	[SYSTem]:CHM#:CORRelation:MATRix:SIZE? .....	45
2.2.114.	[SYSTem]:CHM#:RLINKS? .....	45
2.2.115.	[SYSTem]:CHM#[PROP]:LIBrary? .....	45
2.2.116.	[SYSTem]:CHM#[PROP]:LIBAVail? .....	45
2.2.117.	[SYSTem]:CHM#[PROP]:NUMPaths? .....	46
2.2.118.	[SYSTem]:CHM#[PROP]:BDEath:DBINs? .....	46
2.2.119.	[SYSTem]:CHM#[PROP]:BDEath:NUMBins? .....	46
2.2.120.	[SYSTem]:CHM#[PROP]:BDEath:SDURation? .....	46
2.2.121.	[SYSTem]:CHM#[PROP]:DIRection? .....	46
2.2.122.	[SYSTem]:CHM#[PROP]:BULKdelay:[VALue]? .....	47
2.2.123.	[SYSTem]:CHM#[PROP]:BULKdelay:STATe? .....	47
2.2.124.	[SYSTem]:CHM#[PROP]:GCM:PATH#:AOA? .....	47
2.2.125.	[SYSTem]:CHM#[PROP]:GCM:PATH#:AOD? .....	47
2.2.126.	[SYSTem]:CHM#[PROP]:GCM:PATH#:BSAS? .....	47
2.2.127.	[SYSTem]:CHM#[PROP]:GCM:PATH#:BSPAS? .....	48
2.2.128.	[SYSTem]:CHM#[PROP]:GCM:PATH#:DELay:[VALue]? .....	48
2.2.129.	[SYSTem]:CHM#[PROP]:GCM:PATH#:LOS:AOA? .....	48
2.2.130.	[SYSTem]:CHM#[PROP]:GCM:PATH#:LOS:AOD? .....	48
2.2.131.	[SYSTem]:CHM#[PROP]:GCM:PATH#:LOS:DOPPler? .....	48



2.2.132.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:KFACtor?	49
2.2.133.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:LOS:[STATe]?	49
2.2.134.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#: EXCDelay?	49
2.2.135.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#: NUMScatterers?	49
2.2.136.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPath#: RELPower?	50
2.2.137.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MIDPATHS: [STATe]?	50
2.2.138.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MODulation?	50
2.2.139.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSAS?	50
2.2.140.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSDirection?	51
2.2.141.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSPAS?	51
2.2.142.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:MSVelocity?	51
2.2.143.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:NUMMidpaths?	51
2.2.144.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:NUMScatterers?	51
2.2.145.	[SYSTem]:CHM#:[PROP]:GCM:PATH#:RPLoss?	52
2.2.146.	[SYSTem]:CHM#:[PROP]:GCM3D:XPR?	52
2.2.147.	[SYSTem]:CHM#:[PROP]:GCM3D:MSVUNITs	52
2.2.148.	[SYSTem]:CHM#:[PROP]:GCM3D:MSVelocity	52
2.2.149.	[SYSTem]:CHM#:[PROP]:GCM3D:PHIDOT	53
2.2.150.	[SYSTem]:CHM#:[PROP]:GCM3D:THETADOT	53
2.2.151.	[SYSTem]:CHM#:[PROP]:GCM3D:LOS:[STATe]?	53
2.2.152.	[SYSTem]:CHM#:[PROP]:GCM3D:LOS:KFACMethod?	53
2.2.153.	[SYSTem]:CHM#:[PROP]:GCM3D:LOS:KFACtor?	53
2.2.154.	[SYSTem]:CHM#:[PROP]:GCM3D:LOS:RPLOS?	54
2.2.155.	[SYSTem]:CHM#:[PROP]:GCM3D:LOS:RPNLOS?	54
2.2.156.	[SYSTem]:CHM#:[PROP]:GCM3D:MODEL?	54
2.2.157.	[SYSTem]:CHM#:[PROP]:GCM3D:PAS?	54
2.2.158.	[SYSTem]:CHM#:[PROP]:GCM3D:ZEROLOSPHase?	54
2.2.159.	[SYSTem]:CHM#:[PROP]:GCM3D: STREETWidth	55
2.2.160.	[SYSTem]:CHM#:[PROP]:GCM3D: BUILDHeight	55
2.2.161.	[SYSTem]:CHM#:[PROP]:GCM3D:DIMension	55
2.2.162.	[SYSTem]:CHM#:[PROP]:GCM3D:USEPOLPHasefile	55
2.2.163.	[SYSTem]:CHM#:[PROP]:GCM3D:POLPHasefile	55

