This document describes the following software options:

- **R&S®AMU-K46/-K246**
  1402.6506.02, 1402.8109.02
- **R&S®SMATE-K46**
  1404.5507.02
- **R&S®SMBV-K46/-K246**
  1415.8083.xx, 1415.8283.xx
- **R&S®SMJ-K46/-K246**
  1409.1016.02
- **R&S®SMU-K46/-K246**
  1160.9876.02, 1408.6014.02
- **R&S®SMW-K246**
  1413.4939.02
- **R&S®AFQ-K246**
  1401.6554.02
- **R&S®CMW-KW800**
  1203.1506.02
- **R&S®SFU-K246**
  2115.2289.02
# Contents

1 Preface.......................................................................................................................... 7
  1.1 Documentation Overview.......................................................................................... 7
  1.2 Typographical Conventions...................................................................................... 8

2 Introduction.................................................................................................................. 9

3 Modulation System CDMA2000.................................................................................... 11
  3.1 Modulation System CDMA2000 in the Downlink (Forward)..................................... 11
  3.2 Modulation System CDMA2000 in the Uplink (Reverse)......................................... 11
  3.3 Data Source - Uplink and Downlink......................................................................... 12
  3.4 Channel Coding - Uplink and Downlink.................................................................... 12
  3.5 Long-Code Scrambling Generator - Downlink....................................................... 13
  3.6 Power Control Puncturing - Downlink.................................................................... 14
  3.7 Variable-Length Walsh Spreading - Downlink....................................................... 14
  3.8 PN Short-Code Scrambling - Downlink.................................................................... 14
  3.9 Spreading - Uplink.................................................................................................. 14
    3.9.1 Variable Length Walsh Spreading......................................................................... 15
    3.9.2 64-ary Orthogonal Modulator............................................................................. 15
  3.10 Scrambling - Uplink.............................................................................................. 15
    3.10.1 Scrambling for Radio Configuration 1 and 2.................................................... 15
    3.10.2 Scrambling for Radio Configuration 3, 4 and 5.................................................. 17
  3.11 Baseband Filtering - Uplink and Downlink............................................................ 18
  3.12 I/Q Modulator - Uplink and Downlink.................................................................. 18
  3.13 Constellation of I/Q Signals - Downlink............................................................... 19
    3.13.1 BPSK channels................................................................................................. 19
    3.13.2 QPSK channels............................................................................................... 19
  3.14 Power Control - Downlink and Uplink................................................................. 20

4 User Interface.............................................................................................................. 21
  4.1 General Settings for CDMA2000 Signals................................................................. 22
  4.2 Configure Base Station or Mobile Station............................................................... 27
  4.3 Filter / Clipping / ARB Settings.............................................................................. 31
    4.3.1 Filter Settings.................................................................................................... 31
4.3.2 Clipping Settings........................................................................................................... 32
4.3.3 ARB Settings................................................................................................................ 36
4.3.4 I/Q Setting..................................................................................................................... 36
4.4 Trigger/Marker/Clock Settings................................................................................... 37
4.4.1 Trigger In.......................................................................................................................38
4.4.2 Marker Mode................................................................................................................. 42
4.4.3 Marker Delay.................................................................................................................43
4.4.4 Clock Settings............................................................................................................... 43
4.4.5 Global Settings..............................................................................................................45
4.5 Predefined Settings - Downlink.................................................................................. 46
4.6 Additional Mobile Station - Uplink.............................................................................49
4.7 Base Station Configuration........................................................................................50
4.7.1 Common Settings..........................................................................................................51
4.7.2 Code Domain and Channel Graphs............................................................................ 53
4.7.3 Channel Table - BS.......................................................................................................57
4.8 More Parameters - BS Channel Table......................................................................... 63
4.8.1 General Settings........................................................................................................... 65
4.8.2 Power Control............................................................................................................... 66
4.8.3 Channel Coding............................................................................................................ 68
4.8.4 Additional Sync Channel Parameters........................................................................... 70
4.8.5 Error Insertion............................................................................................................... 72
4.9 More Parameters for F-PDCH - BS............................................................................ 73
4.9.1 General Settings for Packet Channel............................................................................74
4.9.2 Subpacket Table Settings............................................................................................. 75
4.9.3 Subpacket Graph.......................................................................................................... 78
4.10 Mobile Station Configuration (MS)............................................................................ 78
4.10.1 Common Settings - MS................................................................................................. 79
4.10.2 Power Control - MS.......................................................................................................80
4.10.3 Channel Table - MS......................................................................................................82
5 Remote-Control Commands.......................................................................................... 87
5.1 Primary Commands..................................................................................................... 88
5.2 Filter/Clipping Settings................................................................................................. 95
5.2.1 Filter Settings............................................................................................................... 95
5.2.2 Clipping Settings......................................................................................................... 100
5.3 Trigger Settings........................................................................................................... 101
5.4 Marker Settings.......................................................................................................... 107
5.5 Clock Settings........................................................................................................... 111
5.6 Predefined Settings.................................................................................................... 114
5.7 Setting Base Stations................................................................................................ 119
5.8 Mobile Station Settings............................................................................................ 154

List of Commands.......................................................................................................... 168
Index.................................................................................................................................... 172
1 Preface

1.1 Documentation Overview

The user documentation for the R&S Signal Generator consists of the following parts:

- Online Help system on the instrument,
- "Quick Start Guide" printed manual,
- Documentation CD-ROM with:
  - Online help system (*.chm) as a standalone help,
  - Operating Manuals for base unit and options,
  - Service Manual,
  - Data sheet and specifications,
  - Links to useful sites on the R&S internet.

Online Help

The Online Help is embedded in the instrument's firmware. It offers quick, context-sensitive access to the complete information needed for operation and programming. The online help contains help on operating the R&S Signal Generator and all available options.

Quick Start Guide

The Quick Start Guide is delivered with the instrument in printed form and in PDF format on the Documentation CD-ROM. It provides the information needed to set up and start working with the instrument. Basic operations and an example of setup are described. The manual includes also general information, e.g., Safety Instructions.

Operating Manuals

The Operating Manuals are a supplement to the Quick Start Guide. Operating Manuals are provided for the base unit and each additional (software) option.

These manuals are available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. In the Operating Manual for the base unit, all instrument functions are described in detail. Furthermore, it provides an introduction to remote control and a complete description of the remote control commands with programming examples. Information on maintenance, instrument interfaces and error messages is also given.

In the individual option manuals, the specific instrument functions of the option are described in detail. For additional information on default settings and parameters, refer to the data sheets. Basic information on operating the R&S Signal Generator is not included in the option manuals.
Service Manual

The Service Manual is available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. It describes how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the instrument by the replacement of modules.

This manual can also be ordered in printed form (see ordering information in the data sheet).

Release Notes

The release notes describe new and modified functions, eliminated problems, and last minute changes to the documentation. The corresponding firmware version is indicated on the title page of the release notes. The current release notes are provided in the Internet.

Web Helps

Web helps are provided for the base unit and each additional (software) option. The content of the web helps correspond to the user manuals for the latest product versions.

The web help is an additional file format that offers quick online access. They are not intended to be downloaded but rather to access the required information directly from the R&S website.

Web helps are available at the R&S website, on the R&S Signal Generator product page at the "Downloads > Web Help" area.

1.2 Typographical Conventions

The following text markers are used throughout this documentation:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Graphical user interface elements&quot;</td>
<td>All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.</td>
</tr>
<tr>
<td>KEYS</td>
<td>Key names are written in capital letters.</td>
</tr>
<tr>
<td><strong>File names, commands, program code</strong></td>
<td>File names, commands, coding samples and screen output are distinguished by their font.</td>
</tr>
<tr>
<td>Input</td>
<td>Input to be entered by the user is displayed in italics.</td>
</tr>
<tr>
<td>Links</td>
<td>Links that you can click are displayed in blue font.</td>
</tr>
<tr>
<td>&quot;References&quot;</td>
<td>References to other parts of the documentation are enclosed by quotation marks.</td>
</tr>
</tbody>
</table>
2 Introduction

The R&S Signal Generator provides you with the ability to generate signals in accordance with the standard CDMA2000. CDMA2000 is the North American standard for the third mobile radio generation (3G). It is a further development of the North American mobile radio system of the second generation IS95 (CDMA). The R&S Signal Generator supports the CDMA2000 standard 3GPP2 C.S0002-C, version 1.0, may 2002 (release C). CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA – USA).

The R&S Signal Generator generates the CDMA2000 signals with a chip rate of 1,2288 Mcps, corresponding to the so-called "Spreading Rate 1".

The CDMA2000 signals of the base station are generated in a combination of realtime mode (real time channels) and arbitrary waveform mode. Simulation of bit and block errors can be activated for the channels generated in realtime. In arbitrary waveform mode, the signal is first calculated and then output.

The CDMA2000 signals of mobile station 1 (MS1) are always generated in realtime mode, the signals of the three remaining mobile stations always in arbitrary waveform mode.

The R&S Signal Generator simulates CDMA2000 at the physical channel level. The following list gives an overview of the options provided by the R&S Signal Generator for generating a CDMA2000 signal:

- Configuration of up to 4 base stations or 4 mobile stations
- Real time generation of one traffic channel and the SYNC channel on the downlink
- All special channels and up to 78 channels on the downlink (depending on the radio configuration)
- Packet channel according to 1xEV-DV on the downlink
- "Misuse For Output Power Control" parameter for varying the original normal transmit power over time
- Simulation of up to 64 additional mobile stations
- Clipping for reducing the crest factor
- All channel coding modes included in IS-2000 (Frame Quality Indicator, Convolutional Encoder, Turbo Encoder, Symbol Puncture, Interleaver, etc)
- Feeding through of bit errors (to test a BER tester) and block errors (to test a BLER tester)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreading rate</td>
<td>1.2288 MHz</td>
</tr>
<tr>
<td>Channel types</td>
<td>Downlink:</td>
</tr>
<tr>
<td></td>
<td>● Forward Pilot (F-PICH)</td>
</tr>
<tr>
<td></td>
<td>● Sync (F-SYNC)</td>
</tr>
<tr>
<td></td>
<td>● Paging (F-PCH)</td>
</tr>
<tr>
<td></td>
<td>● Transmit Diversity Pilot (F-TDPICH)</td>
</tr>
<tr>
<td></td>
<td>● Auxiliary Pilot (F-APICH)</td>
</tr>
<tr>
<td></td>
<td>● Auxiliary Transmit Diversity Pilot (F-ATDPCH)</td>
</tr>
<tr>
<td></td>
<td>● Broadcast (F-BCH)</td>
</tr>
<tr>
<td></td>
<td>● Quick Paging (F-QPCH)</td>
</tr>
<tr>
<td></td>
<td>● Common Power Control (F-CPCCH)</td>
</tr>
<tr>
<td></td>
<td>● Common Assignment (F-CACH)</td>
</tr>
<tr>
<td></td>
<td>● Forward Common Control (F-CCCH)</td>
</tr>
<tr>
<td></td>
<td>● Packet Channels</td>
</tr>
<tr>
<td></td>
<td>● Forward Packet Data Control (F-PDCCH)</td>
</tr>
<tr>
<td></td>
<td>● Forward Packet Data (F-PDCH)</td>
</tr>
<tr>
<td></td>
<td>● Traffic Channels</td>
</tr>
<tr>
<td></td>
<td>● Forward Dedicated Control (F-DCCH)</td>
</tr>
<tr>
<td></td>
<td>● Forward Fundamental (F-FCH)</td>
</tr>
<tr>
<td></td>
<td>● Forward Supplemental (F-SCH)</td>
</tr>
<tr>
<td></td>
<td>Uplink:</td>
</tr>
<tr>
<td></td>
<td>● Reverse Pilot (R-PICH)</td>
</tr>
<tr>
<td></td>
<td>● Access (R-ACH)</td>
</tr>
<tr>
<td></td>
<td>● Enhanced Access (R-EACH)</td>
</tr>
<tr>
<td></td>
<td>● Reverse Common Control (R-CCCH)</td>
</tr>
<tr>
<td></td>
<td>● Traffic Channel</td>
</tr>
<tr>
<td></td>
<td>● Reverse Dedicated Control (R-DCCCH)</td>
</tr>
<tr>
<td></td>
<td>● Reverse Fundamental (R-FCH)</td>
</tr>
<tr>
<td></td>
<td>● Reverse Supplemental Code (R-SCCH)</td>
</tr>
<tr>
<td></td>
<td>● Reverse Supplemental (R-SCH)</td>
</tr>
<tr>
<td>Channel count</td>
<td>In downlink 4 base stations each with up to 78 code channels (depending on the radio configuration).</td>
</tr>
<tr>
<td></td>
<td>In uplink 4 mobile stations with up to 8 code channels (depending on the radio configuration).</td>
</tr>
<tr>
<td>Radio configuration</td>
<td>RC 1 – RC 5 &amp; RC10</td>
</tr>
<tr>
<td>Frame length</td>
<td>Radio frame: 5 ms, 10 ms, 20 ms, 40 ms, 80 ms, 160 ms (depending on the channel type and the radio configuration)</td>
</tr>
<tr>
<td>PN offset</td>
<td>0 ... 511</td>
</tr>
<tr>
<td>Quasi Orthogonal Walsh Set</td>
<td>set 1 – set 3</td>
</tr>
<tr>
<td>Channel coding</td>
<td>All channel coding modes included in IS-2000 (Frame Quality Indicator, Convolutional Encoder, Turbo Encoder, Symbol Puncture, Interleaver, etc)</td>
</tr>
<tr>
<td>Long Code Mask</td>
<td>0 ... 3FF FFFF FFFF hex</td>
</tr>
</tbody>
</table>
3 Modulation System CDMA2000

The following simplified diagram is used to explain the system principle of CDMA200 in the forward (down) and reverse (up) link. The exact system configuration depends on parameters like link direction, spreading rate, mode, radio configuration and channel type. A detailed description cannot be given in this manual. For further information refer to the IS2000 standard.

3.1 Modulation System CDMA2000 in the Downlink (Forward)

The following block diagram shows the components of the CDMA2000 transmission system in the downlink.

![Fig. 3-1: Components of the CDMA2000 transmission system in the downlink (forward)](image)

3.2 Modulation System CDMA2000 in the Uplink (Reverse)

The following block diagram shows the components of the CDMA2000 transmission system in the uplink.
3.3 Data Source - Uplink and Downlink

The data fields of all channels can be filled from all possible data sources: pattern (all1, all0, user-defined up to 64 bits), PRBS data, data lists and external data.

3.4 Channel Coding - Uplink and Downlink

In contrast to 3GPP FDD, channel coding with CDMA2000 is part of the physical layer. The channel coding procedure may slightly vary depending on channel type, frame length and data rate. The basic coding procedure is illustrated by the coding block in the diagram above. Blocks like ‘Add reserved bits’ or ‘Symbol puncture’ are not used in all coding scenarios. For a more exact definition refer to the standard.

- **Add Reserved Bits:** filled with “0” bits
- **Add Frame Quality Indicator:** calculation and insertion of a CRC (cyclic redundancy code) checksum for error identification.
- **Add 8 Reserved/Encoder Tail Bits:** reserved, tail bits which set the subsequent coder to a defined final state.
- **Convolutional or Turbo Encoder:** error correction code, depending on data rate and other parameters either by convolutional coding or turbo codes.
Symbol Repetition: symbol repetition is used together with block symbol puncture for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Symbol Puncture: symbol puncturing (elimination) is used together with block symbol repetition for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Block Interleaver: blockwise permutation of input data sequence of interleaver to reduce bit errors.

3.5 Long-Code Scrambling Generator - Downlink

The long-code generator is also referred to as scrambling code generator since it scrambles the chip sequence in a user-specific way (long-code mask).

The long-code generator is a feedback 42-bit shift register with its status vector linked to a user-specific long-code mask to form the specific long-code sequence.

The generator polynomial of the shift-register section of the long-code generator is:

\[ p(x) = x^{42} + x^{35} + x^{33} + x^{27} + x^{26} + x^{25} + x^{22} + x^{21} + x^{19} + x^{18} + x^{17} + x^{16} + x^{10} + x^7 + x^6 + x^5 + x^3 + x^2 + x^1 + 1 \]

A real long code is used in the forward link. In the reverse link a complex long code with I and Q component is required. The long code for the I component is derived directly from the 1X generator, that for the Q component corresponds to the I long code delayed by one chip.

Fig. 3-3: Long-code generator CDMA2000
3.6 Power Control Puncturing - Downlink

To control the output power of the mobile station, the base station sends power control bits in the traffic channel at an 800 Hz rate instead of the scrambled data bits. Depending on the power control bits, the mobile station increases or reduces its output power.

3.7 Variable-Length Walsh Spreading - Downlink

Spreading of the CDMA2000 signal is performed in this block. Walsh codes with a variable spreading factor are used. The spreading factor and the Walsh code depend on the spreading rate, channel type, frame length and data rate. To extend the base-station capacity, so-called ‘quasi-orthogonal Walsh sets’ can be used in addition to the Walsh codes. The input data stream of the spreading unit is already complex (I + jQ). If a standard Walsh code is used, spreading is performed by multiplying the input symbol (modulo 2 multiplication) with the real Walsh code. The quasi-orthogonal Walsh code results in complex spreading through an additional rotation of the output phase (the spreading code then consists of a real and an imaginary part).

3.8 PN Short-Code Scrambling - Downlink

The (complex) input data stream of the PN short-code scrambler is multiplied by a complex PN sequence (I_{PN} + j Q_{PN}). This is also called ‘quadrature spreading’. With channels of the radio configurations 1 and 2, whose generation is comparable with that of IS-95 systems, this block splits up the input stream in I and Q components.

The base-station-specific parameter PN offset determines the start phase of these PN short-code sequences. This permits signals of different base stations to be distinguished.

Generator polynomial for I and Q components of the PN short code:

\[ P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1 \]
\[ P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1 \]

The period of a PN short-code sequence is 26.666 ms.

3.9 Spreading - Uplink

Increasing the data rate or spreading in the reverse link is performed in different ways depending on the radio configuration and the channel type.
3.9.1 Variable Length Walsh Spreading

Walsh codes with a variable spread factor are used for spreading. The spreading factor and the Walsh code depend on the spreading rate, channel type, frame length and the data rate. Spreading is obtained by multiplication of the input symbol (modulo 2 multiplication) by the real Walsh code.

3.9.2 64-ary Orthogonal Modulator

Groups of 6 input bits are used for addressing a line of the Walsh code table with the spread code length of 64. This ‘modulator’ increases the data rate by a factor of 64/6. This type of rate increase comes from IS-95 and is mainly used in the radio configurations 1 and 2.

3.10 Scrambling - Uplink

In the scrambling block of the uplink system the spread data stream is scrambled by means of the long code and the PN short code. Different methods are used for the radio configurations 1, 2 and RC3 to RC5.

3.10.1 Scrambling for Radio Configuration 1 and 2

![Fig. 3-4: Scrambling in the uplink RC 1 and RC2](image)

The output data stream of the spreading block is scrambled with the long code. The rate is increased in addition by a factor of four. The long-code generator is also referred to as scrambling code generator since it scrambles the chip sequence in a user-specific way (long-code mask). This generator exactly corresponds to that described in chapter 3.5, “Long-Code Scrambling Generator - Downlink”, on page 13 for the downlink.

The real input data stream of the PN short-code scrambler is multiplied by a complex PN sequence \((I_{PN} + j Q_{PN})\). This procedure is also called 'quadrature spreading'. With
channels of the radio configurations 1 and 2, whose generation is comparable with that of IS-95 systems, this block splits up the input stream in I and Q components.

In contrast to the downlink, no variable PN offset parameter is available for the PN short code in the reverse link. The PN offset is always 0.

Different generation rules are used for the PN short codes depending on the mode and spreading rate. The generator polynomials of the PN short codes correspond to those in the downlink (see chapter 3.8, “PN Short-Code Scrambling - Downlink”, on page 14). The I and Q data streams consisting of \{0, 1\} sequences are then mapped to \{+1, -1\} in the **signal point mapping** block.

Because of the delay of the Q component, offset QPSK constellation known from the reverse link of IS-95 is obtained from the QPSK constellation. Due to the Q delay, the transfer of the I and Q signal components from one chip to the next is never synchronous. For this reason there are no zero crossings in the transfer from one chip to the next. This behavior can be seen in the vector diagram below.

---

**Fig. 3-5: Scrambling in the uplink RC 1 and RC2**
3.10.2 Scrambling for Radio Configuration 3, 4 and 5

Here too, the long-code generator defined in chapter 3.5, "Long-Code Scrambling Generator - Downlink", on page 13 for the downlink is used. A complex long-code sequence is required. For this purpose, the output sequence of the generator is used as the I component and the sequence delayed by one chip as the Q component.

The I component of the long code is then multiplied by the I component of the PN short code, the Q component with the corresponding Q component of the PN short code. The definition of the PN short code is given in chapter 3.8, "PN Short-Code Scrambling - Downlink", on page 14.

The subsequent operations decimation by factor of 2 and linking the Q component to the Walsh sequence (+-) and the I component serve for reducing the zero crossings of the I/Q signal at the end of the whole scrambling process. Thus a behavior similar to that in the uplink of 3GPP is obtained. It is also known as HPSK (hybrid phase shift keying).

The resulting I/Q output stream is obtained by complex multiplication (modulo 2) of the I/Q input sequence of the scrambler by the complex scramble sequence obtained from the long code and the PN short code. The constellation obtained is a combination of QPSK and offset QPSK.

In this mode, the traffic data streams of a channel are mapped either to the I or to the Q path of the complex data stream shown in the diagram above. With these so-called BPSK channels, the channel component at the scrambler input consists of a real or an
imaginary component. As can be seen in the table below, the constellation after complex scrambling is again at the angle bisector.

<table>
<thead>
<tr>
<th>d(n) \ S-Code(n)</th>
<th>-1-j</th>
<th>-1+j</th>
<th>+1-j</th>
<th>+1+j</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>+1+j</td>
<td>+1-j</td>
<td>-1+j</td>
<td>-1-j</td>
</tr>
<tr>
<td>+1</td>
<td>-1-j</td>
<td>-1+j</td>
<td>+1-j</td>
<td>+1+j</td>
</tr>
<tr>
<td>-j</td>
<td>-1+j</td>
<td>+1+j</td>
<td>-1-j</td>
<td>+1-j</td>
</tr>
<tr>
<td>+j</td>
<td>+1-j</td>
<td>-1-j</td>
<td>+1+j</td>
<td>-1+j</td>
</tr>
</tbody>
</table>

### 3.11 Baseband Filtering - Uplink and Downlink

This block performs baseband filtering (pulse shaping and band limiting) of the I/Q signal. In addition to the filters specified in the standard, the signal generator also provides equalizer filters with a better adjacent-channel leakage ratio.

### 3.12 I/Q Modulator - Uplink and Downlink

The IQ modulator defined in the IS2000 standard differs from the definition in this implementation. The definition on which the implementation is based is used by virtually all digital communication standards (except IS95 and IS2000).

In the final step, the filtered IQ signal is modulated to the desired RF in a different way in the IQ modulator:

![Fig. 3-7: Definition of IQ modulator in IS2000 and the R&S Signal Generator](image)

According to IS2000, the RF signal $s(t)$ is derived from the baseband I/Q signal as follows:

$$s(t) = i(t) \cos(2\pi f_c t) + q(t) \sin(2\pi f_c t)$$

The R&S Signal Generator is based on the following definition:
To generate baseband signals according to IS2000 (cdma2000 standard), invert the Q-part of the signal. So that this baseband signal can be used to generate an RF signal which also conforms to the standard, the "I/Q Modulator" menu contains the "I/Q Swap" function for swapping the I/Q control of the I/Q modulator.

### 3.13 Constellation of I/Q Signals - Downlink

Depending on radio configuration and channel type, the signal components in the different channels create different sub-constellations.

#### 3.13.1 BPSK channels

With some channel types (particularly in RC1 and 2 but always in the pilot channel, for instance) the data stream is split up in I and Q components in the PN Short Code Scrambling block. The input data stream of this block is a real +/-1 sequence similar to BPSK. The complex output data sequence is then as follows:

\[ S_{out}(n) = d_{in}(n) (PN_{I}(n) + j PN_{Q}(n)) \]

with \( d_{in}(n), PN_{I}(n), PN_{Q}(n) \in \{-1, +1\} \).

This yields four different output combinations for \( S_{out} \):

\((-1 -j), (-1 +j), (+1 -j), (+1 +j)\),

ie. all points are on one of the two angle bisectors at the I/Q level.

![Fig. 3-8: Constellation diagram of a BPSK channel with 0 dB power](image)

#### 3.13.2 QPSK channels

With other channel types, the input data stream of the PN Short Code Scrambling block is a complex \( \pm 1 \pm j \) sequence similar to QPSK. The complex output data sequence is then as follows:
\[ S_{\text{out}}(n) = (d_i(n) + jd_q(n)) (PN_i(n) + jPN_q(n)), \] with \( d_i(n), d_q(n), PN_i(n), PN_q(n) \in \{-1, +1\}. \)

**Table 3-2: Output combinations with QPSK channels**

<table>
<thead>
<tr>
<th>PN(n) \ d(n)</th>
<th>-1-j</th>
<th>-1+j</th>
<th>+1-j</th>
<th>+1+j</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1-j</td>
<td>+2j</td>
<td>+2</td>
<td>-2</td>
<td>-2j</td>
</tr>
<tr>
<td>-1+j</td>
<td>+2</td>
<td>-2j</td>
<td>+2j</td>
<td>-2</td>
</tr>
<tr>
<td>+1-j</td>
<td>-2</td>
<td>+2j</td>
<td>-2j</td>
<td>+2</td>
</tr>
<tr>
<td>+1+j</td>
<td>-2j</td>
<td>-2</td>
<td>+2</td>
<td>+2j</td>
</tr>
</tbody>
</table>

This again yields four different output combinations for \( S_{\text{out}} \):

-2j, 2j, -2, 2,

i.e. all points are on one of the two axes at the I/Q level.

**Fig. 3-9: Constellation diagram of a QPSK channel with 0 dB power**

### 3.14 Power Control - Downlink and Uplink

After spreading and scrambling, a channel-specific power factor \( p \) is applied to the signal. For example, a value of -6 dB therefore results in half the level (or \( 1/4 \) power).
4 User Interface

The dialog for setting the CDMA2000 digital standard is either called from the baseband block or from the dialog tree under Baseband.

The dialog is split into several sections for configuring the standard. The choice of transmission direction determines which displays and parameters are made available in the lower section.

The upper section of the dialog is where the CDMA2000 digital standard is enabled, the default settings are called and the transmission direction selected.

The valid CDMA2000 version and the spreading rate in use are displayed.

Many of the buttons lead to subdialogs for loading and saving the CDMA2000 configuration and for setting the filter, trigger and clock parameters.

The lower dialog section is where either the base station signal or the mobile station signal is configured, depending on the transmission direction selected.
The screenshots provided in this description show parameter values that have been selected to illustrate as much as possible of the provided functions and possible interdependencies between them. These values are not necessarily representative of realistic test situations.

### 4.1 General Settings for CDMA2000 Signals

The upper dialog section is where the CDMA2000 digital standard is enabled and reset and where all the settings valid for the signal in both transmission directions are made.

**State**

Enables/disables the CDMA2000 standard.

Enabling this standard disables all the other digital standards and digital modulation modes (in case of two-path instruments, this affects the same path).

The CDMA2000 signal is generated by a combination of realtime mode (real time channels) and arbitrary waveform mode (all the other channels).

On the downlink, one traffic channel and the SYNC channel of base station 1 are generated in realtime. All the other channels are generated in arbitrary waveform mode and added.

In the uplink, all the channels of mobile station 1 are generated in realtime, the other mobile stations are generated in arbitrary waveform mode and added to the realtime signal.

Remote command:

[:SOURce<hw>]:BB:C2K:STATe on page 94

**Set to Default**

Calls the default settings. The following table gives an overview of the settings. The preset value for each parameter is specified in the description of the remote-control commands.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Not affected by Set to default</td>
</tr>
<tr>
<td>Link Direction</td>
<td>Downlink</td>
</tr>
<tr>
<td>Filter</td>
<td>CdmaOne + Equalizer</td>
</tr>
<tr>
<td>Clipping</td>
<td>Off</td>
</tr>
<tr>
<td>Trigger</td>
<td>Auto</td>
</tr>
<tr>
<td>Clock</td>
<td>Internal</td>
</tr>
</tbody>
</table>

**Base Station Configuration**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Off</td>
</tr>
<tr>
<td>Radio Configuration Traffic Channels 1 and 2</td>
<td>RC3</td>
</tr>
<tr>
<td>Radio Configuration other Traffic Channels</td>
<td>RC1</td>
</tr>
</tbody>
</table>
### General Settings for CDMA2000 Signals

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
<td>0 chips</td>
</tr>
<tr>
<td>PN Offset</td>
<td>0</td>
</tr>
<tr>
<td>Transmit Diversity</td>
<td>Off</td>
</tr>
<tr>
<td>Quasi Orthogonal Walsh Set</td>
<td>1</td>
</tr>
</tbody>
</table>

### Mobile Station Configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Off</td>
</tr>
<tr>
<td>Mode</td>
<td>Traffic</td>
</tr>
<tr>
<td>Radio Configuration</td>
<td>RC3</td>
</tr>
<tr>
<td>Channel Coding</td>
<td>Complete</td>
</tr>
<tr>
<td>LC Mask (hex)</td>
<td>0</td>
</tr>
<tr>
<td>State (all Channels)</td>
<td>Off</td>
</tr>
<tr>
<td>Power Control</td>
<td>Off</td>
</tr>
</tbody>
</table>

Remote command:

```
[:SOURce<hw>]:BB:C2K:PRESet
```

on page 92

**Save/Recall ...**

Calls the “Save/Recall” dialog.

From the "Save/Recall" dialog the "File Select" windows for saving and recalling CDMA2000 configurations and the "File Manager" can be called.

CDMA2000 configurations are stored as files with the predefined file extension 
*.cdma2k. The file name and the directory they are stored in are user-definable.

The complete settings in the "CDMA2000" dialog are saved and recalled.

"Recall CDMA2000 Setting"

Opens the File Select window for loading a saved CDMA2000 configuration.

The configuration of the selected (highlighted) file is loaded by pressing the "Select" button.
"Save CDMA2000 Setting"

Opens the "File Select" window for saving the current CDMA2000 signal configuration.

The name of the file is specified in the File name entry field, the directory selected in the save into field. The file is saved by pressing the "Save" button.

The "Fast Save" checkbox determines whether the instrument performs an absolute or a differential storing of the settings. Enable this function to accelerate the saving process by saving only the settings with values different to the default ones. "Fast Save" is not affected by the "Preset" function.

"File Manager"

Calls the "File Manager".

The "File Manager" is used to copy, delete and rename files and to create new directories.

Remote command:

[:SOURce<hw>]:BB:C2K:SETTING:LOAD on page 93
[:SOURce<hw>]:BB:C2K:SETTING:STORE on page 93
[:SOURce<hw>]:BB:C2K:SETTING:STORE:FAST on page 94
[:SOURce<hw>]:BB:C2K:SETTING:DELete on page 93

Data List Management

Calls the "Data List Management" dialog. This dialog is used to create and edit a data list.

All data lists are stored as files with the predefined file extension *.dm_iqd. The file name and the directory they are stored in are user-definable.

The data lists must be selected as a data source from the subdialogs under the individual function, e.g. in the channel table of the base stations.

Note: All data lists are generated and edited by means of the SOURce:BB:DM subsystem commands. Files containing data lists usually end with *.dm_iqd. The data lists are selected as a data source for a specific function in the individual subsystems of the digital standard.
Example: Creating and editing the data list
:SOUR:BB:DM:DLIS:SEL "d_list1"
:SOUR:BB:DM:DLIS:DATA #B11101010100001111....

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA on page 129
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:DSELect on page 130
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA on page 136
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA on page 157
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:DSELect on page 158
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA on page 164
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA:DSELect on page 165

Generate Waveform File
Opens the subdialog for storing the current CDMA2000 signal as ARB signal in a waveform file. This file can be loaded in the ARB dialog and processed as multicarrier or multisegment signal.
The file name is entered in the subdialog. The file is stored with the predefined file extension *.wv. The file name and the directory it is stored in are user-definable.
Remote command:
[:SOURce<hw>]:BB:C2K:WAVeform:CREate on page 95

CDMA 2000 Version
Displays the current version of the CDMA2000 standard.
The default settings and parameters provided are oriented towards the specifications of the version displayed.
Remote command:
[:SOURce<hw>]:BB:C2K:VERSion? on page 95

Spreading Rate
Displays the spreading rate.
Mode Spreading Rate 1 ("Direct Spread 1X") is used:
The Chip Rate parameter which determines the rate of the spread symbols that is used for signal output, can be varied in the Filter, Clipping, ARB Settings dialog (see chapter 4.3, "Filter / Clipping / ARB Settings", on page 31).
Remote command:
[:SOURce<hw>]:BB:C2K:CRATe? on page 90
Link Direction
Selects the transmission direction.
The settings of the base station or the mobile station are provided in the following dialog section in accordance with the selection.
"Downlink/ Forward Link"
The transmission direction selected is base station to mobile station.
The signal corresponds to that of a base station.
"Uplink/ Reverse Link"
The transmission direction selected is mobile station to base station.
The signal corresponds to that of a mobile station.

Remote command:

Filtering/Clipping/ARB Settings
Calls the dialog for setting baseband filtering, clipping and the sequence length of the arbitrary waveform component. The current setting is displayed next to the button.
The dialog is described in chapter 4.3, "Filter / Clipping / ARB Settings", on page 31.
Remote command:
n.a.

Trigger/Marker
(Trigger for R&S SMx and R&S AMU instruments only)
Calls the dialog for selecting the trigger source, for configuring the marker signals and for setting the time delay of an external trigger signal (see chapter 4.4, "Trigger/Marker/ Clock Settings", on page 37).
The currently selected trigger source is displayed to the right of the button.
Remote command:
n.a.

Execute Trigger
(Trigger for R&S SMx and R&S AMU instruments only)
Executes trigger manually. A manual trigger can be executed only when an internal trigger source and a trigger mode other than "Auto" have been selected.
Remote command:

Clock
(Trigger for R&S SMx and R&S AMU instruments only)
Calls the dialog for selecting the clock source and for setting a delay (see chapter 4.4, "Trigger/Marker/Clock Settings", on page 37).
Remote command:
n.a.
4.2 Configure Base Station or Mobile Station

Depending on the transmission direction selection, the central section of the dialog provides either the "Configure Base Station" section (selection "Downlink/Forward Link") or the "Configure Mobile Station" section (selection "Uplink/Reverse Link").