2.2.164.	[SYSTem]:CHM#:[PROP]:GCM3D:SPASSIGNment .....	56
2.2.165.	[SYSTem]:CHM#:[PROP]:GCM3D:SPASSIGNFILE .....	56
2.2.166.	[SYSTem]:CHM#:[PROP]:GCM3D:USESPANGlesfile .....	56
2.2.167.	[SYSTem]:CHM#:[PROP]:GCM3D:SPANGlesfile .....	56
2.2.168.	[SYSTem]:CHM#:[PROP]:GCM3D:USEMPMAPfile .....	56
2.2.169.	[SYSTem]:CHM#:[PROP]:GCM3D:MPMAPfile .....	57
2.2.170.	[SYSTem]:CHM#:[PROP]:GCM3D:CLUSTDSpread .....	57
2.2.171.	[SYSTem]:CHM#:[PROP]:GCM3D:DIST3D .....	57
2.2.172.	[SYSTem]:CHM#:[PROP]:GCM3D:DSScaling .....	57
2.2.173.	[SYSTem]:CHM#:[PROP]:GCM3D:DSDDESired .....	58
2.2.174.	[SYSTem]:CHM#:[PROP]:GCM3D:ASADESired.....	58
2.2.175.	[SYSTem]:CHM#:[PROP]:GCM3D:ASDDESired .....	58
2.2.176.	[SYSTem]:CHM#:[PROP]:GCM3D:ZSADESired .....	58
2.2.177.	[SYSTem]:CHM#:[PROP]:GCM3D:ZSDDESired.....	59
2.2.178.	[SYSTem]:CHM#:[PROP]:GCM3D:AOAOffset.....	59
2.2.179.	[SYSTem]:CHM#:[PROP]:GCM3D:ASDOFFset.....	59
2.2.180.	[SYSTem]:CHM#:[PROP]:GCM3D:ZOAOFFset.....	59
2.2.181.	[SYSTem]:CHM#:[PROP]:GCM3D:ZODOFFset.....	60
2.2.182.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:STATe .....	60
2.2.183.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:DELay:[VALue] ....	60
2.2.184.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:RPLoss .....	60
2.2.185.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPATHS: [STATe] .....	61
2.2.186.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:NUMMidpaths? ....	61
2.2.187.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#: NUMScatters .....	61
2.2.188.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#: RELPower.....	61
2.2.189.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:MIDPath#: EXCDelay .....	62
2.2.190.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:AOA .....	62
2.2.191.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:AOD .....	62
2.2.192.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ASA .....	62
2.2.193.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ASD .....	63
2.2.194.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZOA .....	63
2.2.195.	[SYSTem]:CHM#:[PROP]:GCM3D:PATH#:ZOD .....	63

2.2.196.	[SYSTem]:CHM#[PROP]:GCM3D:PATH#:ZSA.....	63
2.2.197.	[SYSTem]:CHM#[PROP]:GCM3D:PATH#:ZSD .....	64
2.2.198.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:PATternfile# .....	64
2.2.199.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCX .....	64
2.2.200.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCY .....	65
2.2.201.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCZ .....	65
2.2.202.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:THETATilt.....	65
2.2.203.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:THETADTilt.....	66
2.2.204.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:PHIROTation.....	66
2.2.205.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:ANTLOCations .....	66
2.2.206.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:ENABSECSlant.....	67
2.2.207.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:POLVEctor# .....	67
2.2.208.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:NROWs .....	67
2.2.209.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:NCOLs .....	68
2.2.210.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:DISTUNITs.....	68
2.2.211.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:DISTY .....	68
2.2.212.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:DISTZ.....	69
2.2.213.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCVECX .....	69
2.2.214.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCVECY .....	69
2.2.215.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:LOCVE CZ .....	70
2.2.216.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:SLANTSTart.....	70
2.2.217.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:COUNTSTYLE.....	70
2.2.218.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:FIRSTVALue .....	71
2.2.219.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:ARRAYCENTer .....	71
2.2.220.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:NORMVERTGAIN ..	71
2.2.221.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:REMSelfNORMalization.....	72
2.2.222.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:FORCEAODstozero.....	72
2.2.223.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:FORCEZODstoninety .....	72
2.2.224.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:FORCEUNCORRelated.....	73
2.2.225.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:NORMOUTputpower .....	73
2.2.226.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:NORMPOWerpertap.....	73

2.2.227.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#: OUTPOWSCALFactor .....	74
2.2.228.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:PATTeRn:[STATe]...	74
2.2.229.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:THETa.....	74
2.2.230.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:AM.....	75
2.2.231.	[SYSTem]:CHM#[PROP]:GCM3D:ANT#:GAIN .....	75
2.2.232.	[SYSTem]:CHM#[PROP]:PATH#:DELay:[VALue]? .....	75
2.2.233.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MODE? .....	75
2.2.234.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: DMIN? .....	76
2.2.235.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: DMAX? .....	76
2.2.236.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: ORATe? .....	76
2.2.237.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: PERiod? .....	76
2.2.238.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: PHINitial? .....	77
2.2.239.	[SYSTem]:CHM#[PROP]:PATH#:DELay:MOVProp: DINitial? .....	77
2.2.240.	[SYSTem]:CHM#[PROP]:PATH#:DFRequency?.....	77
2.2.241.	[SYSTem]:CHM#[PROP]:PATH#:DVELocity? .....	77
2.2.242.	[SYSTem]:CHM#[PROP]:PATH#:SPFRequency? .....	78
2.2.243.	[SYSTem]:CHM#[PROP]:PATH#:SPVELocity?.....	78
2.2.244.	[SYSTem]:CHM#[PROP]:PATH#:FSHAPe?.....	78
2.2.245.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:[VALue]? .....	78
2.2.246.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:MODE? .....	79
2.2.247.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:HST:INIDs?.....	79
2.2.248.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:HST:DMIN? .....	79
2.2.249.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:HST:VELocity? .....	79
2.2.250.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:HST: MAXDoppler? .....	80
2.2.251.	[SYSTem]:CHM#[PROP]:PATH#:FSHift:HST:PERiod? .....	80
2.2.252.	[SYSTem]:CHM#[PROP]:PATH#:LOGNormal:RATE? .....	80
2.2.253.	[SYSTem]:CHM#[PROP]:PATH#:LOGNormal: SDEViation? .....	80
2.2.254.	[SYSTem]:CHM#[PROP]:PATH#:LOGNormal:[STATe]? .....	81