**Configure Base Station or Mobile Station**

**Reset All Base Stations**

Resets all base stations to the predefined settings. The following table gives an overview of the settings. The preset value for each parameter is specified in the description of the remote-control commands.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base Station Configuration</strong></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Off</td>
</tr>
<tr>
<td>Time Delay</td>
<td>0 chips</td>
</tr>
<tr>
<td>PN Offset</td>
<td>0</td>
</tr>
<tr>
<td>Transmit Diversity</td>
<td>Off</td>
</tr>
<tr>
<td>Quasi Orthogonal Walsh Set</td>
<td>1</td>
</tr>
<tr>
<td>State (all channels)</td>
<td>Off</td>
</tr>
<tr>
<td>Frame Length (0-5 / 0-7/ 0-10)</td>
<td>26.6 ms / 40 ms / 5 ms</td>
</tr>
<tr>
<td>Frame Length (all other channels)</td>
<td>20 ms</td>
</tr>
<tr>
<td>Data Rate (0-6,0-10,0-11,1-1,1-4,2-1,2-4)</td>
<td>9.6 kbps</td>
</tr>
<tr>
<td>Data Rate (0-7,0-9,1-2,1-3,2-2,2-3)</td>
<td>19.2 kbps</td>
</tr>
<tr>
<td>Data Rate (all other channels)</td>
<td>1.2 kbps</td>
</tr>
</tbody>
</table>
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:PRESet on page 122

Reset All Mobile Stations
Resets all mobile stations to the predefined settings. The following table gives an overview of the settings. The preset value for each parameter is specified in the description of the remote-control commands.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Station Configuration</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Off</td>
</tr>
<tr>
<td>Mode</td>
<td>Traffic</td>
</tr>
<tr>
<td>Radio Configuration</td>
<td>3</td>
</tr>
<tr>
<td>Channel Coding</td>
<td>Complete</td>
</tr>
<tr>
<td>LC Mask (hex)</td>
<td>0</td>
</tr>
<tr>
<td>State (all Channels)</td>
<td>Off</td>
</tr>
<tr>
<td>Frame Length</td>
<td>20 ms</td>
</tr>
<tr>
<td>Data Rate (2 / 3,4,5)</td>
<td>9.6 kbps / 1.5 kbps</td>
</tr>
<tr>
<td>Walsh (0 / 8 / 4 / 2 / 6)</td>
<td>0 / 8 / 4 / 2 / 6</td>
</tr>
<tr>
<td>Spread (2 / 3,4,5)</td>
<td>32 / 16</td>
</tr>
<tr>
<td>Power</td>
<td>0 dB</td>
</tr>
<tr>
<td>Data Source</td>
<td>PN9</td>
</tr>
</tbody>
</table>

Remote command:
[:SOURce<hw>]:BB:C2K:MSTation:PRESet on page 157
Configure Base Station or Mobile Station

Copy ...
Copies the settings of a base or mobile station to a second base or mobile station. A window opens for creating the destination station.

<table>
<thead>
<tr>
<th>Downlink / Forward link direction</th>
<th>Uplink / Reverse link direction</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Copy from Source" /></td>
<td><img src="image2" alt="Copy from Source" /></td>
</tr>
<tr>
<td><img src="image3" alt="To Destination" /></td>
<td><img src="image4" alt="To Destination" /></td>
</tr>
<tr>
<td><img src="image5" alt="Walsh Code Offset (Base Station only)" /></td>
<td></td>
</tr>
<tr>
<td><img src="image6" alt="Accept" /></td>
<td><img src="image7" alt="Accept" /></td>
</tr>
</tbody>
</table>

"Copy from Source"
Selects the base station or mobile station whose settings are to be copied.

"To Destination"
Selects the base station or mobile station whose settings are to be overwritten.

"Walsh Code Offset (Base Station only)"
Enter the offset to be applied when copying the base station to the Walsh codes of the destination base station. The minimum value is 0 (Walsh codes are identical), the maximum value is 255.

"Accept"
Starts the copy process.

Remote command:
```
[:SOURce<hw>]:BB:C2K:COPY:SOURce
[:SOURce<hw>]:BB:C2K:COPY:DESTination
[:SOURce<hw>]:BB:C2K:COPY:COFFset
[:SOURce<hw>]:BB:C2K:COPY:EXECute
```

Predefined Settings
Accesses the dialog for setting predefined configurations in "Downlink / Forward" direction, see chapter 4.5, "Predefined Settings - Downlink", on page 46.

Additional Mobile Station
Accesses the dialog for simulating up to 64 additional mobile stations, see chapter 4.6, "Additional Mobile Station - Uplink", on page 49.

Adjust Total Power to 0dB
This parameter is available when the "CDMA2000 > State > On". Sets the power of an enabled channel so that the total power of all the active channels is 0 dB. This will not change the power ratio among the individual channels.

Remote command:
```
[:SOURce<hw>]:BB:C2K:POWER:ADJJust
```
**Total Power**
Displays the total power of the active channels.
The total power is calculated from the power ratio of the powered up code channels with modulation on. If the value is not equal to 0 dB, the individual code channels (whilst still retaining the power ratios) are internally adapted so that the "Total Power" for achieving the set output level is 0 dB.
Remote command:
`:SOURce<hw>:BB:C2K:POWer[:TOTal]?` on page 92

**Select ...**
Selects the base or mobile station by pressing the accompanying button. This opens a dialog for editing the selected base or mobile station.
The dialogs are described in chapter 4.7, "Base Station Configuration", on page 50 and chapter 4.10, "Mobile Station Configuration (MS)", on page 78.
Remote command:
( the base station or mobile station is selected by the keyword index `BSTation<i>` or `MSTation<i>`.)

**Base Station or Mobile Station On**
Activates or deactivates the base or mobile station.

Remote command:
`:SOURce<hw>:BB:C2K:BSTation<st>:STATe` on page 152
`:SOURce<hw>:BB:C2K:MSTation<st>:STATe` on page 164
4.3 Filter / Clipping / ARB Settings

To access this dialog, select "Main dialog > Filter/Clipping/ARB Settings".

The dialog comprises the settings, necessary to configure the baseband filter, to enable clipping and adjust the sequence length of the arbitrary waveform component.

4.3.1 Filter Settings

Provided are the following settings:

**Filter**
Selects the baseband filter.
Remote command:
\[ [:SOURce<hw>:BB:C2K:FILTER:TYPe \]
on page 96

**Roll Off Factor or BxT**
Sets the filter parameter.
The filter parameter offered ("Roll Off Factor" or "BxT") depends on the currently selected filter type. This parameter is preset to the default for each of the predefined filters.

Remote command:

```
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:APCO25 on page 97
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:COSine on page 97
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:GAUs on page 98
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:SPHase on page 99
```

**Cut Off Frequency Factor**

Sets the value for the cut off frequency factor. The cut off frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:

```
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:LPAS on page 98
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:LPASSEVM on page 98
```

**Chip Rate Variation**

Enters the chip rate.

Remote command:

```
[:SOURce<hw>]:BB:C2K:CRAt:VARiation on page 90
```

**Impulse Length**

(For WinIQSIM2 only)

Displays the number of filter tabs. If the check box is activated, the most sensible parameter values are selected. The value depends on the coherence check. If the check box is deactivated, the values can be changed manually.

Remote command:

```
[:SOURce<hw>]:BB:C2K:FILTer:ILENgth:AUTO on page 96
[:SOURce<hw>]:BB:C2K:FILTer:ILENgth on page 96
```

**Oversampling**

(For WinIQSIM2 only)

Determines the upsampling factor. If the check box is activated, the most sensible parameter values are selected. The value depends on the coherence check. If the check box is deactivated, the values can be changed manually.

Remote command:

```
[:SOURce<hw>]:BB:C2K:FILTer:OSAMpling:AUTO on page 97
[:SOURce<hw>]:BB:C2K:FILTer:OSAMpling on page 97
```

### 4.3.2 Clipping Settings

Provided are the following settings:
Clipping State
Switches baseband clipping on and off.

Baseband clipping is a very simple and effective way of reducing the crest factor of the signal.

CDMA signals may have very high crest factors particularly with many channels and long sequences. High crest factors entail two basic problems:

- The nonlinearity of the power amplifier (compression) causes intermodulation which expands the spectrum (spectral regrowth).
- Since the level in the D/A converter is relative to the maximum value, the average value is converted with a relatively low resolution. This results in a high quantization noise.

Both effects increase the adjacent-channel power.

With baseband clipping, all the levels are limited to a settable value ("Clipping Level"). This level is specified as a percentage of the highest peak value. Since clipping is done prior to filtering, the procedure does not influence the spectrum. The EVM however increases.

Since clipping the signal not only changes the peak value but also the average value, the effect on the crest factor is unpredictable.
Example:
This example shows the effect of the Clipping on the crest factor for typical scenarios. The following pictures demonstrate the affect of clipping with vector mode (|i+q|), using a signal configuration with 2 active channels.

Fig. 4-1: Constellation diagram of the signal without clipping, shows the level mapping.
Fig. 4-2: Constellation diagram with clipping level 80 %, vector mode (|i+q|) The circle emphasizes the changed constellation points.

Remote command:
[:SOURce<hw>]:BB:C2K:CLIPping:STATe on page 101

Clipping Level
Sets the limit for clipping.
This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.
Remote command:
[:SOURce<hw>]:BB:C2K:CLIPping:LEVel on page 100

Clipping Mode
Selects the clipping method. A graphic illustration of the way in which these two methods work is given in the dialog.
- "Vector |i + q |
  The limit is related to the amplitude |i + q|. The I and Q components are mapped together, the angle is retained.
- "Scalar |i| + |q|
  The limit is related to the absolute maximum of all the I and Q values |i| + |q|.
  The I and Q components are mapped separately, the angle changes.
Remote command:
[:SOURce<hw>]:BB:C2K:CLIPping:MODE on page 100
4.3.3 ARB Settings

Provided are the following settings:

**Sequence Length ARB**
Changes the sequence length of the arbitrary waveform component of the signal. This component is calculated in advance and output in the arbitrary waveform generator. It is added to the realtime signal components.

The number of chips is determined from this sequence length (1 Frame = 80 ms) and the chip rate. At 1.2288 MChips/s a frame equals 98.304 chips.

In pure amplifier tests with several channels and no real time channels, it is possible to improve the statistical properties of the signal by increasing the sequence length.

**Note:** Unlike for 3GPP, in the case of CDMA2000 the length of a frame is not uniformly defined. This implementation uses a frame length of 80 ms. Division into 80 ms frames was chosen because in this time grid the frame lengths for both the SYNC channel, with its cycle duration of 26.67 ms, and all other channels work out to 5 ms, 10 ms, 20 ms or 80 ms. The F-BCH has a frame length of 160 ms. In order to use this channel, an even number of 80 ms frames has to be set.

Remote command:
[:SOURce<hw>]:BB:C2K:SLENgt on page 94

4.3.4 I/Q Setting

Provided are the following settings:

**Invert Q for Correct Baseband Output**
Inverts Q-part of the baseband signal. (see also chapter 3.12, "I/Q Modulator - Uplink and Downlink", on page 18)

"ON" The signal on the baseband outputs meets the cdma2000 standard. In order to generate an RF signal that conforms to the standard, the I/Q Swap function in the I/Q Modulator dialog must be enabled (On).

"OFF" The signal of the baseband outputs does not meet the CDMA2000 standard. It can however be mixed with other signals from the second baseband without any problem. In order to generate the RF signal, the I/Q Swap function in the I/Q Modulator dialog must be disabled (Off).

Remote command:
[:SOURce<hw>]:BB:C2K:IQSWap[:STATe] on page 91
4.4 Trigger/Marker/Clock Settings

The trigger, clock, and marker delay functions are available for R&S SMx and R&S AMU instruments only.

To access this dialog, select "Main Menu > Trigger/Marker".

The "Trigger In" section is where the trigger for the signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

The "Marker Mode" section is where the marker signals at the MARKER output connectors are configured.

The "Marker Delay" section is where a marker signal delay can be defined, either without restriction or restricted to the dynamic section, i.e., the section in which it is possible to make settings without restarting signal and marker generation.

The "Clock Settings" section is where the clock source is selected and - in the case of an external source - the clock type.
4.4.1 Trigger In

The trigger functions are available for R&S SMx and R&S AMU instruments only.

The "Trigger In" section is where the trigger for the signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

**Trigger Mode**

Selects trigger mode, i.e. determines the effect of a trigger event on the signal generation.

- "Auto"
  The signal is generated continuously.

- "Retrigger"
  The signal is generated continuously. A trigger event (internal or external) causes a restart.

- "Armed_Auto"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously. An "Arm" stops the signal generation. A subsequent trigger event (internal with or external) causes a restart.

- "Armed_Retrigger"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart. An "Arm" stops signal generation. A subsequent trigger event (internal with or external) causes a restart.

- "Single"
  The signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified at "Signal Duration". Every subsequent trigger event (internal or external) causes a restart.

Remote command:

```
[:SOURce<hw>]:BB:C2K[:TRIGger]:SEQUence
```
Signal Duration Unit
Defines the unit for the entry of the length of the signal sequence to be output in the Single trigger mode. Available units are chip sequence length (CLS), chips or frames.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:SLUNit on page 106

Signal Duration
Defines the length of the signal sequence to be output in the "Single" trigger mode. It is possible to output deliberately just part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:SLENght on page 105

Running/Stopped
For enabled modulation, displays the status of signal generation for all trigger modes.

- "Running"
  The signal is generated; a trigger was (internally or externally) initiated in triggered mode.
- "Stopped"
  The signal is not generated and the instrument waits for a trigger event.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:RMODE? on page 105

Arm
For trigger modes "Armed Auto" and "Armed Retrigger", stops the signal generation until subsequent trigger event occurs.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:ARM:EXECute on page 102

Execute Trigger
(Trigger for R&S SMx and R&S AMU instruments only)
Executes trigger manually. A manual trigger can be executed only when an internal trigger source and a trigger mode other than "Auto" have been selected.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:EXECute on page 103

Trigger Source
Selects trigger source. This setting is effective when a trigger mode other than "Auto" has been selected.

- "Internal"
  The trigger event is executed by "Execute Trigger".
- "Internal (Baseband A/B)"
  (two-path instruments)
  The trigger event is the trigger signal from the second path
- "External (Trigger 1/2)"
  The trigger event is the active edge of an external trigger signal, supplied at the TRIGGER 1/2 connector.
Use the "Global Trigger/Clock Settings" dialog to define the polarity, the trigger threshold and the input impedance of the trigger signal.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:SOURce on page 106

**Sync. Output to External Trigger**
(enabled for "Trigger Source" External)

Enables/disables output of the signal synchronous to the external trigger event.

For R&S SMBV instruments:

For or two or more R&S SMBVs configured to work in a master-slave mode for synchronous signal generation, configure this parameter depending on the provided system trigger event and the properties of the output signal. See the table below for an overview of the required settings.

**Table 4-1: Typical Applications**

<table>
<thead>
<tr>
<th>System Trigger</th>
<th>Application</th>
<th>&quot;Sync. Output to External Trigger&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common External Trigger event for the master and the slave instruments</td>
<td>All instruments are synchronous to the external trigger event</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>All instruments are synchronous among themselves but starting the signal from first symbol is more important than synchronicity with external trigger event</td>
<td>OFF</td>
</tr>
<tr>
<td>Internal trigger signal of the master R&amp;S SMBV for the slave instruments</td>
<td>All instruments are synchronous among themselves</td>
<td>OFF</td>
</tr>
</tbody>
</table>

"On"

Corresponds to the default state of this parameter.

The signal calculation starts simultaneously with the external trigger event but because of the instrument's processing time the first samples are cut off and no signal is outputted. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.
"Off"  
The signal output begins after elapsing of the processing time and  
starts with sample 0, i.e. the complete signal is outputted.  
This mode is recommended for triggering of short signal sequences  
with signal duration comparable with the processing time of the  
instrument.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:EXTernal:SYNChronize:OUTPut  
on page 103

**Trigger Delay**
Sets the trigger signal delay in samples on external triggering.  
This enables the R&S Signal Generator to be synchronized with the device under test  
or other external devices.  
For two-path instruments, the delay can be set separately for each of the two paths.  
Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger[:EXTernal<ch>]:DELa y on page 107  
[:SOURce<hw>]:BB:C2K:TRIGger:OBASeband:DELa y on page 104

**Trigger Inhibit**
Sets the duration for inhibiting a new trigger event subsequent to triggering. The input  
is to be expressed in samples.  
In the "Retrigger" mode, every trigger signal causes signal generation to restart. This  
restart is inhibited for the specified number of samples.  
This parameter is only available on external triggering or on internal triggering via the  
second path.  
For two-path instruments, the trigger inhibit can be set separately for each of the two  
paths.  
Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger[:EXTernal<ch>]:INHibit on page 107  
[:SOURce<hw>]:BB:C2K:TRIGger:OBASeband:INHibit on page 104
4.4.2 Marker Mode

The marker output signal for synchronizing external instruments is configured in the "Marker Settings" section "Marker Mode".

The R&S SMBV supports only two markers.

**Marker Mode**

Selects a marker signal for the associated "MARKER" output.

- **"Power Control Group (1.25 ms)"**
  A marker signal is generated at the start of each Power Control Group (every 1.25 ms).

- **"Radio Frame (20 ms)"**
  A marker signal is generated every 20 ms (traffic channel frame clock).

- **"Sync Channel Frame (26.6 ms)"**
  A marker signal is generated at the beginning of each Sync Channel Frame (every 26.6 ms).

- **"Superframe (80 ms)"**
  A marker signal is generated every 80 ms (super frame clock).

- **"Even Second Mark (2 s)"**
  A marker signal is generated every 2 seconds.

- **"Chip Sequence Period (ARB)"**
  A marker signal is generated at the beginning of every Arbitrary Waveform sequence (depending on the set sequence length). The marker signal is generated regardless of whether or not an ARB component is actually used.

- **"ON/OFF Period"**
  A regular marker signal that is defined by an ON/OFF ratio is generated. A period lasts one ON and OFF cycle.

The "ON Time" and "OFF Time" are each expressed as a number of samples and are set in an input field which opens when ON/OFF ratio is selected.

Remote command:

[::SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:ONTime on page 110

[::SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:OFFTime on page 110
"User Period" A marker signal is generated at the beginning of every user-defined period. The period is defined in "Period".

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:PERiod on page 111

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:MODE on page 109

4.4.3 Marker Delay

The delay of the signals on the MARKER outputs is set in the "Marker Delay" section.

The marker delay functions are available for R&S SMx and R&S AMU instruments only.

The R&S SMBV supports only two markers.

**Marker x Delay**

Enters the delay between the marker signal at the marker outputs and the start of the frame or slot.

The input is expressed as a number of symbols/samples.

If the setting "Fix marker delay to dynamic range" is enabled, the setting range is restricted to the dynamic range. In this range the delay of the marker signals can be set without restarting the marker and signal.

Remote command:
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:DELay on page 108

**Current Range without Recalculation**

Displays the dynamic range within which the delay of the marker signals can be set without restarting the marker and signal.

The delay can be defined by moving the setting mark.

Remote command:

**Fix marker delay to current range**

Restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal.

Remote command:

4.4.4 Clock Settings

The "Clock Settings" is used to set the clock source and a delay if required.
The clock functions are available for R&S SMx and R&S AMU instruments only.

**Sync. Mode**  
(for R&S SMBV only)  
Selects the synchronization mode.  
This parameter is used to enable generation of very precise synchronous signal of several connected R&S SMBVs.  
**Note:** If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type.  
Avoid unnecessary cable length and branching points.  
"None" The instrument is working in stand-alone mode.  
"Sync. Master" The instrument provides all connected instrument with its synchronisation (including the trigger signal) and reference clock signal.  
"Sync. Slave" The instrument receives the synchronisation and reference clock signal from another instrument working in a master mode.

Remote command:  
[:SOURce<hw>]:BB:C2K:CLOCK:SYNChronization:MODE on page 113

**Set Synchronization Settings**  
(for R&S SMBV only)  
Performs automatically adjustment of the instrument’s settings required for the synchronization mode, selected with the parameter "Synchronization Mode".  
Remote command:  
[:SOURce<hw>]:BB:C2K:CLOCK:SYNChronization:EXECute on page 113

**Clock Source**  
Selects the clock source.  
"Internal" The internal clock reference is used to generate the symbol clock.
"External"  The external clock reference is fed in as the symbol clock or multiple thereof via the CLOCK connector. The symbol rate must be correctly set to an accuracy of +/-2 % (see data sheet). The polarity of the clock input can be changed with the aid of "Global Trigger/Clock Settings". In the case of two-path instruments this selection applies to path A.

Remote command:

**Clock Mode**
Enters the type of externally supplied clock.

"Chip"  A chip clock is supplied via the CLOCK connector.

"Multiple"  A multiple of the chip clock is supplied via the CLOCK connector; the chip clock is derived internally from this. The "Multiplier" window provided allows the multiplication factor to be entered.

Remote command:
`:SOURce<hw>:BB:C2K:CLOCK:MODE` on page 112

**Clock Multiplier**
Enter the multiplication factor for clock type "Multiple".

Remote command:

**Measured External Clock**
Provided for permanent monitoring of the enabled and externally supplied clock signal.

Remote command:
`CLOCK:INPUT:FREQUENCY?`

### 4.4.5 Global Settings

The buttons in this section lead to dialogs for general trigger, clock and mapping settings.

These settings are available for R&S SMx and R&S AMU instruments only.

**Global Trigger/Clock Settings**
Calls the "Global Trigger/Clock/Input Settings" dialog.

This dialog is used among other things for setting the trigger threshold, the input impedance and the polarity of the clock and trigger inputs.

In the case of two-path instruments, these settings are valid for both paths.

The parameters in this dialog affect all digital modulations and standards, and are described in chapter "Global Trigger/Clock/Input Settings" in the Operating Manual.
User Marker / AUX I/O Settings
Calls the "User Marker AUX I/O Settings" dialog, used to map the connector on the rear of the instruments.
See also "User Marker / AUX I/O Settings" in the Operating Manual.

4.5 Predefined Settings - Downlink

The "Predefined Settings" can be reached via the "CDMA2000" main dialog. It is only available when the Downlink transmission direction is selected.

In the top section of the dialog, the radio configuration of the test scenario and the used special channels are selected.

The channel table of base station 1 is filled (preset) with the set parameters.

With the "Predefined Settings" function, it is possible to create highly complex scenarios with just a few keystrokes. This function is of use if, say, just the envelope of the signal is of interest.

A separate set of settings of all predefined parameters is provided for each radio configuration. If the radio configuration is changed, the set of traffic channel settings belonging to this RC is automatically indicated.

In the "Traffic Channel Settings" section, the number and the structure of the traffic channels used in the test scenario is set. The selected structure is valid for all activated traffic channels.

The indicated parameters depend on the radio configuration. Their settings are specific for the selected radio configuration.

Additionally, the desired range for the crest factor is selected. Button "Accept" presets the channel table of base station 1 with the predefined parameters.
Radio Configuration - Predefined Settings
Selects the radio configuration (RC).

The R&S Signal Generator provides a separate set of settings of all predefined traffic channel parameters for each radio configuration. If the radio configuration is changed, the set of traffic channel table values belonging to this RC is automatically activated.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:RCONfiguration on page 116

Use Pilot (F-PICH) - Predefined Settings
Selects if pilot channel F-PICH is used in the scenario or not.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:FICHannel[:STATe] on page 116

Use Sync (F-Sync) - Predefined Settings
Selects if sync channel F-SYNC is used in the scenario or not.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:SCHannel[:STATe] on page 116

Use Paging Channel (F-PCH) - Predefined Settings
Selects if paging channel F-PCH is used in the scenario or not.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:PCHannel[:STATe] on page 115

Number of Traffic Channels - Predefined Settings
Sets the number of activated traffic channels. Channels F-DCCH, F-FCH, and F-SCH form a traffic channel.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:TCHannel:COUNt on page 117

Use Dedicated Control (F-DCCH) - Predefined Settings
Selects if the dedicated control channel F-DCCH is activated for the traffic channel or not. PN9 is used as a data source for F-DCCH.

The set state is specific for the selected radio configuration.

F-DCCH cannot be activated for radio configuration RC1 and RC2.

Remote command:
[:SOURce<hw>]:BB:C2K:PPARameter:TCHannel:DCCHannel[:STATe] on page 118
Use Fundamental (F-FCH) - Predefined Settings
Selects if the fundamental channel F-FCH is activated for the traffic channel or not. PN9 is used as data source for F-FCH. The set value is specific for the selected radio configuration.

Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FChannel[:STATe]
```
on page 118

Number of Supplemental (F-SCH) - Predefined Settings
Sets the number of activated supplemental channels F-SCH. PN9 is used as data source for F-SCH. The set value is specific for the selected radio configuration.

The maximum number depends on the selected radio configuration:
- RC1 and RC2: 0 ... 7
- RC3, RC4, and RC5: 0 ... 2

Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:SChannel:COUNt
```
on page 119

Frame Length - Predefined Settings
Sets the frame length of the traffic channel. The set value is specific for the selected radio configuration.

The value range for the frame length depends on the selected radio configuration:
- RC1 and RC2: 20 ms
- RC3 to RC5: 5, 20, 40 and 80 ms

Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FLENgth
```
on page 118

Data Rate - Predefined Settings
Sets the data rate for F-FCH and all F-SCH. The set value is specific for the selected radio configuration.

The value range depends on the set frame length.

Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:DATA:RATE
```
on page 117

Crest Factor - Predefined Settings
Selects the desired range for the crest factor of the test scenario. The crest factor of the signal is kept in the desired range by automatically setting appropriate Walsh Code Numbers.

"Minimum" The crest factor is minimized by assigning Walsh codes which are chosen as close as possible.

"Average" An average crest factor is set. The Walsh codes are distributed uniformly over the code domain.

"Worst" The crest factor is set to an unfavorable value (i.e. maximum) by assigning Walsh codes which are separated as widely as possible.

Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:CRESt
```
on page 115
**Accept - Predefined Settings**
Presets the channel table of base station 1 with the parameters defined in the "Predefined Settings" dialog. Base station one is switched on, the other base stations are switched off.
Remote command:
```
[:SOURce<hw>]:BB:C2K:PPARameter:EXECute
```
on page 115

### 4.6 Additional Mobile Station - Uplink

Subdialog "Additional User Equipment" can be reached via the "CDMA2000" main dialog. It is only available when the Uplink transmission direction is selected.

It is possible to simulate up to 64 additional mobile stations and thus to generate a signal that corresponds to the received signal for a base station with high capacity utilization.

The fourth mobile station (MS4) serves as a template for all other stations. The following parameters are the only ones modified for the additional mobile stations:
- LC Mask Step (different for all stations)
- Power (different to MS4, but identical among themselves)

**State**
Activates additional mobile stations. At "State Off", all the additional mobile stations are switched off.
Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:STATe
```
on page 156

**Number of Additional MS**
Sets the number of additional mobile stations. As many as 64 additional mobile stations can be simulated.
Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:COUNt
```
on page 155

**LC Mask Step**
Enters the step width for increasing the LC mask of the additional mobile stations. The start value is the scrambling code of MS4.
The Long Code generator mask serves for channel-specific and user-specific scrambling of the code channel.
Remote command:
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:LCMask:STEP on page 155

**Power Offset**
Sets the power offset of the active channels of the additional mobile stations to the power outputs of the active channels of MS4.
The resultant power must fall within the range 0 ... - 80 dB. If the value is above or below this range, it is limited automatically.
Remote command:
[:SOURce<hw>]:BB:C2K:MSTation:ADDitical:POWer:OFFSet on page 156

**Time Delay Step**
Enter the step width for the time delay of the additional mobile stations to one another. The start value returns the time delay of MS4. Entry is made in chips and can be a maximum of 1 frame.
The time delay allows mobile stations to be simulated even if the arrival of their signals is not synchronized at the base station.
Remote command:
[:SOURce<hw>]:BB:C2K:MSTation:ADDitical:TDELay:STEP on page 156

### 4.7 Base Station Configuration

Base stations can be configured independently of one another. Base station 1 (BS1) also includes real time channels.

The "Base Station Configuration" dialog is called by selecting base station "BS1" ... "BS4" in the "CDMA2000" dialog. Base stations can be configured independently of one another. Base station 1 (BS1) also includes real time channels.

The dialog comprises the "Common Settings" section, in which the general parameters of the base station are set, a row containing the buttons "Code Domain..." and "Channel Graph...", which calls the appropriate graphics and the most important part, the channel table.
### 4.7.1 Common Settings

The general parameters of the base station are set in the "Common Settings" section.

#### State - BS
Activates or deactivates the selected base station.

Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:STATE
```

on page 152

#### Transmit Diversity - BS
Switches transmit diversity on and off.

The signal can be sent simultaneously on several antennas. Various forms of transmit diversity are described in the CDMA2000 standard. Different coding is used to divide the signal between the two antennas. As a result, the receiver can decode the traffic signal from the two input signals and is less liable to fading and other interference. The R&S Signal Generator can simulate the signal of one of the two antennas.

To activate transmit diversity, the antennas whose signals are to be simulated must be specified. The signal is generated differently depending on the selected antenna.

Additionally two diversity schemes for the calculation of the signals are available for selection at "Diversity Mode".

- **Off**  
  No transmit diversity

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

![Base Station Configuration](image-url)
"Antenna 1" Calculates and applies the output signal for antenna 1. The diversity scheme is selected at "Diversity Mode".

"Antenna 2" Calculates and applies the output signal for antenna 2. The diversity scheme is selected at "Diversity Mode".

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity on page 153

Diversity Mode - BS
Selects the diversity scheme for "Transmit Diversity".
The diversity scheme defines the calculation mode of the signal for the selected antenna (at Transmit Diversity).

"OTD" Orthogonal Transmit Diversity Mode. A forward link transmission method which distributes forward link channel symbols among multiple antennas and spreads the symbols with a unique Walsh or quasi-orthogonal function associated with each antenna.

"STS" Space Time Spreading Mode. A forward link transmission method which transmits all forward link channel symbols on multiple antennas and spreads the symbols with complementary Walsh or quasi-orthogonal functions.

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity:MODE on page 153

Time Delay - BS
Enters the time delay of the signal of the selected basestation compared to the signal of BS1.

Note: For BS1, this value is always 0 and read-only.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:TDELay on page 153

PN Offset - BS
Enters the PN offset (short code).
The PN offset determines the start phase of these PN short-code sequences (see chapter 3.8, "PN Short-Code Scrambling - Downlink", on page 14).
This permits signals of different basestations to be distinguished.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:PNOFfset on page 152

Quasi orth Walsh Set - BS
Selects the Quasi Orthogonal Walsh Set. The standard defines three different sets.
The so-called 'quasi-orthogonal Walsh sets' can be used in addition to the Walsh codes. They increase the number of possible channels and thus extend the basestation capacity. When the quasi-orthogonal Walsh code is used, spreading the data stream results in complex spreading also through an additional rotation of the output phase (the spreading code then consists of a real and an imaginary part).
In the channel table, a decision can be made for each channel whether the Walsh code of the standard set or of the quasi-orthogonal set should be used. The quasi-orthogonal Walsh codes are used if "On" is activated in column "Q. Orth".

Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:QWSet
```

**Code Domain Graph - BS**

Opens the code domain display to visually check the signal (see chapter 4.7.2, "Code Domain and Channel Graphs", on page 53).

Remote command:

n.a.

### 4.7.2 Code Domain and Channel Graphs

The Walsh codes of variable length used by CDMA2000 are the so-called Hadamard codes.

The structure of these codes is explained below. The code matrix of the order N+1 is obtained from the matrix N by extending the latter to the right and downwards through copying and downwards to the right by copying and inversion.

*Fig. 4-3: Generation scheme of Walsh code*
Walsh codes of the lengths 4, 8, 16, 32, 64, and 128 are used in CDMA2000 with spreading rate 1. The greater the spreading factor / Walsh code length, the smaller the useful symbol rate prior to spreading and vice versa.

In contrast to the spreading codes of 3GPP, Walsh codes of short lengths (low spreading factor) do not occupy a block area in a Walsh matrix of larger spreading factor. Several lines (ratio of the two spreading factors) are occupied in the matrix with a higher spreading factor, distributed over the whole matrix. This behavior is illustrated in the diagram below. This results from the structuring scheme of the Walsh codes that are obtained by copying and inverting the next smaller matrix.

If a Walsh code with the length 4 and index 1 is used, codes 1 and 5 are disabled at the length 8, and codes 1, 5, 9 and 13 at the length 16 because codes of greater length contain the output code of shorter length (or its inversion).

When using such conflicting Walsh codes simultaneously, the signals of the associated code channels are mixed so that they can no longer be separated in the receiver. Orthogonality will then be lost.

The matrix range with the highest spreading factor (i.e. 128), which is based on the spreading code selected in the code tree, is then defined as domain of a specific Walsh spreading code. Using a spreading code means that its entire domain is used.

The "Code Domain" graphic shows the assignment of active code channels in the code domain. The upper part shows the code domain of the standard Walsh set, the lower part the code domain of quasi-orthogonal Walsh sets.

The code numbers are plotted on the X axes, the colored bars show the code channels. The legend at the left of the graph indicates the assignment of colors to the spreading factors. An additional color is reserved for the packet channel F-PDCH because this channel may be assigned to more than one code channel. The height of the bars indicates the power of the code channel.
In this display assignment of the domains can be seen at a glance. Compared to 3GPP it is however much more difficult to see whether the code domains of different channels overlap, i.e. whether there is a domain conflict. This is due to the structure of the Walsh codes described above. The reason is that no block areas are occupied in the domain but several areas of minimum width are distributed over the whole domain. Therefore, the occurrence of a domain conflict is indicated by a red dot marking of the involved channels. In addition, in the channel table, a code domain conflict is indicated in the column "Do Conf" on the far right of the graph by a red dot and the orange-colored column.

The graph is calculated from the settings that have been made. A change in the settings results at once in a change of the graphical display.

**Order - Code Domain BS**
Switches the order of the spreading codes.
"Hadamard" The code channels are displayed in the order determined by the Hadamard matrix. The codes are numbered as Walsh codes according to the standard.

"Bit reversed" The code channels are displayed in the order defined by the Orthogonal Variable Spreading Factor (OVSF) code tree (3GPP code). The Walsh codes and their generation scheme are closely related to the spreading codes of 3GPP. Basically, the same spreading sequences are used, only the order in the respective code trees is different. According to 3GPP TS 25.213 the following code tree is used:

```
        C[4] = 0,0,0
     / | \
   /   |   \  
C[2] = 0,1,1  C[2] = 0,1,0  C[2] = 0,0,1
```

To find a 3GPP code that corresponds to a CDMA2000 code, the bit-inverted line (line index) has to be selected in the 3GPP matrix of identical spreading factor.

**Example:**
The 3GPP spreading code matching line 10 of the 16-bit Walsh code matrix is searched for. The binary form of the line index 10 (with 4 bits, because of Walsh length 16 = 2^4) is 1010. The bit-inverted index is 0101, i.e. 5 in decimal notation. This means that the Walsh code No. 10 with the length 16 corresponds to the 3GPP spreading code 5 of the same length (spreading factor).

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:DCONflict:MODE on page 143

**Channel Graph - Basestation**
Opens the channel graph display to visually check the configured signal.

The channel graph display shows the active code channels. The channel number is plotted on the X axis. The red bars represent the special channels, the green bars the traffic channels. The channel index is plotted on the X-axes. The height of the bars shows the relative power of the channel.

The graph is calculated from the settings that have been made.
4.7.3 **Channel Table - BS**

The "channel table" is located in the lower part of the dialog. The channel table is where the individual channel parameters are set.

Up to 78 channels are available for each basestation. Channels 0-1 to 0-11 are assigned to the special channels which are responsible for the correct communication between basestation and mobile station. The packet channels (0-12 to 0-14) and the traffic channels (1-0 and above) transmit the data.

A traffic channel is used for transmitting the radio link information, i.e. for communication with the addressee. The traffic channels consists of a dedicated channel, a fundamental channel and, depending on the radio configuration, of up to 7 supplemental channels.

The packet data channel and the packet data control channels are used for transmitting data packets (packet data service) usually at higher data rates than is the case with purely circuit-mode traffic channels. The radio configuration of these channels is defined as 10 in accordance with the CDMA2000 standard.

The number of sub channels and the sub channel types of a traffic channel depend on the selected radio configuration. The radio configuration can be set separately for each traffic channel and is the same for all sub channels of this traffic channel. It determines among other things the channel coding types, the frame lengths and the data rates that...
can be used and the settings of fixed parameter, e.g. CRC length. The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. Thus, when the radio configuration is changed, the current set of settings is internally stored for the old radio configuration and the complete set of settings belonging to the new radio configuration is activated and indicated in the channel table.

Channel 0-5 (F-SYNC) and the first traffic channel can be generated in real time.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-PICH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td>C0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-TDPICH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td>.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-APICH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-ATDPICH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-SYNC</td>
<td>On</td>
<td>20.0</td>
<td>2.4</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PCH</td>
<td></td>
<td>20.0</td>
<td>9.6</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-BCCH</td>
<td></td>
<td>20.0</td>
<td>9.6</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PLCH</td>
<td></td>
<td>20.0</td>
<td>2.4</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-BCCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PLCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-BCCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PLCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-BCCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-PLCH</td>
<td></td>
<td>20.0</td>
<td>1.2</td>
<td>Off</td>
<td>0</td>
<td>PN 9</td>
<td>Config</td>
<td>On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Channel Number - BS**
Displays the channel numbers.

The channel number is made up of 2 numbers. If the first number is 0 it identifies the special channels, i.e. the control channels and packet channels. A first number of 1 to 8 designates the traffic channels. The second number refers consecutively to the special channels or the sub-channels of a traffic channel.

All available channels are always displayed, even those that are inactive. The number of sub-channels per traffic channel 1 (four or eight) depends on the chosen radio configuration.

Each channel is switched on and off by the "On/Off" button in the "State" column.

Remote command:
During remote control the channel is selected via the suffix to the keywords `CGRoup<n>:COFFset<n>` Then `CGRoup0` selects the special channels group, `CGRoup1` to 8 the traffic channel. `COFFset1` to 14 selects either the special channel or the code channel of a traffic channel. E.g. `CGRoup0:COFFset14` selects the packet channel F-PDCH, `CGRoup3:COFFset1` selects the F-FCH of traffic channel 3.

**Channel Type - BS**
Indication of the channel type (see following table).
### Table 4-2: List of supported channel types and their sequence in the CDMA2000 channel table

<table>
<thead>
<tr>
<th>Index</th>
<th>Shortform</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>F-PICH</td>
<td>Forward Pilot Channel</td>
<td>The basestation continuously transmits the pilot channel. This channel provides capabilities for soft handoff and coherent detection. Handoff is a procedure where a mobile with an on-going call changes channel and/or basestation under the supervision of the network. The Walsh code is 0.</td>
</tr>
<tr>
<td>0-2</td>
<td>F-TDPICH</td>
<td>Forward Transmit Diversity Pilot Channel</td>
<td>The basestation continuously transmits this pilot channel from the secondary antenna when transmit diversity is enabled.</td>
</tr>
<tr>
<td>0-3</td>
<td>F-APICH</td>
<td>Forward Auxiliary Pilot Channel</td>
<td>This pilot channel transmits the basestation as an option.</td>
</tr>
<tr>
<td>0-4</td>
<td>F-ATDPICH</td>
<td>Forward Auxiliary Transmit Diversity Pilot Channel</td>
<td>The basestation optionally transmits this pilot channel from the secondary antenna when transmit diversity is enabled.</td>
</tr>
<tr>
<td>0-5</td>
<td>F-SYNC</td>
<td>Forward Synchronization Channel</td>
<td>The synchronization channel enables the mobile station to synchronize with the basestation. It contains the PN offset, the system time and the long code status, information about the paging channel, together with the system ID and the network ID. The Walsh code is 32.</td>
</tr>
<tr>
<td>0-6</td>
<td>F-PCH</td>
<td>Forward Paging Channel</td>
<td>The paging channel carries control information specific to a mobile station when the network does not know where the mobile station is located.</td>
</tr>
<tr>
<td>0-7</td>
<td>F-BCCH</td>
<td>Forward Broadcast Channel</td>
<td>The broadcast channel is used to broadcast system- and cell-specific information.</td>
</tr>
<tr>
<td>0-8</td>
<td>F-QPCH</td>
<td>Forward Quick Paging Channel</td>
<td>The paging channel contains short form information for the mobile station, particularly if the latter is not transmitting.</td>
</tr>
<tr>
<td>0-9</td>
<td>F-CPCCCH</td>
<td>Forward Common Power Control Channel</td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>F-CACH</td>
<td>Forward Common Assignment Channel</td>
<td></td>
</tr>
<tr>
<td>0-11</td>
<td>F-CCCH</td>
<td>Forward Common Control Channel</td>
<td>General channel for transmitting control information. It also provides a mean for paging functions but it supports different data rates. It provides capability for short burst data communications.</td>
</tr>
<tr>
<td>0-12/13</td>
<td>F-PDCCH</td>
<td>Forward Packet Data Control Channel</td>
<td>The Forward Packet Data Control Channel carries the control information for the Forward Packet Data Channel.</td>
</tr>
<tr>
<td>0-14</td>
<td>F-PDCH</td>
<td>Forward Packet Data Channel</td>
<td>Packet oriented data channel, supports high data rates</td>
</tr>
<tr>
<td>1-1</td>
<td>F-FCH</td>
<td>Forward Fundamental Channel</td>
<td>Subchannel of a traffic channel. Contains control data and user data.</td>
</tr>
</tbody>
</table>
Remote command:

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TYPE?
on page 140

**Real Time - BS1**
Activates realtime generation of the channel. This option is only available for the sync channel F-SYNC and the first traffic channel.

The channel state, Real Time On or Off, is displayed in different colors. The set state for the first traffic channel is specific for the selected radio configuration.

To test the BER/BLER testers (e.g. integrated in the basestation), it is possible to feed through artificial bit errors to all the data sources (and block errors to the CRC checksum).

Remote command:

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:
REALtime:STATe on page 135

**Radio Configuration (RC) - BS**
Selects radio configuration of the traffic channel.

The radio configuration determines the channel types, the frame lengths, the channel coding types and the data rates that can be used.

The radio configuration is the same for all sub channels of a traffic channel. If the radio configuration is modified for one of the sub channels the new value is then automatically used by all other sub-channels of this traffic channel.

The radio configuration for the packet channels F-PDCCH and F-PDCH is fixed to RC10.

The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. Changing the radio configuration causes the settings belonging to the new RC value to be activated in the channel table (the settings belonging to the old RC value are stored).

The radio configuration determines the permissible frame lengths. The frame length defines the permitted data rate and channel coding type which in turn determine the permitted Walsh codes.

This gives rise to a hierarchy within the following parameters:
Frame Length -> Data Rate + Channel Coding Type -> Walsh Code
Changing one of the parameters in this hierarchy automatically causes the lower-level settings to be changed if they are no longer permitted following the change to the higher-level parameter.

Remote command:

\[ [:\text{SOURce<hw>}:\text{BB}:C2K:BSTation<st>:\text{CGRoup<di0>:RCONfiguration}} \]

on page 142

Frame Length - BS
Enters the frame length of the channel. The set value is specific for the selected radio configuration.

The value range depends on the channel type and radio configuration. The frame length of the F-SCH is fixed to 26.6 ms. The maximum frame length is 160 ms, the minimum frame length is 5 ms.

The frame length affects the data rates and the channel coding types that are possible within a channel. Changing the frame length may lead to a change of data rate and/or the channel coding type and this in turn may bring about a change of the Walsh code.

Remote command:

\[[:\text{SOURce<hw>}:\text{BB}:C2K:BSTation<st>:\text{CGRoup<di0>:\text{COFFset<ch>:FLENgth}}\text{}}\]

Data Rate - BS
Enters the data rate of the channel. The set value is specific for the selected radio configuration.

The R&S Signal Generator supports all data rates between 1.2 kbps and 1,036.8 kbps defined in the standard.

The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

The data rate affects the Walsh code (spreading factor) that is possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.

Remote command:

\[ [:\text{SOURce<hw>}:\text{BB}:C2K:BSTation<st>:\text{CGRoup<di0>:\text{COFFset<ch>:DATA:RATE}}\text{}}\]

Walsh Code - BS
Assigns the Walsh Code to the channel (see chapter 3.7, "Variable-Length Walsh Spreading - Downlink", on page 14, and see "Code Domain Graph - BS" on page 53). The set value is specific for the selected radio configuration.

The code channel is spread with the set Walsh code (spreading code).

The value range of the Walsh code depends on the frame length, the channel coding type and the data rate.

If one of these parameters is changed so that the set Walsh code gets invalid, the next permissible value is automatically set.
The standard assigns a fixed Walsh code to some channels (F-PICH, for example, always uses Walsh code 0). Generally, the Walsh code can only be varied within the range specified by the standard.

Remote command:
```
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:WCODen on page 142
```

**Quasi Orthogonal Walsh Code State - BS**
Activates/deactivates the use of the quasi orthogonal Walsh codes for the channel. The set state is specific for the selected radio configuration.

Depending on the channel type and other parameters, the standard does not allow the use of quasi-orthogonal codes. In this case the selection field is dimmed.

The quasi orthogonal Walsh Code set is selected for all channels of the base station in the upper area of the CDMA200 dialog.

Remote command:
```
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>: QWCode:STATe on page 135
```

**Power - BS**
Sets the channel power in dB. The set value is specific for the selected radio configuration.

The power entered is relative to the powers outputs of the other channels. If "Adjust Total Power to 0 dB" is executed (top level of the CDMA dialog), all the power data is relative to 0 dB.

The set "Power" value is also the start power of the channel for "Misuse For Output Power Control".

**Note:** The maximum channel power of 0 dB applies to non-blanked channels (duty cycle 100%). For blanked channels, the maximum value can be increased (by Adjust Total Power) to values greater than 0 dB (to $10 \log_{10}(1/duty\_cycle)$).

Remote command:
```
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:POWer on page 134
```

**Data - BS**
Selects data source. The set value is specific for the selected radio configuration.

The following standard data sources are available:

- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
More Parameters - BS Channel Table

4.8 More Parameters - BS Channel Table

The "More Parameters" dialog can be called in the BS channel table in column "More Params" with button "Config...". The indicated values and the settings are specific for the selected radio configuration.
The settings for the packet channel F-PDCH channel and all other channels are different (see chapter 4.9, "More Parameters for F-PDCH - BS", on page 73). The dialog for the special channels and the traffic channels is described below.

The upper section is where the channel number, channel type and Walsh length of the selected channel is displayed.

The "Power Control" section is where the settings for the power control bits are made.

This section is only available for the traffic sub channels F-FCH and F-DCCH.

The "Channel Coding" section is where the channel coding settings are made.

The "Bit/Block Error Insertion" section is where the bit/block error simulation is configured and activated.

This section is only available for the real time channels.
4.8.1 General Settings

The upper section of the dialog is where the channel number, channel type and Walsh length of the selected channel are displayed.

Channel No - More Parameters BS
Displays the channel number of the channel being configured.
Remote command:
n.a.

Channel Type - More Parameters BS
Displays the type of the channel being configured.
Remote command:
n.a.

Walsh Length - More Parameters BS
Displays the Walsh code of the channel being configured. The indicated value is specific for the selected radio configuration.
Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:WLENgth? on page 142
```

LC Mask - More Parameters BS
(hex) Enters the mask of the long-code generator in hexadecimal form. The set value is specific for the selected radio configuration.

The long-code mask is a 42-bit value. The mask serves for channel-specific and user-specific scrambling of the code channel. The value range is 0 to 3FF FFFF FFFF.
The LC Mask is the same for all sub channels of a traffic channel. If the mask is modified for one of the sub channels the new value is then automatically used by all other sub-channels of this traffic channel.
Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:LCMask on page 134
```
4.8.2 Power Control

The "Power Control" section is where the settings for the power control bits are made. These bits are used to control the transmit power.

This section is only available for the traffic sub channels F-FCH and F-DCCH.

Data Source - Power Control - BS

Defines the data source for the power control bits of the channel. The set value is specific for the selected radio configuration.

The following standard data sources are available:

- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also "Main Dialog > Data List Management".

Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA on page 136
```

Read Out Mode (Power Control) - BS

Defines power control bits usage. The set value is specific for the selected radio configuration.

With CDMA, the power control bits are used to signal the increase or reduction in transmit power to the called station.

The basestation sends power control bits in the traffic channel at an 800 Hz rate instead of the scrambled data bits. The mobile station increases or decrease its output power depending on these power control bits. One to four data bits (depending on the data rate) are replaced a corresponding number of power control bits ("0...0" or "1...1").

With all read out modes, one bit is taken from the power control, multiplied and entered into the bit stream. The difference between the modes lies in the usage of the power control bits.
These different modes can be used, for example, to deliberately set a basestation to a specific output power (e.g. with the pattern 11111) and then let it oscillate around this power (with Single + alt. 01 and Single + alt. 10). This then allows power measurements to be carried out at the basestation (at a quasi-constant power). Together with the option (Mis-)Use for output power control (see below), Read Out Mode can also be used to generate various output power profiles.

"Continuous" The power control bits are used cyclically.

"Single + All 0" The power control bits are used once, and then the power control sequence is continued with 0 bits.

"Single + All 1" The power control bits are used once, and then the power control sequence is continued with 1 bits.

"Single + alt. 01" The power control bits are used once and then the power control sequence is continued with 0 and 1 bits alternately (in multiples, depending on the data rate, for example, 00001111).

"Single + alt. 10" The power control bits are used once and then the power control bit sequence is continued with 1 and 0 bits alternately (in multiples, depending on the data rate, for example, 1110000).

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:READ on page 139

Misuse for Output Power Control - BS
Activates "mis-" use of the power control data. The set value is specific for the selected radio configuration.

With CDMA, the power control bits are used to signal the increase or reduction of transmit power to the called station. If "(Mis-) use for output power" control is activated, the specified pattern is misused, in order to vary the intrinsic transmit power over time. Every 1.25 ms (800 Hz) a bit of this pattern is removed in order to increase (bit = "1") or reduce (bit = "0") the channel power by the specified power step "(Power Step)". The upper limit of this is 0 dB and the lower limit -80 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and Pattern ReadOut Mode "Continuous":

![Dynamic change of channel power (continuous)](image)

**Fig. 4-5: Dynamic change of channel power (continuous)**

**Note:** The first bit is assigned to the first power control section. In this first section the start power specified in the channel table is always used, i.e. the defined power
change will be effective only in the next power control section (with the second power control bit).

Remote command:
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC: 
MISuse on page 138

**Power Step (DPCCH) - BS**

Sets the step width of the power change in dB for "(Mis-) use for output power control". The set value is specific for the selected radio configuration.

Remote command:
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC: 
PSTep on page 138

### 4.8.3 Channel Coding

The "Channel Coding" section or dialog "More Parameters" is where the channel coding settings are made. The indicated values and the settings are specific for the selected radio configuration.

In contrast to 3GPP FDD, channel coding with CDMA2000 is part of the physical layer. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

**Channel Coding Mode - More Params BS**

Activates or deactivates channel coding. The set state is specific for the selected radio configuration.

- **"Off"**
  
  Channel coding is deactivated. Channel coding is not performed. The data sources of the individual channels apply their data stream directly to the long-code scrambler. The data source supplies the traffic data with the data rate that would be available at the long-code scrambler after coding is switched on. This effective data rate, which is used for reading off from the data source, is displayed under Effective Data Rate. The Data Rate parameter displayed in the channel table continues to affect the Effective Data Rate, but no longer agrees with it.

- **"Complete"**
  
  The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

- **"Without Interleaving"**
  
  Except for the block interleaver, the whole channel coding procedure is carried out. In this mode the frame structure and the convolutional coder of an receiver can be tested.

- **"Interleaving Only"**
  
  In this mode only a block interleaver is used for coding. This allows the deinterleaver in the receiver to be tested independently of the remaining (de-)coding process.

Remote command:
[:SOURce<hw>:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>: 
CCODing:MODE on page 127
Effective Data Rate - More Params BS
Indication of the effective data rate. The indicated value is specific for the selected radio configuration.

For coding modes "Interleaving Only" and "Coding Off" the effective data rate differs from the set data rate, since no increase in the data rate is brought about by the convolution coder. The data rate set in the channel table is therefore not correct.

For coding modes "Without Interleaving" and "Complete" the data rate in the channel table agrees with the effective data rate, since there is an increase in the data rate due to the convolution coder.

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRo<di0>:COFFset<ch>:CCODing:DATA:RATE?] on page 126

Source Bits / Frame - More Params BS
Indication of the number of input bits per frame for the channel coder. The indicated value is specific for the selected radio configuration.

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRo<di0>:COFFset<ch>:CCODing:BIFrame?] on page 125

CRC Length - More Params BS
Indication of the CRC (cyclic redundancy code) type (length) for error identification. The indicated value is specific for the selected radio configuration.

Remote command:
n.a.

Channel Coder Type - More Params BS
Selects error protection. The set value is specific for the selected radio configuration.

Which coder types are available depends on the channel type and other channel settings such as frame length, etc.

If one of these parameters is changed so that the set channel coding type gets invalid, the next permissible value is automatically set.

"Off" No error protection. This selection is available for the pilot channels only.

"Conv Encoder" Convolution Coder with generator polynomials defined by CDMA. The numeric value defines the rate of the convolution coder.

"Turbo Encoder" Turbo Coder of rate 1/3 in accordance with the CDMA specifications. The numeric value defines the rate of the turbo coder.

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRo<di0>:COFFset<ch>:CCODing:TYPE] on page 128
Symbol Repetition - More Params BS
Indication of the symbol repetition rate. The indicated value is specific for the selected radio configuration.

Symbol repetition is used together with block symbol puncture for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Remote command:
```
```

Symbol Puncture - More Params BS
Indication of the symbol puncture rate. The indicated value is specific for the selected radio configuration.

Symbol puncturing (elimination) is used together with block symbol repetition for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Remote command:
```
```

Block Interleaver - More Params BS
Displays the number of symbols that the interleaver processes per block. The indicated value is specific for the selected radio configuration.