2.2.255.	[SYSTem]:CHM#[PROP]:PATH#:LOS:AOA? .....	81
2.2.256.	[SYSTem]:CHM#[PROP]:PATH#:LOS:DOPPler? .....	81
2.2.257.	[SYSTem]:CHM#[PROP]:PATH#:LOS:KRICian? .....	81
2.2.258.	[SYSTem]:CHM#[PROP]:PATH#:MODulation? .....	81
2.2.259.	[SYSTem]:CHM#[PROP]:PATH#:PHSHift? .....	82
2.2.260.	[SYSTem]:CHM#[PROP]:PATH#:RPLoss? .....	82
2.2.261.	[SYSTem]:CHM#[PROP]:PATH#[STATe]? .....	82
2.2.262.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:[STATe]? .....	82
2.2.263.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: [STATe]? .....	83
2.2.264.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: POWER? .....	83
2.2.265.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: AOA? .....	83
2.2.266.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: AOD? .....	84
2.2.267.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: ASRX? .....	84
2.2.268.	[SYSTem]:CHM#[PROP]:PATH#:CLMODeling:CLUSTer#: ASTX? .....	84
2.2.269.	[SYSTem]:CHM#[PROP]:CLMODeling:[USERnumber]? .....	85
2.2.270.	[SYSTem]:CHM#[PROP]:DPREFerence? .....	85
2.2.271.	[SYSTem]:RPI:TCPEcho? .....	85
2.2.272.	[SYSTem]:RPI:MONMMsg? .....	85
2.2.273.	[SYSTem]:DEE:[STATe]? .....	85
2.2.274.	[SYSTem]:DEE:MODE? .....	85
2.2.275.	[SYSTem]:DEE:TYPE? .....	86
2.2.276.	[SYSTem]:DEE:INPut? .....	86
2.2.277.	[SYSTem]:DEE:CSTATe? .....	86
2.2.278.	[SYSTem]:DEE:CLOOP? .....	86
2.2.279.	[SYSTem]:DEE:ETIME? .....	86
2.2.280.	[SYSTem]:DEE:NUMSTates? .....	86
2.2.281.	[SYSTem]:DEE:NUMLoops? .....	86
2.2.282.	[SYSTem]:DEE:COMPIle:ABORt .....	86
2.2.283.	[SYSTem]:DEE:COMPIle:BEGin .....	87
2.2.284.	[SYSTem]:DEE:COMPIle:FILE? .....	87
2.2.285.	[SYSTem]:DEE:COMPIle:PROGress? .....	87

2.2.286.	[SYSTem]:DEE:COMPile:STATus?	87
2.2.287.	[SYSTem]:DEE:PAUSE?	87
2.2.288.	[SYSTem]:DEE:PAUSEOnstate	87
2.2.289.	[SYSTem]:DEE:RESume	88
2.2.290.	[SYSTem]:DEE:ADVance	88
2.2.291.	[SYSTem]:IQP:COMPile:FILE?	88
2.2.292.	[SYSTem]:IQP:COMPile:BEG	88
2.2.293.	[SYSTem]:IQP:COMPile:PROGress?	88
2.2.294.	[SYSTem]:IQP:COMPile:ABORT	88
2.2.295.	[SYSTem]:IQP:COMP:STATUS?	88
2.2.296.	[SYSTem]:IQP?	89
2.2.297.	[SYSTem]:IQP:MODE?	89
2.2.298.	[SYSTem]:IQP: NUMMilliseconds	89
2.2.299.	[SYSTem]: IQP:TYPE?	89
2.2.300.	[SYSTem]:IQP:CLOOP?	89
2.2.301.	[SYSTem]:IQP:CSAMPlE?	90
2.2.302.	[SYSTem]:IQP:NUMSAMPles?	90
2.2.303.	[SYSTem]:IQP:ETIMe?	90
2.2.304.	[SYSTem]:ENSEmble:[STATE]?	90
2.2.305.	[SYSTem]:ENSEmble:IPADdress#?	91
2.2.306.	[SYSTem]:ENSEmble:NUMINSTruments?	91
2.2.307.	[SYSTem]: HARDWAREBANDwidth	91
2.2.308.	[SYSTem]:XD:A:ATTNMODE?	91
2.2.309.	[SYSTem]:XD:B:ATTNMODE?	91
2.2.310.	[SYSTem]:XD:A:CONnect?	92
2.2.311.	[SYSTem]:XD:B:CONnect?	92
2.2.312.	[SYSTem]:XD:A:ATTN#?	92
2.2.313.	[SYSTem]:XD:B:ATTN#?	92
2.2.314.	[SYSTem]:XD:A:ATTNOFFset#?	92
2.2.315.	[SYSTem]:XD:B:ATTNOFFset#?	93
2.2.316.	[SYSTem]:XD:A:INTATTNOFFset#?	93
2.2.317.	[SYSTem]:XD:B:INTATTNOFFset#?	93
2.2.318.	[SYSTem]:XD:A:CONF#?	93
2.2.319.	[SYSTem]:XD:B:CONF#?	94
2.2.320.	[SYSTem]:XD:SETNode	94