Remote command:
```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:BINTerleaver? on page 125
```

4.8.4 Additional Sync Channel Parameters

In the "Additional Sync Channel Parameters" sections of the "More Params" dialog is available for the synchronisation channel F-SYNC and real time mode only.

```
<table>
<thead>
<tr>
<th>Source Bit/Frame</th>
<th>CDMA Channel Number</th>
<th>System Time</th>
<th>LC State (hex)</th>
<th>P_REV</th>
<th>MIN_P_REV</th>
<th>SID</th>
<th>NID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32</td>
<td>0</td>
<td>0000 0000 000</td>
<td>6</td>
<td>2</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>
```

CDMA Channel Number - More Params BS
Displays the CDMA Channel Number which corresponds to the RF.

Remote command:
```
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:CNUMber on page 122
```
**System Time - More Params BS**
(available for R&S SMBV and R&S WinIQSIM2 only)
Displays the system time.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:STIme on page 124

**LC State (hex) - More Params BS**
(available for R&S SMBV and R&S WinIQSIM2 only)
Defines the long code state in hexadecimal format.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:LCSta on page 122

**P_REV - More Params BS**
Displays the Protocol Revision Level, i.e. specifies the CDMA2000 system release number.
The table below gives the cross-reference between the P_REV values and the CDMA2000 Releases.

<table>
<thead>
<tr>
<th>P_REV</th>
<th>CDMA2000 Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Korean PCS(Band Class4), USPCS(Band Class1)</td>
</tr>
<tr>
<td>2</td>
<td>IS-95</td>
</tr>
<tr>
<td>3</td>
<td>TBS74</td>
</tr>
<tr>
<td>4</td>
<td>IS-95A</td>
</tr>
<tr>
<td>5</td>
<td>IS-95B</td>
</tr>
<tr>
<td>6</td>
<td>IS2000 Release 0</td>
</tr>
<tr>
<td>7</td>
<td>IS2000 Release A</td>
</tr>
<tr>
<td>8</td>
<td>IS2000 Release B</td>
</tr>
</tbody>
</table>

Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:PREV on page 123

**MIN_P_REV - More Params BS**
Displays the Minimum Protocol Revision Level.
The basestation sets this field to prevent mobile stations which can not be supported by the basestation from accessing the CDMA system.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:MPRev on page 123

**SID - More Params BS**
Displays the System Identification.
The basestation sets the system identification number.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:SID on page 124
NID - More Params BS
Displays the Network Identification.
The NID serves as a sub-identifier of a CDMA system as defined by the owner of the SID.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:NID on page 123

4.8.5 Error Insertion

In the "Bit Error Insertion" and "Block Error Insertion" sections of the "More Params" dialog, errors can be inserted into the data source and into the CRC checksum, in order, for example, to check the bit and block error rate testers.
These functions are available for realtime channels only.

<table>
<thead>
<tr>
<th>Bit Error Insertion</th>
<th>Block Error Insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>State</td>
</tr>
<tr>
<td>Bit Error Rate</td>
<td>Block Error Rate</td>
</tr>
<tr>
<td>0.001 000 0</td>
<td>0.100 0</td>
</tr>
</tbody>
</table>

Bit Error State - More Params BS
Activates or deactivates bit error generation.
Bit errors are inserted into the data fields of the realtime channels.
When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream with the specified error rate in order to simulate an invalid signal.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BIT:STATE on page 132

Bit Error Rate - More Params BS
Sets the bit error rate.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BIT:RATE on page 131

Block Error State - More Params BS
Activates or deactivates the block error generation.
The CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate an invalid signal.
Block error generation is only possible with channel coding enabled.

Remote command:
```plaintext
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BLOCk:STATe on page 133
```

**Block Error Rate - More Params BS**
Sets the block error rate.

Remote command:
```plaintext
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BLOCk:RATE on page 132
```

### 4.9 More Parameters for F-PDCH - BS

The "More Parameters" dialog for packet channel F-PDCH can be called in the BS channel table in column "More Params" with button "Config...".

The settings for the packet channel F-PDCH channel and all other channels are different (see chapter 4.8, "More Parameters - BS Channel Table", on page 63). The dialog for the special channels and the traffic channels is described below.

The channel coding for the F-PDCHs is always carried out in full (see 3GPP2 C.S0002-C figure 3.1.3.1.1.1-19).

The parameters of both F-PDCCHs (such as Number of Slots per Subpacket, Subpacket Position, etc.) are implicitly defined by the F-PDCH settings, since both these channels are always transmitted simultaneously with the F-PDCH. The "More Parameters" dialog for these F-PDCCHs is therefore mostly for display, it only enables the selection of channel coding mode.

The left part is used to enter the general settings for the packet channel.

The right, upper part contains a table for setting the parameters of the subpackets. Up to 8 subpackets can be transmitted for each regular packet.

The right, lower part displays the current configuration of the packet channel in graphical form.
4.9.1 General Settings for Packet Channel

Packet Interval - More Params F-PDCHs BS
Selects the interval at which new data packets arrive.

New F-PDCH packets are generated in this interval. Within an interval, up to 8 sub-packets of a data packet can be transmitted with any required time offset.

The value range is dependent on the set sequence length (ARB settings). The values 80 ms, 40 ms, 20 ms, 10 ms and 5 ms can always be set, and the maximum value is 2000 ms. All intermediate values must satisfy the condition

**Sequence Length = * 80ms/2^n**

where \( n \) is a whole number.

**Example:**
Sequence length = one 80 ms frame.
The possible values for the packet interval are 80 ms, 40 ms, 20 ms, 10 ms and 5 ms.
Sequence length = three 80 ms frames.
The possible values for the packet interval are 240 ms, 120 ms, 80 ms, 40 ms, 20 ms, 10 ms and 5 ms.

Remote command:
```
[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCChannel:PINTerval
```
Walsh Code Column Index - More Params F-PDCHs BS
Selects the standard-compliant set of available Walsh codes for the F_PDCH (see 3GPP2 C.S0003-C, table 2-35).
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:WINdex on page 151

Same Packet Setup... - More Params F-PDCHs BS
Sets whether or not all subpackets are to be generated with the same settings.
In case "On" is selected, setting the packet parameters (Number of Bits etc., see below) can only be done for subpacket 1. All other subpackets receive the same parameters.
The "Off" setting allows individual settings for each subpacket.
Remote command:
[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:PSETup on page 144

4.9.2 Subpacket Table Settings
The middle part contains a table for setting the parameters of the subpackets. Up to 8 subpackets can be transmitted for each regular packet (Encoder Packet).

<table>
<thead>
<tr>
<th>Subpacket Number - More Params F-PDCHs BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index number of the subpackets in the selected channel. Each packet can include up to eight subpackets.</td>
</tr>
<tr>
<td>The subpacket is selected by the suffix to SUBPacket in remote control.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subpacket State - More Params F-PDCHs BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of the subpacket.</td>
</tr>
<tr>
<td>Subpacket 1 is always active. The rest can be turned on and off.</td>
</tr>
<tr>
<td>Remote command:</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:BSTation&lt;st&gt;:PDCHannel:SUBPacket&lt;di&gt;:STATE on page 150</td>
</tr>
</tbody>
</table>
**Subpacket ID (SPID) - More Params F-PDCHs BS**

Selects the subpacket ID.

The subpacket ID controls the subpacket symbol selection and adopts one of four possible subpackets from the encoder packet.

The ID of the first subpacket is fixed at 0. The ID can be chosen for each of the rest.

Remote command:

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:ID
```

**Time Slot Offset - More Params F-PDCHs BS**

Sets the starting time of the subpacket relative to the starting time of the packet interval.

The first subpacket always has an offset of 0, which cannot be changed.

The value range for the individual subpackets depends on the settings of the other subpackets:

The time slot offsets of the remaining subpackets must be entered in ascending order. Also it is not permitted to transmit two packets simultaneously.

**Example:**

Subpacket 2 is transmitted in time slot 5 and is 4 slots long. Subpacket 3 can only be transmitted in time slot 9 and no sooner.

In total the value range is 0 to (Packet Interval/1.25 ms - Number of Slots per Subpacket).

**Example:**

Packet Interval = 20 ms, Number of Slots per Subpacket = 2. The value range is 0 to 14.

The entry for "Number of Slots per Subpacket" defines the length of a packet.

Remote command:

```
```

**PDCH Subpacket Table Parameters - More Params F-PDCHs BS**

Only certain combinations of this parameter with the parameters of the last five table columns are possible. These combinations are shown in the selection list in the form of a table for all five parameters.
"Number of Bits per Encoder Packet"

Sets the number of bits per encoder packet. The "Number of Bits per Encoder Packet" defines the number of data bits that can be read from the data source for an encoder packet. Due to the channel coding this number is multiplied by a factor of about 5. The subsequent subpacket symbol selection then divides these bits into four different subpackets which can be selected via the SPID parameter. The "Number of Bits per Encoder Packet" can only be changed for subpacket 1. This value must be identical for the remaining subpackets, since they are all part of a single encoder packet.

"Number of 32-Chip Walsh Channels"

Selects the number of 32-chip Walsh channels.

"Subpacket Data Rate (kbps)"

Selects the data rate of the subpacket. The data rate is the result of the "Number of Bits per Encoder Packet" divided by the duration of the subpacket (= "Number of Slots per Subpacket"). Therefore only specified combinations of the "Subpacket Data Rate" with the "Number of Slots per Subpacket" at a specified "Number of Bits per Encoder Packet" are possible.

"Number of Slots per Subpacket"

Selects the number of slots per subpacket. This parameter defines the duration of the subpacket. A slot equals 1.25 ms. The "Number of Slots per Subpacket" is the result of the "Number of Bits per Encoder Packet" divided by the data rate. Therefore only specified combinations of the Subpacket Data Rate with the "Number of Slots per Subpacket" at a specified "Number of Bits per Encoder Packet" are possible.

"Modulation"

Indication of the modulation type. The modulation type is fix for each combination of the above parameters.

Remote command:

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDChannel:SUBPacket<di>:
PARameters on page 145
Resulting Walsh Codes for Subpacket - More Params F-PDCHs BS
Indication of the resulting Walsh codes for the sub packet.

Remote command:
[:SOURce<hw>:BB:C2K:BSTation<st>:PDChannel:SUBPacket<di>:
WCODes? on page 151

4.9.3 Subpacket Graph

The current configuration of the packet channel and its active subpackets is displayed in graphical form below the table.

The X axis is the length of the set packet interval in ms, i.e. the duration of the transmission of an encoder packet.

The relative power of the subpackets is represented on the Y axis. The subpackets are shown as bars and are 1, 2 or 4 time slots wide according to the configuration. The position on the X axis corresponds to the selected time slot offset.

The color of the bar depends on the sub packet ID (SPID). The assignment of colors to SPIIDs is shown below the graph.

4.10 Mobile Station Configuration (MS)

The "Mobile Station Configuration" dialog is called by selecting mobile station "MS1 ... MS4" in the CDMA2000 dialog.

Mobile station 1 (MS1) generates all the channels in realtime, the other mobile stations generate the channels in arbitrary waveform mode.

The dialog is divided into the sections "Common Settings", "Power Control" and "Channel Table".

The structure of the channel table depends on the selected operating mode and - for the traffic channel - on the selected radio configuration.
4.10.1 Common Settings - MS

The "Common Settings" section is where the general settings for the selected mobile station are made.

State - MS
Activates or deactivates the selected mobile station. The number of the selected mobile station is specified in the dialog header.

Remote command:

\[[\text{SOURce}\langle\text{hw}\rangle]:\text{BB}\langle\text{C2K}\rangle:\text{MSTation}\langle\text{st}\rangle:\text{STATE}\text{ on page 164}\]

Operating Mode - MS
Selects the mode in which the mobile station is to work.

The operating mode defines the generated channel types. The lower part of the dialog will change in accordance with the mode. The following modes are available:

"Traffic" In this mode the instrument generates a single traffic channel. A traffic channel consists of up to 8 sub channels depending on the selected radio configuration. This mode corresponds to the standard mode of a mobile station during voice and data transmission.

"Access" In this mode, the instrument generates an access channel (R-ACH). This channel is needed to set up the connection between the mobile station and the base station.

"Enhanced Access" In this mode, the instrument generates an enhanced access channel (R-ACH) and a pilot channel (R-PICH). These channels are used to set up the connection between the mobile station and the base station.

"Common Control" In this mode, the instrument generates a common control channel (R-ACH) and a pilot channel (R-PICH).

Remote command:

\[[\text{SOURce}\langle\text{hw}\rangle]:\text{BB}\langle\text{C2K}\rangle:\text{MSTation}\langle\text{st}\rangle:\text{MODE}\text{ on page 163}\]

Radio Configuration - MS
Selects the radio configuration for the traffic channel.
In the reverse link, the channel scenario with the spreading codes of the individual channels is predefined by selecting the radio configuration. For this reason the channel table does not contain selection parameters for the Walsh code.

A separate set of settings of all channel table parameters is provided for each radio configuration. Changing the radio configuration causes the settings belonging to the new RC value to be activated in the channel table (the settings belonging to the old RC value are not lost).

The radio configuration determines the permissible frame lengths and the frame length defines the permitted data rate.

Changing the frame length automatically causes the data rate to be changed if it is no longer permitted.

Remote command:

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:RCONfiguration
```

Channel Coding - MS
Activates or deactivates channel coding.

- "Off"  Channel coding is deactivated.
- "Complete"  The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.
- "Without Inter-leaving"  Except for the block interleaver, the whole channel coding procedure is carried out.
- "Interleaving Only"  In this mode only block interleaver is used for coding.

Remote command:

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:CCODing:MODE
```

LC Mask (hex) - MS
Enters the mask of the long-code generator in hexadecimal form.

The long-code mask is a 42-bit value. The mask serves for channel-specific and user-specific scrambling of the code channel. The value range is 0 to 3FF FFFF FFFF.

Remote command:

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:LCMask
```

4.10.2 Power Control - MS

The "Power Control" section is where the settings for the power control bits are made.

In the uplink, the bits are used exclusively for controlling the mobile station output power by activating the "Mis(use) Power Control" function. Power control puncturing of the data bits of the traffic channels for controlling the base station power is not performed.

This section is only available for the traffic channel.
Data Source (Power Control) - MS
Defines the data source for the power control bits of the channel.

The following standard data sources are available:
- **"All 0, All 1"**
  An internally generated sequence containing 0 data or 1 data.
- **"PNxx"**
  An internally generated pseudo-random noise sequence.
- **"Pattern"**
  An internally generated sequence according to a bit pattern. Use the "Pattern" box to define the bit pattern.
- **"Data List/Select DList"**
  A binary data from a data list, internally or externally generated. Select "Select DList" to access the standard "Select List" dialog.
  - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also "Main Dialog > Data List Management".

Remote command:

- [:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA on page 164
- [:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA:DSELect on page 165

Read Out Mode (Power Control) - MS
Defines a read-out mode of power control bits.

Together with the option (Mis-)Use for output power control (see below), Read Out Mode can also be used to generate various output power profiles.

- **"Continuous"** The power control bits are used cyclically.
- **"Single + All 0"** The power control bits are used once and then the power control sequence is continued with 0 bits.
- **"Single + All 1"** The power control bits are used once and then the power control sequence is continued with 1 bits.
- **"Single + alt. 01"** The power control bits are used once and then the power control sequence is continued with 0 and 1 bits alternately.
- **"Single + alt. 10"** The power control bits are used once and then the power control sequence is continued with 1 and 0 bits alternately.

Remote command:

- [:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:READ on page 166

Misuse for Output Power Control - MS
Activates "mis-" use of the power control data.

In the uplink, the power control bits are used exclusively for controlling the mobile station output power. Power control puncturing is not defined for controlling the basestation power.
If "(Mis-) use for output power control" is activated, the specified pattern is used to vary
the intrinsic transmit power over time. Every 1.25 ms (800 Hz) a bit of this pattern is
removed in order to increase (bit = "1") or reduce (bit = "0") the channel power by the
specified power step "(Power Step)". The upper limit for this is 0 dB and the lower limit
-80 dB. The following envelope is produced at a channel power of 0 dB, power step
1.0 dB and pattern "00110100000011" and Pattern ReadOut Mode "Continuous":

![Fig. 4-6: Dynamic change of channel power (continuous)](image)

**Note:** The first bit is assigned to the first power control section. In this first section the
start power specified in the channel table is always used, i.e. only in the next power
control section (with the second power control bit) will the defined power change be
effective.

Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:MISuse
```
on page 165

**Power Step - MS**
Sets the step width of the power change in dB for "(Mis-) use for output power control".
Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:PSTep
```
on page 166

### 4.10.3 Channel Table - MS

The "channel table" is located in the lower part of the dialog. The channel table is
where the individual channel parameters are set.

The structure of the channel table depends on the selected operating mode and - for
the traffic channel - on the selected radio configuration. Also, for the traffic channels,
the indicated values and the settings are specific for the selected radio configuration.
In uplink, the employed Walsh code is determined by the radio configuration and cannot
be chosen.

The following combinations between the operating modes of the four mobile stations
are allowed:
# Channel Number - MS

Displays the channel number.

All channels of the selected operating mode are listed. The channels are switched on and off with the "On/Off" button in the "State" column.

Remote command:

n.a.

## Channel Type - MS

Indication of the channel type (see table 4-3). The possible channel types depend on the selected operating mode of the mobile station.