2.2.321.	[SYSTem]:ANTenna:BSAConfig?	94
2.2.322.	[SYSTem]:ANTenna:BSASpacing:MM?	94
2.2.323.	[SYSTem]:ANTenna:BSASpacing:LAMbda?	94
2.2.324.	[SYSTem]:ANTenna:MSASpacing:MM?	95
2.2.325.	[SYSTem]:ANTenna:MSASpacing:LAMbda?	95
2.2.326.	[SYSTem]:ANTenna:MSAConfig?	95
2.2.327.	[SYSTem]:ANTenna:PATtern:AM?	95
2.2.328.	[SYSTem]:ANTenna:PATtern:[STATe]?	95
2.2.329.	[SYSTem]:ANTenna:PATtern:THETa?	95
2.2.330.	[SYSTem]:ANTenna:BSPAT#?	96
2.2.331.	[SYSTem]:ANTenna:MSPAT#?	96
2.2.332.	[SYSTem]:ANTenna:COUPMATRix	96
2.2.333.	[SYSTem]:XA:INST#:CONnect?	97
2.2.334.	[SYSTem]:XA:INST#:RF#:OUTATT?	97
2.2.335.	[SYSTem]:XA:INST#:MSW?	97
2.2.336.	[SYSTem]:XA:INST#:SSW?	98
2.2.337.	[SYSTem]:XA:INST#:RF#:OUTATTA?	98
2.2.338.	[SYSTem]:XA:INST#:RF#:UPBANDATT?	98
2.2.339.	[SYSTem]:XA:INST#:RF#:UPBANDSW?	99
2.2.340.	[SYSTem]:XA:INST#:RF#:LOWBANDATT?	99
2.2.341.	[SYSTem]:XA:INST#:RF#:LOWBANDSW?	100
2.2.342.	[SYSTem]:XA:INST#:RF#:ATT?	100
2.2.343.	[SYSTem]:XA:INST#:RF#:SW?	101
2.2.344.	[SYSTem]:XA:INST#:INAMPSW?	101
2.2.345.	[SYSTem]:XA:INST#:INAMPSWA?	101
2.2.346.	[SYSTem]:FRANGMAX?	101
2.2.347.	[SYSTem]: DOPPLERFREQ?	102
2.2.348.	[SYSTem]: DSPBType?	102
2.2.349.	[SYSTem]:HSRPI[:STATe]?	102
2.2.350.	[SYSTem]:RTDEE[:STATe]?	102
2.2.351.	[SYSTem]:RTDEE:PMMODE?	102
2.2.352.	[SYSTem]:RTDEE:LOG:TTHreshold?	102
2.2.353.	[SYSTem]:RTDEE:LOG:EVENTs?	103
2.2.354.	[SYSTem]:RTDEE:LOG:EVENTs:CLEar	103
2.2.355.	[SYSTem]:HFC:A:CONF?	103



2.2.356.	[SYSTem]:MEB:CMB:LIBrary?	103
2.2.357.	[SYSTem]:MEB:CMB: LIBAVailable?	103
2.2.358.	[SYSTem]:MEB:CHANCOUNT?	103
2.2.359.	[SYSTem]:MEB:PORT:MAP?	103
2.2.360.	[SYSTem]:MEB:PORT:GETMAP? Channel #	104
2.2.361.	[SYSTem]:MEB:PORT:SETMAP Channel#, portMAP	104
2.2.362.	[SYSTem]:MEB: PORT:RESET	104
2.2.363.	[SYSTem]:MEB:ENV:GETALG? Channel#	104
2.2.364.	[SYSTem]:MEB:ENV:SETALG algType, channel#	104
2.2.365.	[SYSTem]:MEB:ENV:GETFREQ? Channel#	104
2.2.366.	[SYSTem]:MEB:ENV:SETOUTP power,channel#	104
2.2.367.	[SYSTem]:MEB:ENV:GETOUTP? Channel#	104
2.2.368.	[SYSTem]:MEB: PORT: ROTAtE?	105
2.2.369.	[SYSTem]:MEB: CAL:LIBrary?	105
2.2.370.	[SYSTem]:MEB: CAL: LIBAVailable?	105
2.2.371.	[SYSTem]:MEB: CAL: SEND? channel# (optional)	105
2.2.372.	[SYSTem]:MEB: PHCAL	105
2.2.373.	SYSTem]:MEB: PHCAL: BEGin	105
2.2.374.	[SYSTem]:MEB: PHCAL: STATus?	106
2.2.375.	[SYSTem]:MEB: PHCAL: ABORT	106
2.2.376.	[SYSTem]:MEB: ENV:LIBrary?,Channel# (optional)	106
2.2.377.	[SYSTem]:MEB: ENV:LIBAVailable?	106
2.2.378.	[SYSTem]:MEB: ENV:NUMProbes?	106
2.2.379.	[SYSTem]:MEB: ENV:LAYOut?	106
2.2.380.	[SYSTem]:MEB: ENV: ANGLEs?	106
2.2.381.	[SYSTem]:MEB: ENV: ANTConfig?	107
2.2.382.	[SYSTem]:MEB: ENV: OUTMode?	107
2.2.383.	[SYSTem]:MEB: ENV: FREQ?,Channel# (Optional)	107
2.2.384.	[SYSTem]:MEB: ENV: SENDCAL channel#	107
2.2.385.	[SYSTem]:MEB: ENV: DOT?	107
2.2.386.	[SYSTem]:MEB: ENV:EXPPower? Channel# (optional)	107
2.2.387.	[SYSTem]:MEB: ENV: PATHGAIN?	107
2.2.388.	[SYSTem]:MEB: ENV: OUTPower<value>	108
2.2.389.	[SYSTem]:MEB: ENV:SETPower? channel# (optional)	108
2.2.390.	[SYSTem]:MEB: ENV:VEL vel,channel# (optional)	108