### Table 4-3: List of supported channel types

<table>
<thead>
<tr>
<th>Short form</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traffic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-PICH</td>
<td>Reverse Pilot Channel</td>
<td>The Reverse Pilot Channel provides the capabilities for coherent detection.</td>
</tr>
<tr>
<td>R-DCCH</td>
<td>Reverse Dedicated Control Channel</td>
<td>The Reverse Dedicated Control Channel transports mobile-specific control information.</td>
</tr>
<tr>
<td>R-FCH</td>
<td>Reverse Fundamental Channel</td>
<td>The Reverse Fundamental Channel is similar to F-FCH; designed to transport dedicated data.</td>
</tr>
<tr>
<td>R-SCH</td>
<td>Reverse Supplemental Channel (RC 3...5)</td>
<td>The Reverse Supplemental Channels are allocated dynamically to meet a required data rate.</td>
</tr>
<tr>
<td>R-SCCH</td>
<td>Reverse Supplemental Code Channel (RC 1 / 2)</td>
<td>The Reverse Supplemental Code Channels are allocated dynamically to meet a required data rate.</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-ACH</td>
<td>Reverse Access Channel</td>
<td>The Access channel is needed to set up the connection between the mobile station and the base station.</td>
</tr>
</tbody>
</table>

## Mobile Station Configuration (MS)

<table>
<thead>
<tr>
<th>Traffic, RC1 &amp; RC 2</th>
<th>Traffic, RC3 &amp; RC 4</th>
<th>Access</th>
<th>Enhanced Access</th>
<th>Common Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Traffic, RC3 &amp; RC 4</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Access</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Enhanced Access</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Common Control</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Short form</td>
<td>Name</td>
<td>Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enhanced Access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-EACH</td>
<td>Reverse Enhanced Access Channel</td>
<td>The Reverse Enhanced Access Channel is needed to set up the connection between the mobile station and the base station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-PICH</td>
<td>Reverse Pilot Channel</td>
<td>The Reverse Pilot Channel provides the capabilities for coherent detection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-CCCH</td>
<td>Reverse Common Control Channel</td>
<td>The Reverse Fundamental Channel is similar to R-ACH but it is meant to transport control information.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remote command:

`[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:TYPE?` on page 161

### Frame Length - MS

Enters the frame length of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The value range depends on the channel type and the selected radio configuration. The frame length of some channels is fixed. The maximum frame length is 80 ms, the minimum frame length is 5 ms.

The frame length affects the data rates that are possible within a channel. If a frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

Remote command:

`[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:FLENgth` on page 160

### Data Rate - MS

Enters the data rate of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The R&S Signal Generator supports all data rates between 1.2 kbps and 1,036.8 kbps defined in the standard.

The value range depends on the frame length. If one of these parameters is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

Remote command:

`[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:RATE` on page 159

### Walsh - MS

Assigns the Walsh Code to the channel (see chapter 3.9, "Spreading - Uplink", on page 14). For the traffic channels, the indicated value is specific for the selected radio configuration.
The code channel is spread with the set Walsh code (spreading code). The Walsh codes to be used are specified by the standard and cannot be chosen.

Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:WCODe?
```
on page 162

Spread- MS

Indication of the spreading factor of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The spreading factor corresponds to the length of the employed Walsh code. The Walsh codes to be used are specified by the standard and cannot be chosen.

Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:SPReading?
```
on page 160

Power - MS

Enters the channel power in dB. For the traffic channels, the set value is specific for the selected radio configuration.

The power entered is relative to the power's output of the other channels. If "Adjust Total Power to 0 dB" is executed (top level of the CDMA2000 dialog), all the power data is relative to 0 dB.

The set power value is also the start power of the channel for "Misuse For Output Power Control".

Note: The maximum channel power of 0 dB applies to non-blanked channels (duty cycle 100%), with blanked channels, the maximum value can be increased (by Adjust Total Power) to values greater than 0 dB (to $10 * \log_{10}(1 / \text{duty cycle})$).

Remote command:
```
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:POWer
```
on page 160

Data - MS

Selects data source. For the traffic channels, the set value is specific for the selected radio configuration.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern. Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated. Select "Select DList" to access the standard "Select List" dialog.
  - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
– Use the standard "File Manager" function to transfer external data lists to the instrument.

See also "Main Dialog > Data List Management".

Remote command:

\[
\begin{align*}
&[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA \quad \text{on page 157} \\
&[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:PATTern \quad \text{on page 159} \\
&[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:DSELect \quad \text{on page 158}
\end{align*}
\]

**Channel State- MS**

Activates/deactivates the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

Remote command:

\[
[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:STATe \quad \text{on page 161}
\]
5 Remote-Control Commands

The following commands are required to perform signal generation with the CDMA2000 options in a remote environment. We assume that the R&S Signal Generator has already been set up for remote operation in a network as described in the R&S Signal Generator documentation. Knowledge of the remote control operation and the SCPI command syntax is assumed.

Conventions used in SCPI command descriptions

For a description of the conventions used in the remote command descriptions, see section "Remote Control Commands" in the R&S Signal Generator operating manual.

The commands in the SOURce:BB:C2K subsystem are described in several sections, separated into general remote commands, commands for base station settings and commands for mobile station settings.

Common Suffixes

The following common suffixes are used in remote commands:

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Value range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOURce&lt;hw&gt;</td>
<td>[1]</td>
<td>2</td>
</tr>
<tr>
<td>OUTPut&lt;ch&gt;</td>
<td>1 .. 4</td>
<td>available markers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R&amp;S SMBV supports two markers</td>
</tr>
<tr>
<td>EXTernal&lt;ch&gt;</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Placeholder <root>

For commands that read out or save files in the default directory, the default directory is set using command MMEM:CDIRectory. The examples in this description use the placeholder <root> in the syntax of the command.

- D:\ - for selecting the internal hard disk of a Windows instrument
- E:\ - for selecting the memory stick which is inserted at the USB interface of a Windows instrument
- /var/user/ - for selecting the internal flash card of a Linux instrument
- /usb/ - for selecting the memory stick which is inserted at the USB interface of a Linux instrument.
Tasks (in manual or remote operation) that are also performed in the base unit in the same way are not described here.

In particular, this includes:

- Managing settings and data lists, i.e. storing and loading settings, creating and accessing data lists, accessing files in a particular directory, etc.
- Information on regular trigger, marker and clock signals as well as filter settings, if appropriate.
- General instrument configuration, such as configuring networks and remote operation
- Using the common status registers

For a description of such tasks, see the R&S Signal Generator operating manual.

The following commands specific to the CDMA2000 are described here:

### 5.1 Primary Commands

[:SOURce<hw>]:BB:C2K:COPY:COFFset

[:SOURce<hw>]:BB:C2K:COPY:DESTination

[:SOURce<hw>]:BB:C2K:COPY:EXECute

[:SOURce<hw>]:BB:C2K:CRATe?

[:SOURce<hw>]:BB:C2K:CRATe:VARiation

[:SOURce<hw>]:BB:C2K:IQSWap[:STATe]

[:SOURce<hw>]:BB:C2K:LINK

[:SOURce<hw>]:BB:C2K:POWer:ADJust

[:SOURce<hw>]:BB:C2K:POWer[:TOTal]?

[:SOURce<hw>]:BB:C2K:PRESet

[:SOURce<hw>]:BB:C2K:SETTing:CATalog?

[:SOURce<hw>]:BB:C2K:SETTing:DELeTe

[:SOURce<hw>]:BB:C2K:SETTing:LOAD

[:SOURce<hw>]:BB:C2K:SETTing:STORE

[:SOURce<hw>]:BB:C2K:SETTing:STORE:FAST

[:SOURce<hw>]:BB:C2K:SLENth

[:SOURce<hw>]:BB:C2K:STATe

[:SOURce<hw>]:BB:C2K:WAVEform:CREate

[:SOURce]:BB:C2K:VERSion?

[:SOURce<hw>]:BB:C2K:COPY:COFFset <COffset>

The command sets the offset for the Walsh code in the destination base station. The minimum value is 0 (Walsh codes are identical), the maximum value is 255.

This command is only available in the downlink (SOUR:BB:C2K:LINK FORW/DOWN).
Parameters:
<COffset> integer
Range: 0 to 255
Increment: 1
*RST: 0

Example: BB:C2K:COPY:COFF 10
the Walsh code is shifted by 10 when the source base station is copied to the destination base station.

Manual operation: See "Copy ..." on page 29

[:SOURce<hw>]:BB:C2K:COPY:DESTination <Destination>
The command selects the station to which data is to be copied. Whether the data is copied to a base station or a mobile station depends on which transmission direction is selected (command C2K:LINK UP | DOWN).

Parameters:
<Destination> 1 | 2 | 3 | 4
Range: 1 to 4
*RST: 2

Example: BB:C2K:LINK DOWN
selects the downlink transmit direction (base station to mobile station).
BB:C2K:COPY:SOUR 1
selects base station 1 as the source.
BB:C2K:COPY:DEST 4
selects base station 4 as the destination.
BB:C2K:COPY:EXEC
starts copying the parameter set of base station 1 to base station 4.

Manual operation: See "Copy ..." on page 29

[:SOURce<hw>]:BB:C2K:COPY:EXECute
The command starts the copy process. The dataset of the source station is copied to the destination station. Whether the data is copied to a base station or a mobile station depends on which transmission direction is selected (command :BB:C2K:LINK UP | DOWN).

Example: BB:C2K:COPY:EXEC
starts copying the parameter set of the selected source station to the selected destination station.

Usage: Event
Manual operation: See "Copy ..." on page 29
The command selects the station that has data to be copied. Whether the station copied is a base or mobile station depends on which transmission direction is selected (command **C2K:LINK UP | DOWN**).

**Parameters:**

*<Source>*

- 1 | 2 | 3 | 4
- Range: 1 to 4
- *RST: 1*

**Example:**

- **BB:C2K:LINK UP** selects the uplink transmit direction (mobile station to base station).
- **BB:C2K:COPY:SOUR 1** selects mobile station 1 as the source.
- **BB:C2K:COPY:DEST 4** selects mobile station 4 as the destination.
- **BB:C2K:COPY:EXEC** starts copying the parameter set of mobile station 1 to mobile station 4.

**Manual operation:** See "Copy ..." on page 29

---

The command queries the spreading rate. The output chip rate which determines the rate of the spread symbols as is used for signal output can be set with the command **SOUR:BB:C2K:CRAT:VAR**.

**Return values:**

*<CRate>*

- R1M2
- *RST: R1M2*

**Example:**

- **BB:C2K:CRAT?** queries the system chip rate.
  - Response: R1M2
  - the system chip rate is 1.2288 Mcps.

**Usage:** Query only

**Manual operation:** See "Spreading Rate" on page 25

---

The command enters the output chip rate.

The output chip rate changes the output clock and the modulation bandwidth, as well as the synchronization signals that are output. It does not affect the calculated chip sequence.
Remote-Control Commands

Parameters:

**<Variation>**
- float
- **Range:** 1 Mcps to 5 Mcps
- **Increment:** 1 Hz
- *RST:* 1.2288 Mcps

**Example:**
```
BB:C2K:CRAT:VAR 4086001
```
sets the chip rate to 4.08 Mcps.

**Manual operation:** See "Chip Rate Variation" on page 32

### [:SOURce<hw>]:BB:C2K:IQSWap[:STATe] <State>

This command inverts the Q-part of the baseband signal if set to ON. The signal on the baseband outputs meets the cdma2000 standard. In order to generate an RF signal that conforms to the standard, the "I/Q Swap" function in the "I/Q Modulator" menu must be enabled ("On") (SOURce:IQ:SWAP ON).

**Parameters:**

- **<State>**
  - 0 | 1 | OFF | ON
  - *RST:* OFF

**Example:**
```
BB:C2K:IQSW:STAT ON
```
inverts the Q-part of the baseband signal.

**Manual operation:** See "Invert Q for Correct Baseband Output" on page 36

### [:SOURce<hw>]:BB:C2K:LINK <Link>

The command defines the transmission direction. The signal either corresponds to that of a base station (FORWard | DOWN) or that of a mobile station (REVerse | UP).

**Parameters:**

- **<Link>**
  - DOWN | UP | FORward | REVerse
  - *RST:* DOWN

**Example:**
```
BB:C2K:LINK DOWN
```
the transmission direction selected is base station to mobile station. The signal corresponds to that of a base station.

**Manual operation:** See "Link Direction" on page 26

### [:SOURce<hw>]:BB:C2K:POWer:ADJust

The command sets the power of the active channels in such a way that the total power of the active channels is 0 dB. This will not change the power ratio among the individual channels.

**Example:**
```
BB:C2K:POW:ADJ
```
the total power of the active channels is set to 0 dB, the power ratio among the individual channels is unchanged.

**Usage:** Event
Remote-Control Commands

CDMA2000® incl. 1xEV-DV

Manual operation: See "Adjust Total Power to 0dB" on page 29

[:SOURce<hw>]:BB:C2K:POWer[:TOTal]?

The command queries the total power of the active channels. After "Power Adjust", this power corresponds to 0 dB.

Return values:

<Total> float
Range: -80 dB to 30 dB
Increment: 0.01 dB
*RST: 0 dB

Example:

BB:C2K:POW?
queries the total power of the active channels.
Response: -22.5
the total power is -25 dB.

Usage: Query only

Manual operation: See "Total Power " on page 30

[:SOURce<hw>]:BB:C2K:PRESet

The command produces a standardized default for the CDMA2000 standard. The settings correspond to the *RST values specified for the commands.

All CDMA2000 settings are preset.

Example:

BB:C2K:PRES
resets all the CDMA2000 settings to default values.

Usage: Event

Manual operation: See "Set to Default" on page 22

[:SOURce<hw>]:BB:C2K:SETTing:CATalog?

This command reads out the files with CDMA2000 settings in the default directory. The default directory is set using command MMEM:CDIRectory. Only files with the file extension *.cdma2k will be listed.

Return values:

<Catalog> string

Example:

MMEM:CDIR "<root>cdma"
sets the default directory to <root>cdma.
BB:C2K:SETT:CAT?
reads out all the files with CDMA2000 settings in the default directory.
Response: 'CDMA_UP','CDMA_DN'
the files CDMA_UP and CDMA_DN are available.
Usage: Query only
Manual operation: See "Save/Recall ..." on page 23

[:SOURce<hw>]:BB:C2K:SETTing:DELe'te <Filename>

This command deletes the selected file with CDMA2000 settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension *.cdma2k will be deleted.

Setting parameters:
<Filename> string


Usage: Setting only
Manual operation: See "Save/Recall ..." on page 23

[:SOURce<hw>]:BB:C2K:SETTing:LOAD <Filename>

This command loads the selected file with CDMA2000 settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension *.cdma2k will be loaded.

Setting parameters:
<Filename> string

Example: BB:C2K:SETT:LOAD 'CDMA_UP' loads file CDMA_UP.

Usage: Setting only
Manual operation: See "Save/Recall ..." on page 23

[:SOURce<hw>]:BB:C2K:SETTing:STORe <Filename>

This command stores the current CDMA2000 settings into the selected file. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. Only the file name has to be entered. CDMA2000 settings are stored as files with the specific file extensions *.cdma2k.

Setting parameters:
<Filename> string

Example: BB:C2K:SETT:STOR 'CDMA_UP' stores the current CDMA2000 settings into file CDMA_UP.

Usage: Setting only
Manual operation: See "Save/Recall ..." on page 23
Reduced Control Commands

[:SOURce<hw>:BB:C2K:SETTing:STORe:FAST <Fast>

Determines whether the instrument performs an absolute or a differential storing of the settings.

Enable this function to accelerate the saving process by saving only the settings with values different to the default ones.

**Note:** This function is not affected by the "Preset" function.

**Parameters:**
- <Fast>: 0 | 1 | OFF | ON
- *RST:* ON

**Manual operation:** See "Save/Recall ..." on page 23

[:SOURce<hw>:BB:C2K:SLENgth <SLength>

The command sets the sequence length of the arbitrary waveform component of the CDMA2000 signal in the number of frames. This component is calculated in advance and output in the arbitrary waveform generator. It is added to the realtime signal components.

**Parameters:**
- <SLength>: float
  - Range: 1 frame to 511 frames
  - *RST:* 1

**Example:**
BB:C2K:SLEN 10
sets the sequence length to 10 frames.

**Manual operation:** See "Sequence Length ARB" on page 36

[:SOURce<hw>:BB:C2K:STATe <State>

The command activates modulation in accordance with the CDMA2000 standard. Activating this standard deactivates all the other digital standards and digital modulation modes (in case of two-path instruments, this affects the same path).

BB:C2K:STAT ON deactivates the other standards and digital modulation.

**Parameters:**
- <State>: 0 | 1 | OFF | ON
- *RST:* OFF

**Example:**
BB:C2K:STAT ON
activates modulation in accordance with the CDMA2000 standard.

**Manual operation:** See "State" on page 22
[:SOURce<hw>]:BB:C2K:WAVEform:CREate <Filename>

This command creates a waveform using the current settings of the "CDMA2000" menu. The file name is entered with the command. The file is stored with the pre-defined file extension *.wv. The file name and the directory it is stored in are user-definable.

Setting parameters:
FILENAME string

Example:  
MMEM:CDIR "<root>waveform"
sets the default directory to <root>waveform.

BB:C2K:WAV:CRE "cdma bs"
creates the waveform file cdma bs.wv in the default directory.

Usage: Setting only
Manual operation: See "Generate Waveform File" on page 25

[:SOURce]:BB:C2K:VERSion?

The command queries the version of the CDMA standard underlying the definitions.

Return values:
VERSION string

Example:  
BB:C2K:VERS?
queries the CDMA version.

Response: Release C

CDMA Release 5

Usage: Query only

5.2 Filter/Clipping Settings

5.2.1 Filter Settings

[:SOURce<hw>]:BB:C2K:FILTER:TYPE

[:SOURce<hw>]:BB:C2K:FILTER:ILENgth

[:SOURce<hw>]:BB:C2K:FILTER:ILENgth:AUTO

[:SOURce<hw>]:BB:C2K:FILTER:OSAMpling

[:SOURce<hw>]:BB:C2K:FILTER:OSAMpling:AUTO

[:SOURce<hw>]:BB:C2K:FILTER:PARameter:APCO25

[:SOURce<hw>]:BB:C2K:FILTER:PARameter:COSine

[:SOURce<hw>]:BB:C2K:FILTER:PARameter:GAUSs

[:SOURce<hw>]:BB:C2K:FILTER:PARameter:LPAS

[:SOURce<hw>]:BB:C2K:FILTER:PARameter:LPASSEVM
[:SOURce<hw>]:BB:C2K:FILTer:PARameter:SPHase...........................................................99

[:SOURce<hw>]:BB:C2K:FILTer:TYPe <Type>
The command selects the filter type.