2.2.391.	[SYSTem]:MEB:ENV:BUILD channel# (optional) .....	108
2.2.392.	[SYSTem]:MEB: BST: LIBrary<Library> .....	108
2.2.393.	[SYSTem]:MEB: BST: LIBrary? .....	108
2.2.394.	[SYSTem]:MEB: BST: LIBAvalable? .....	108
2.3.	Vectorized RPI Command .....	109
2.3.1.	Nested Loops .....	109
2.3.2.	Supported Commands .....	110

# 1. Introduction

## 1.1. Overview

The Spirent Vertex® channel emulator simplifies MIMO testing for technologies such as 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. 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.

## 1.3. How to Contact Us

To obtain technical support for any Spirent Communications product, please contact our Support Services department using any of the following methods:

### Americas

E-mail: [support@spirent.com](mailto:support@spirent.com)

Web: <http://support.spirent.com>

Toll Free: +1 800-SPIRENT (+1 800-774-7368) (North America)

Hours: Monday through Friday, 05:30 to 18:00 Pacific Time

### Europe, Africa, Middle East

E-mail: [support@spirent.com](mailto:support@spirent.com)

Web: <http://support.spirent.com>

EMEA Phone: +33 (1) 6137 2270

UK Phone: +44 1803 546333

Toll Free Phone: +1 818-676-2616

Hours: Monday through Thursday, 09:00 to 18:00, 9:00 to 17:00 Friday, Paris Time

### Asia Pacific

E-mail: [support@spirent.com](mailto:support@spirent.com)

Web: <http://support.spirent.com>

In China Mainland Phone: +86 (800) 810-9529 (toll-free)

Out of China Mainland Phone: +86 (10) 8233 0033

India Phone: 1800-419-2111

Operating Hours: Monday through Friday, 09:00 to 18:00 Beijing Time

The Spirent Knowledge Base (<http://support.spirent.com>) is designed to serve your technical information needs. The Knowledge Base gives you access to tens of thousands of documents that help answer your network analysis and measurement questions. New content is added daily by Spirent's communications and networking experts. Sign in with your user ID and password to gain access to additional content that is available only to customers – user manuals, Help files, release notes, Tech Bulletins, and more. When you sign in, you can also use the Knowledge Base to download software and firmware, and to manage your SRs.

Information about Spirent Communications and its products and services can be found on the main company website at <http://www.spirent.com>.

### Company Address

Spirent Communications, Inc.

26750 Agoura Road

Calabasas, CA 91302

USA

## 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:LIBAVailable?

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]: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		

## 2.2.46. [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		

## 2.2.47. [SYSTem]:PORT:AWGNAUToset

Initiate an AWGN Autoset operation on all output ports.

## 2.2.48. [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		

## 2.2.49. [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		

## 2.2.50. [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*

## 2.2.51. [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*

## 2.2.52. [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*

## 2.2.53. [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

## 2.2.54. [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	-

## 2.2.55. [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

## 2.2.56. [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

## 2.2.57. [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

## 2.2.58. [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

## 2.2.59. [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.

## 2.2.60. [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

## 2.2.61. [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	-

## 2.2.62. [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

## 2.2.63. [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

## 2.2.64. [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

## 2.2.65. [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.

## 2.2.66. [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		

## 2.2.67. [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		



## 2.2.68. [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".

## 2.2.69. [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		

## 2.2.70. [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		

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

Query the Autoset status for the specified port.

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

Possible responses:

"Failed" - Failed to Autoset.

"Idle" - Autoset process has not yet been initiated.

"Aborted" - Autoset Aborted.

"Complete" - Autoset completed successfully.

"InProgress" - Autoset in progress.

"Averaging" - Autoset in Progress – Averaging.

"Ranging" - Autoset in Progress – Ranging.

"WaitingForTrigger" - Autoset in Progress – No triggers yet received.

**2.2.72. [SYSTem]:PORT:{A,B}#:INTerferer:PORTAUToset**

Initiates an AWGN Autoset operation on the specified port.

**2.2.73. [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	-

**2.2.74. [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	-

**2.2.75. [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.*

**2.2.76. [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.*

## 2.2.77. [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.

## 2.2.78. [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

## 2.2.79. [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	-

## 2.2.80. [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

## 2.2.81. [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	-

## 2.2.82. [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		

## 2.2.83. [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		

## 2.2.84. [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

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

Set the number of Input averages for power meter of the specified channel. Averages will be  $2^{\text{(real)}}$ .

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

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

Set the number of Output averages for power meter of the specified channel. Averages will be  $2^{\text{(real)}}$ .

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

## 2.2.87. [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		

## 2.2.88. [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		

## 2.2.89. [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	-

## 2.2.90. [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	-

## 2.2.91. [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	-

## 2.2.92. [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	-

## 2.2.93. [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	-

## 2.2.94. [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

## 2.2.95. [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

## 2.2.96. [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

## 2.2.97. [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	-

## 2.2.98. [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}.

## 2.2.99. [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}.

## 2.2.100. [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}.

## 2.2.101. [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}.

## 2.2.102. [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.

## 2.2.103. [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.



## 2.2.104. [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	-

## 2.2.105. [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	-

## 2.2.106. [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	-

## 2.2.107. [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	-

## 2.2.108. [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	-

## 2.2.109. [SYSTem]:CHM#:CORRelation:LIBrary?

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	-

## 2.2.110. [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.

## 2.2.111. [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.

## 2.2.112. [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
```

## 2.2.113. [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. .

## 2.2.114. [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

## 2.2.115. [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	-

## 2.2.116. [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.

## 2.2.117. [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

## 2.2.118. [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 (us)	0	0.0001

## 2.2.119. [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

## 2.2.120. [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

## 2.2.121. [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		

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

Set and query the bulk delay for all the paths in a Channel Model Propagation Conditions.

ID	Range	*RST	Resolution
(int)	1 to #Channel Models in Connection Setup		
(real)	5 to 4000 (us)	5 (us)	

## 2.2.123. [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	

## 2.2.124. [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

## 2.2.125. [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

## 2.2.126. [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

## 2.2.127. [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	-

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

Set or query the fixed delay for the given path.

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

## 2.2.129. [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

## 2.2.130. [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

## 2.2.131. [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		



## 2.2.132. [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

## 2.2.133. [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	-

## 2.2.134. [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

## 2.2.135. [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		

### 2.2.136. [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		

### 2.2.137. [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	-

### 2.2.138. [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	-

### 2.2.139. [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

## 2.2.140. [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

## 2.2.141. [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	-

## 2.2.142. [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.

## 2.2.143. [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

## 2.2.144. [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		

## 2.2.145. [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

## 2.2.146. [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

## 2.2.147. [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.

## 2.2.148. [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

## 2.2.149. [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

## 2.2.150. [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

## 2.2.151. [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	

## 2.2.152. [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.

## 2.2.153. [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

## 2.2.154. [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

## 2.2.155. [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

## 2.2.156. [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	

## 2.2.157. [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.

## 2.2.158. [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	

## 2.2.159. [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.

## 2.2.160. [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.

## 2.2.161. [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	

## 2.2.162. [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	

## 2.2.163. [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"	" "	

## 2.2.164. [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	

## 2.2.165. [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"	" "	

## 2.2.166. [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	

## 2.2.167. [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"	" "	

## 2.2.168. [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	



## 2.2.169. [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"	" "	

## 2.2.170. [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.

## 2.2.171. [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.

## 2.2.172. [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	

## 2.2.173. [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.

## 2.2.174. [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.

## 2.2.175. [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.

## 2.2.176. [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.

## 2.2.177. [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.

## 2.2.178. [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.

## 2.2.179. [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.

## 2.2.180. [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.

## 2.2.181. [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.

## 2.2.182. [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.

## 2.2.183. [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 us.

## 2.2.184. [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.

## 2.2.185. [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	

## 2.2.186. [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	

## 2.2.187. [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)	

## 2.2.188. [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.

## 2.2.189. [SYSTem]:CHM#:[PROP]:GCM3D:PATH#: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 us.

## 2.2.190. [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.

## 2.2.191. [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.

## 2.2.192. [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.

## 2.2.193. [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.

## 2.2.194. [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.

## 2.2.195. [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.

## 2.2.196. [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.

## 2.2.197. [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.

## 2.2.198. [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).

## 2.2.199. [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.



## 2.2.200. [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.

## 2.2.201. [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.

## 2.2.202. [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).

## 2.2.203. [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).

## 2.2.204. [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).

## 2.2.205. [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).

## 2.2.206. [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).

## 2.2.207. [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).

## 2.2.208. [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).

## 2.2.209. [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).

## 2.2.210. [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).

## 2.2.211. [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).

## 2.2.212. [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).

## 2.2.213. [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).

## 2.2.214. [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).

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

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).

## 2.2.216. [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).

## 2.2.217. [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).

## 2.2.218. [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).

## 2.2.219. [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).

## 2.2.220. [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).

## 2.2.221. [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).

## 2.2.222. [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).

## 2.2.223. [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).



## 2.2.224. [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).

## 2.2.225. [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).

## 2.2.226. [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).

## 2.2.227. [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).

## 2.2.228. [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).

## 2.2.229. [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).

## 2.2.230. [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).

## 2.2.231. [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).

## 2.2.232. [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 (us)	0	0.0001

## 2.2.233. [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	-

## 2.2.234. [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 (us)	0	0.0001

## 2.2.235. [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 (us)	0	0.0001

## 2.2.236. [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

## 2.2.237. [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)			

### 2.2.238. [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

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

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

### 2.2.240. [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

### 2.2.241. [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.

## 2.2.242. [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		

## 2.2.243. [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		

## 2.2.244. [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	-

## 2.2.245. [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

## 2.2.246. [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	-

## 2.2.247. [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

## 2.2.248. [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

## 2.2.249. [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

### 2.2.250. [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

### 2.2.251. [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)			

### 2.2.252. [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

### 2.2.253. [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



## 2.2.254. [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	-

## 2.2.255. [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

## 2.2.256. [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

## 2.2.257. [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

## 2.2.258. [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	-

## 2.2.259. [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

## 2.2.260. [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

## 2.2.261. [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	-

## 2.2.262. [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		-

## 2.2.263. [SYSTem]:CHM#:[PROP]:PATH#:CLMDeIng: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	

## 2.2.264. [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)	

## 2.2.265. [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

## 2.2.266. [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

## 2.2.267. [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

## 2.2.268. [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

## 2.2.269. [SYSTem]:CHM#:[PROP]:CLMODeIng:[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		

## 2.2.270. [SYSTem]:CHM#:[PROP]:DPREFerence?

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

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

## 2.2.271. [SYSTem]:RPI:TCPEcho?

Enable TCP/IP Echo for the RPI.

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

## 2.2.272. [SYSTem]:RPI:MONMsg?

Enable Monitor Messages for the RPI View.

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

## 2.2.273. [SYSTem]:DEE:[STATe]?

Query, enable or disable DEE.

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

## 2.2.274. [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	-

## 2.2.275. [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	-

## 2.2.276. [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	-

## 2.2.277. [SYSTem]:DEE:CSTATE?

Query the current DEE state number.

## 2.2.278. [SYSTem]:DEE:CLOOP?

Query the current DEE loop number.

## 2.2.279. [SYSTem]:DEE:ETIME?

Query the current DEE elapsed time.

## 2.2.280. [SYSTem]:DEE:NUMSTates?

Query the number of DEE states.

## 2.2.281. [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

## 2.2.282. [SYSTem]:DEE:COMPIle:ABORT

Abort the DEE compile.

### 2.2.283. [SYSTem]:DEE:COMPile:BEgin

Begin a DEE compile.

### 2.2.284. [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"

### 2.2.285. [SYSTem]:DEE:COMPile:PROGress?

Query the DEE compile progress for the given unit.

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

### 2.2.286. [SYSTem]:DEE:COMPile:STATus?

Query the DEE compile status.

Possible Responses:

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

### 2.2.287. [SYSTem]:DEE:PAUSE?

Pause DEE fading or query DEE pause state.

Returns bool {ON, OFF}.

### 2.2.288. [SYSTem]:DEE:PAUSEOnstate

Pause DEE at a user specified state.

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

### 2.2.289. [SYSTem]:DEE:RESume

Resume normal DEE operation if DEE is paused.

### 2.2.290. [SYSTem]:DEE:ADVance

Move a DEE operation to the next state.

### 2.2.291. [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

### 2.2.292. [SYSTem]:IQP:COMPile:BEG

Compile the IQ Playback file.

### 2.2.293. [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

### 2.2.294. [SYSTem]:IQP:COMPile:ABORT

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

### 2.2.295. [SYSTem]:IQP:COMP:STATUS?

Query the status of compiling the IQ Playback file.

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



## 2.2.296. [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?

## 2.2.297. [SYSTem]:IQP:MODE?

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

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

## 2.2.298. [SYSTem]:IQP: NUMMilliseconds

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

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

## 2.2.299. [SYSTem]: IQP:TYPE?

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

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

## 2.2.300. [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	-

## 2.2.301. [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

## 2.2.302. [SYSTem]:IQP:NUMSAMPles?

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

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

## 2.2.303. [SYSTem]:IQP:ETIME?

Queries the Current Playback Duration.

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

## 2.2.304. [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

## 2.2.305. [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	-

## 2.2.306. [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.

## 2.2.307. [SYSTem]: HARDWAREBANDwidth

Sets or queries the bandwidth of the Vertex instrument.

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

## 2.2.308. [SYSTem]:XD:A:ATTNMODE?

Set or query the XD5-A attenuation mode.

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

## 2.2.309. [SYSTem]:XD:B:ATTNMODE?

Set or query the XD5-B attenuation mode.

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

## 2.2.310. [SYSTem]:XD:A:CONnect?

Query the connect state of an XD5-A instrument.

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

## 2.2.311. [SYSTem]:XD:B:CONnect?

Query the connect state of an XD5-B instrument.

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

## 2.2.312. [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.

## 2.2.313. [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.

## 2.2.314. [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

## 2.2.315. [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

## 2.2.316. [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

## 2.2.317. [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

## 2.2.318. [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	-

## 2.2.319. [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	-

## 2.2.320. [SYSTem]:XD:SETNode

Configure an XD5 to Node A or B.

XD:SETN A

## 2.2.321. [SYSTem]:ANTenna:BSAConfig?

Set or query the Base Station antenna configuration.

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

## 2.2.322. [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

## 2.2.323. [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

## 2.2.324. [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

## 2.2.325. [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

## 2.2.326. [SYSTem]:ANTenna:MSAConfig?

Set or query the Mobile Station antenna configuration.

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

## 2.2.327. [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

## 2.2.328. [SYSTem]:ANTenna:PATtern:[STATe]?

Enable or disable the antenna pattern.

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

## 2.2.329. [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

## 2.2.330. [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	""	-

## 2.2.331. [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	""	-

## 2.2.332. [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**



## 2.2.333. [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	-

## 2.2.334. [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

## 2.2.335. [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	-

## 2.2.336. [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	-

## 2.2.337. [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

## 2.2.338. [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

## 2.2.339. [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	-

## 2.2.340. [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

## 2.2.341. [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	-

## 2.2.342. [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

## 2.2.343. [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	-

## 2.2.344. [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	-

## 2.2.345. [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	-

## 2.2.346. [SYSTem]:FRANGMAX?

Set or query the maximum frequency range of Vertex in MHz.

ID	Range	*RST	Resolution
(int)	3850-6000	5925	1

## 2.2.347. [SYSTem]: DOPPLERFREQ?

Set or query the maximum Doppler frequency mode of Vertex in KHz.

ID	Range	*RST	Resolution
(int)	4, 12	4	

## 2.2.348. [SYSTem]: DSPBType?

Query the type of DSP board.

Range : 1 - DSPM1

2 - DSPM2

## 2.2.349. [SYSTem]:HSRPI[:STATe]?

Set or query the High Speed RPI state.

ID	Range	*RST	Resolution
(string)	On, OFF	OFF	

## 2.2.350. [SYSTem]:RTDEE[:STATe]?

Set or query the live streaming DEE state.

ID	Range	*RST	Resolution
(string)	On, OFF	OFF	

## 2.2.351. [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	

## 2.2.352. [SYSTem]:RTDEE:LOG:TThreshhold?

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.

## 2.2.353. [SYSTem]:RTDEE:LOG:EVENTs?

Query LSDEE event log.

ID	Range	*RST	Resolution
(string)	Read only		1

## 2.2.354. [SYSTem]:RTDEE:LOG:EVENTs:CLEAr

Clear LSDEE event log.

ID	Range	*RST	Resolution
(string)	N/A		

## 2.2.355. [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	

## 2.2.356. [SYSTem]:MEB:CMB:LIBrary?

Query the name of the current Chamber Setup library entry.

## 2.2.357. [SYSTem]:MEB:CMB: LIBAvaliable?

Return the list of chamber setup entries available in the Chamber Setup library.

## 2.2.358. [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.

## 2.2.359. [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.

### 2.2.360. [SYSTem]:MEB:PORT:GETMAP? Channel #

Query the port mapping.

MEB:PORT:GETMAP? 1 queries the port mapping of MOTA channel 2.

### 2.2.361. [SYSTem]:MEB:PORT:SETMAP Channel#, portMAP

Specify the portMAP for channel #.

### 2.2.362. [SYSTem]:MEB: PORT:RESET

Restore the default port map (B1, B2, B3, ...Bn).

### 2.2.363. [SYSTem]:MEB:ENV:GETALG? Channel#

Query the algorithm type.

Range of values: PRECISION, REALTIME.

### 2.2.364. [SYSTem]:MEB:ENV:SETALG algType, channel#

Set the algorithm type.

MEB:ENV:SETALG REALTIME, 0

### 2.2.365. [SYSTem]:MEB:ENV:GETFREQ? Channel#

Query carrier frequency.

MEB:ENV:GETFREQ? 1 gets the frequency of MIMO OTA channel 2.

### 2.2.366. [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.

### 2.2.367. [SYSTem]:MEB:ENV:GETOUTP? Channel#

Query output power.



### 2.2.368. [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.

### 2.2.369. [SYSTem]:MEB: CAL:LIBrary?

Query the name of the current Calibration library entry.

### 2.2.370. [SYSTem]:MEB: CAL: LIBAvaliable?

Return the list of Calibration entries available in the Calibration library.

### 2.2.371. [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:SENDCAL channel#.

### 2.2.372. [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.

### 2.2.373. [SYSTem]:MEB: PHCAL: BEGin

Begin a non-blocking execution of the Input Phase Calibration procedure.

### 2.2.374. [SYSTem]:MEB: PHCAL: STATus?

Query the status of the Input Phase Calibration procedure.

Response: IDLE, COMPUting

### 2.2.375. [SYSTem]:MEB: PHCAL: ABORT

Abort the Input Phase Calibration procedure.

### 2.2.376. [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.

### 2.2.377. [SYSTem]:MEB: ENV:LIBAValiable?

Return the list of environment entries available in the Environment library.

### 2.2.378. [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.

### 2.2.379. [SYSTem]:MEB: ENV:LAYOut?

Query the specified Environment library entry and return its chamber layout.

Range of Values: Circular, Sector.

### 2.2.380. [SYSTem]:MEB: ENV: ANGLes?

Query the specified Environment library entry and return the list of probe angles.

### 2.2.381. [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.

### 2.2.382. [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.

### 2.2.383. [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.

### 2.2.384. [SYSTem]:MEB: ENV: SENDCAL channel#

Set the Amplitude Calibration values. This command can be used only in real-time mode.

### 2.2.385. [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.

### 2.2.386. [SYSTem]:MEB: ENV:EXPPower? Channel# (optional)

Query the second column values on the Details tab in the MEB GUI.

### 2.2.387. [SYSTem]:MEB: ENV: PATHGAIN?

Set the path gain value for a chamber setup. This command is only valid in real-time mode.

### 2.2.388. [SYSTem]:MEB: ENV: OUTPower<value>

This command can only be used in real-time mode.

Range of Values: -110.0 to -20.0.

### 2.2.389. [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.

### 2.2.390. [SYSTem]:MEB: ENV:VEL vel,channel# (optional)

Set the velocity if the Algorithm Type is REALTIME.

### 2.2.391. [SYSTem]:MEB:ENV:BUILD channel# (optional)

Build the environment.

### 2.2.392. [SYSTem]:MEB: BST: LIBrary<Library>

Load the provided base station configuration. The Vertex must be in MIMO\_OTA Fading mode.

### 2.2.393. [SYSTem]:MEB: BST: LIBrary?

Query the current base station configuration loaded. The Vertex must be in MIMO\_OTA Fading mode.

### 2.2.394. [SYSTem]:MEB: BST: LIBAvailable?

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]