Parameters:
<Type>  
RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQual | COFequal | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape | LPASSEVM

*RST:  
Downlink: COEF; Uplink: CONE

Example: 
BB:C2K:FILT:TYPE CONE
sets the filter type CdmaOne. This filter type is defined by the standard for the uplink.

Manual operation:  See "Filter" on page 31

[:SOURce<hw>]:BB:C2K:FILTer:ILENgth <ILength>
(available for R&S WinIQSIM2 only)
The command sets the impulse length (number of filter tabs).

Parameters:
<ILength>  
integer
Range: 1 to 128
Increment: 1
*RST: 10

Example: 
BB:C2K:FILT:ILEN 10
sets the number of filter tabs to 10.

Manual operation:  See "Impulse Length" on page 32

[:SOURce<hw>]:BB:C2K:FILTer:ILENgth:AUTO <Auto>
(available for R&S WinIQSIM2 only)
The command activates/deactivates the impulse length state. If activated, the most sensible parameter values are selected. The value depends on the coherence check.

Parameters:
<Auto>  
0 | 1 | OFF | ON
*RST: ON

Example: 
BB:C2K:FILT:ILEN:AUTO ON
the most sensible parameters are selected automatically.

Manual operation:  See "Impulse Length" on page 32
[:SOURce<hw>]:BB:C2K:FILTer:OSAMling <OSampling>

(available for R&S WinIQSIM2 only)
The command sets the upsampling factor.

Parameters:

<OSampling> integer
Range: 1 to 32
*RST: 32

Example: BB:C2K:FILT:OSAM 32
sets the upsampling factor to 32.

Manual operation: See "Oversampling" on page 32

[:SOURce<hw>]:BB:C2K:FILTer:OSAMling:AUTO <Auto>

(available for R&S WinIQSIM2 only)
The command activates/deactivates the upsampling factor state. If activated, the most sensible parameter values are selected. The value depends on the coherence check. If deactivated, the values can be changed manually.

Parameters:

<Auto> 0 | 1 | OFF | ON
*RST: ON

Example: BB:C2K:FILT:OSAM:AUTO ON
the most sensible parameters are selected automatically.

Manual operation: See "Oversampling" on page 32

The command sets the roll-off factor for filter type APCO25.

Parameters:

<Apco25> float
Range: 0.05 to 0.99
Increment: 0.01
*RST: 0.20

Example: BB:C2K:FILT:PAR:APCO25 0.2
sets the roll-off factor to 0.2 for filter type APCO25.

Manual operation: See "Roll Off Factor or BxT" on page 31

[:SOURce<hw>]:BB:C2K:FILTer:PARameter:COSinE <Cosine>
The command sets the roll-off factor for the Cosine filter type.
Parameters:
<Cosine>

- **Parameters:**
  - **<Cosine>**
  - **Type:** float
  - **Range:** 0.00 to 1.0
  - **Increment:** 0.01
  - **RST:** 0.35

**Example:**
BB:C2K:FILT:PAR:COS 0.35
sets the roll-off factor to 0.35 for filter type Cosine.

**Manual operation:** See "Roll Off Factor or BxT" on page 31

The command sets the roll-off factor for the Gauss filter type.

Parameters:
<Gauss>

- **Parameters:**
  - **<Gauss>**
  - **Type:** float
  - **Range:** 0.15 to 2.5
  - **Increment:** 0.01
  - **RST:** 0.5

**Example:**
BB:C2K:FILT:PAR:GAUS 0.5
sets B x T to 0.5 for the Gauss filter type.

**Manual operation:** See "Roll Off Factor or BxT" on page 31

The command sets the cut off frequency factor for the Lowpass (ACP Opt.) filter type.

Parameters:
<LPass>

- **Parameters:**
  - **<LPass>**
  - **Type:** float
  - **Range:** 0.05 to 2
  - **Increment:** 0.01
  - **RST:** 0.5

**Example:**
BB:C2K:FILT:PAR:LPAS 0.5
the cut of frequency factor is set to 0.5.

**Manual operation:** See "Cut Off Frequency Factor" on page 32

The command sets the cut off frequency factor for the Lowpass (EVM Opt.) filter type.

Parameters:
<LPassEvm>

- **Parameters:**
  - **<LPassEvm>**
  - **Type:** float
  - **Range:** 0.05 to 2
  - **Increment:** 0.01
  - **RST:** 0.5
Example: \begin{verbatim} BB:C2K:FILT:PAR:LPASSEVM 0.5 \end{verbatim}
the cut of frequency factor is set to 0.5.

Manual operation: See "Cut Off Frequency Factor" on page 32

\begin{verbatim} [:SOURce<hw>]:BB:C2K:FILTer:PARameter:PGAuss <PGauss> \end{verbatim}
The command sets the roll-off factor for the Pure Gauss filter type.

Parameters:
\begin{verbatim} <PGauss> \end{verbatim}
float
Range: 0.15 to 2.5
Increment: 0.01
*RST: 0.5

Example: \begin{verbatim} BB:C2K:FILT:PAR:GAUS 0.5 \end{verbatim}
sets B x T to 0.5 for the Pure Gauss filter type.

Manual operation: See "Roll Off Factor or BxT" on page 31

\begin{verbatim} [:SOURce<hw>]:BB:C2K:FILTer:PARameter:RCOSine <RCosine> \end{verbatim}
The command sets the roll-off factor for the Root Cosine filter type.

Parameters:
\begin{verbatim} <RCosine> \end{verbatim}
float
Range: 0.00 to 1.0
Increment: 0.01
*RST: 0.22

Example: \begin{verbatim} BB:C2K:FILT:PAR:RCOS 0.22 \end{verbatim}
sets the roll-off factor to 0.22 for filter type Root Cosine.

Manual operation: See "Roll Off Factor or BxT" on page 31

\begin{verbatim} [:SOURce<hw>]:BB:C2K:FILTer:PARameter:SPHase <SPhase> \end{verbatim}
The command sets B x T for the Split Phase filter type.

Parameters:
\begin{verbatim} <SPhase> \end{verbatim}
float
Range: 0.15 to 2.5
Increment: 0.01
*RST: 2.00

Example: \begin{verbatim} BB:C2K:FILT:PAR:SPH 0.5 \end{verbatim}
sets B x T to 0.5 for the Split Phase filter type.

Manual operation: See "Roll Off Factor or BxT" on page 31
5.2.2 Clipping Settings

[:SOURce<hw>:BB:C2K:CLIPping:LEVel] <Level>

The command sets the limit for level clipping (Clipping). This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.

Level clipping is activated with the command [:SOURce<hw>:BB:C2K:CLIPping:STATe]

Parameters:

- **<Level>**
  - integer
  - Range: 1 PCT to 100
  - Increment: 1
  - RST: 100 PCT

Example:

BB:C2K:CLIP:LEV 80PCT
sets the limit for level clipping to 80% of the maximum level.
BB:C2K:CLIP:STAT ON
activates level clipping.

Manual operation: See "Clipping Level" on page 35


The command sets the method for level clipping (Clipping).

Parameters:

- **<Mode>**
  - VECTor | SCALar

  **VECTor**
  The reference level is the amplitude | i+jq |

  **SCALar**
  The reference level is the absolute maximum of the I and Q values.

  *RST: VECTor

Example:

BB:C2K:CLIP:MODE SCAL
selects the absolute maximum of all the I and Q values as the reference level.
BB:C2K:CLIP:LEV 80PCT
sets the limit for level clipping to 80% of this maximum level.
BB:C2K:CLIP:STAT ON
activates level clipping.

Manual operation: See "Clipping Mode" on page 35
Remote-Control Commands

CDMA2000® incl. 1xEV-DV

5.3 Trigger Settings

The trigger settings are available for R&S SMx and R&S AMU instruments only.

EXTernal<ch>

The numeric suffix to EXTernal<ch> distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

[:SOURce<hw>]:BB:C2K[:TRIGger]:SEQUence <Sequence>

The command selects the trigger mode.
Parameters:

<Sequence>

AUTO | RETRigger | AAUTo | ARETrigger | SINGle

AUTO
The modulation signal is generated continuously.

RETRigger
The modulation signal is generated continuously. A trigger event (internal or external) causes a restart.

AAUTo
The modulation signal is generated only when a trigger event occurs. After the trigger event the signal is generated continuously. Signal generation is stopped with command SOUR:BB:C2K:TRIG:ARM:EXEC and started again when a trigger event occurs.

ARETrigger
The modulation signal is generated only when a trigger event occurs. The device automatically toggles to RETRIG mode. Every subsequent trigger event causes a restart. Signal generation is stopped with command SOUR:BB:C2K:TRIG:ARM:EXEC and started again when a trigger event occurs.

SINGle
The modulation signal is generated only when a trigger event occurs. After the trigger event the signal is generated once to the set sequence length (SOUR:BB:C2K:TRIG:SLEN). Every subsequent trigger event causes a restart.

*RST: AUTO

Example:

BB:C2K:SEQ AAUT
sets the "Armed_auto" trigger mode; the device waits for the first trigger (e.g. with *TRG) and then generates the signal continuously.

Manual operation:

See "Trigger Mode" on page 38

[:SOURce<hw>]:BB:C2K:TRIGger:ARM:EXECute

The command stops signal generation for trigger modes Armed_Auto and Armed_Retrigger. A subsequent internal or external trigger event restart signal generation.
Example:

- `BB:C2K:TRIG:SEQ ARET` sets Armed_Retrigger mode, i.e. every trigger event causes signal generation to restart.
- `BB:C2K:TRIG:EXEC` executes a trigger, signal generation is started.
- `BB:C2K:TRIG:EXEC` executes a trigger, signal generation is started again.

Usage: Event

Manual operation: See "Arm" on page 39

`:SOURce<hw>:BB:C2K:TRIGger:EXECute`

The command executes a trigger. The internal trigger source must be selected using the command `BB:C2K:TRIG:SOUR INT` and a trigger mode other than AUTO must be selected using the command `BB:C2K:TRIG:SEQ`.

Example:

- `BB:C2K:TRIG:SEQ RETR` sets Retrigger mode, i.e. every trigger event causes signal generation to restart.

Usage: Event

Manual operation: See "Execute Trigger" on page 26


(enabled for "Trigger Source" External)

Enables/disables output of the signal synchronous to the external trigger event.

For R&S SMBV instruments:

See also "Sync. Output to External Trigger" on page 40 for a detailed description of the applications of this setting.
Parameters:

<Output> 0 | 1 | OFF | ON

ON

The signal calculation starts simultaneously with the external trigger event but because of the instrument’s processing time the first samples are cut off and no signal is outputted. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.

OFF

The signal output begins after elapsing of the processing time and starts with sample 0, i.e. the complete signal is outputted. This mode is recommended for triggering of short signal sequences with signal duration comparable with the processing time of the instrument.

*RST: ON

Example:

BB:C2K:TRIG:SOUR EXT
sets external triggering.

BB:C2K:TRIG:EXT:SYNC:OUTP ON
enables synchronous output to external trigger

Manual operation: See “Sync. Output to External Trigger” on page 40

[:SOURce<hw>]:BB:C2K:TRIGger:OBASeband:DELay <Delay>

The command specifies the trigger delay (expressed as a number of chips) for triggering by the trigger signal from the second path (two-path instruments only).

Parameters:

<Delay> float

Range: 0 chips to 65535 chips
Increment: 1 chip
*RST: 0 chips

Example:

BB:C2K:TRIG:SOUR OBAS
sets for path A the internal trigger executed by the trigger signal from the second path (path B).

BB:C2K:TRIG:OBAS:DEL 50
sets a delay of 50 symbols for the trigger.

Manual operation: See “Trigger Delay” on page 41

[:SOURce<hw>]:BB:C2K:TRIGger:OBASeband:INHibit <Inhibit>

The command specifies the number of chips by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.
Parameters:  
**<Inhibit>**  
integer  
Range: 0 chips to 67108863 chips  
Increment: 1 chip  
*RST:* 0 chips

**Example:**  
BB:C2K:TRIG:SOUR OBAS  
sets for path A the internal trigger executed by the trigger signal from the second path (path B).  
BB:C2K:TRIG:INH 200  
sets a restart inhibit for 200 chips following a trigger event.

**Manual operation:**  
See "Trigger Inhibit" on page 41

[:SOURce<hw>]:BB:C2K:TRIGger:RMODe?  
The command queries the current status of signal generation for all trigger modes with CDMA2000 modulation on.

**Return values:**  
**<RMode>**  
STOP | RUN  
RUN  
the signal is generated. A trigger event occurred in the triggered mode.  
STOP  
the signal is not generated. A trigger event did not occur in the triggered modes, or signal generation was stopped by the command :BB:C2K:TRIG:ARM:EXECute (armed trigger modes only).

**Example:**  
SOUR2:BB:C2K:TRIG:SOUR EXT  
sets external triggering for path B of a two-path instrument.  
BB:C2K:TRIG:MODE ARET  
selects the Armed_Retrigger mode.  
BB:C2K:TRIG:RMOD?  
queries the current status of signal generation.  
Response: RUN  
the signal is generated, an external trigger was executed.

**Usage:**  
Query only

**Manual operation:**  
See "Running/Stopped" on page 39

[:SOURce<hw>]:BB:C2K:TRIGger:SLENgth <SLength>  
The command defines the length of the signal sequence to be output in the "Single" trigger mode (SOUR:BB:C2K:SEQ SING). The unit is defined with command [:SOURce<hw>]:BB:C2K:TRIGger:SLUNit. It is then possible to output deliberately just part of the frame, an exact sequence of the frame, or a defined number of repetitions of the frame.
Parameters: 
<SLength> integer
Range: 1 chip to 2^32-1 (4 294 967 295) chips
Increment: 1
*RST: 1 frame length

Example:
BB:C2K:SEQ SING
sets trigger mode Single.
BB:C2K:TRIG:SLUN CHIP
sets unit chips for the entry of sequence length.
BB:C2K:TRIG:SLEN 200
sets a sequence length of 200 chips. The first 200 chips of the current frame will be output after the next trigger event.

Manual operation: See "Signal Duration" on page 39

[:SOURce<hw>]:BB:C2K:TRIGger:SLUNit <SlUnit>
The command defines the unit for the entry of the length of the signal sequence (:SOURce<hw>]:BB:C2K:TRIGger:SLENgth) to be output in the Single trigger mode (SOUR:BB:C2K:SEQ SING).

Parameters: 
<SlUnit> FRAMe | CHIP | SEQuence
*RST: SEQuence

Example:
BB:C2K:SEQ SING
sets trigger mode Single.
BB:C2K:TRIG:SLUN FRAM
sets unit frames for the entry of sequence length.
BB:C2K:TRIG:SLEN 2
sets a sequence length of 2 frames. The current frame will be output twice after the next trigger event.

Manual operation: See "Signal Duration Unit" on page 39

[:SOURce<hw>]:BB:C2K:TRIGger:SOURce <Source>
Selects the trigger source.

Parameters: 
<Source> INTernal|OBASeband|BEXTernal|EXTernal
INTernal
manual trigger or *TRG.
EXTernal|BEXTernal
trigger signal on the TRIGGER 1/2 connector.
OBASeband
trigger signal from the other path
*RST: INTernal
Example:  
\texttt{SOURcel:BB:C2K:TRIGger:SOURce EXTernal}  
sets external triggering via the TRIGGER 1 connector.

Manual operation: See "Trigger Source" on page 39

\texttt{[:SOURce<hw>:]BB:C2K:TRIGger[:EXTernal<ch>]:DELay <Delay>}  
The command specifies the trigger delay (expressed as a number of chips) for external triggering.

Parameters:  
\texttt{<Delay>}  
float  
Range: 0 to 65535  
Increment: 0.01 chips  
*RST: 0

Example:  
\texttt{BB:C2K:TRIG:SOUR EXT}  
sets an external trigger via the TRIGGER 1 connector.  
\texttt{BB:C2K:TRIG:DEL 50}  
sets a delay of 50 symbols for the trigger.

Manual operation: See "Trigger Delay" on page 41

\texttt{[:SOURce<hw>:]BB:C2K:TRIGger[:EXTernal<ch>]:INHibit <Inhibit>}  
The command specifies the number of chips by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering.

Parameters:  
\texttt{<Inhibit>}  
integer  
Range: 0 to 67108863 chips  
Increment: 1 chip  
*RST: 0 chips

Example:  
\texttt{BB:C2K:TRIG:SOUR EXT}  
selects an external trigger via the TRIGGER 1 connector.  
\texttt{BB:C2K:TRIG:INH 200}  
sets a restart inhibit for 200 chips following a trigger event.

Manual operation: See "Trigger Inhibit" on page 41

### 5.4 Marker Settings

This section lists the remote control commands, necessary to configure the markers.

The marker delay settings are available for R&S SMx and R&S AMU instruments only.
Remote-Control Commands

Marker Settings

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut:DELay:FIxed

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

Parameters:

<Fixed> 0 | 1 | OFF | ON

*RST: OFF

Example:

BB:C2K:TRIG:OUTP:DEL:FIX ON

restricts the marker signal delay setting range to the dynamic range.

Manual operation: See "Fix marker delay to current range" on page 43

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:DELay

The command defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of chips. Command [:SOURce<hw>]:BB:C2K:TRIGger:OUTPut:DELay:FIxed can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Parameters:

<Delay> float

Range: 0 chips to (2^24 - 1) chips
Increment: 1 chip

*RST: 0

Example:

BB:C2K:TRIG:OUTP:DEL 1600

sets a delay of 1600 chips for the for the corresponding marker signal.

Manual operation: See "Marker x Delay" on page 43
Remote-Control Commands

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:DELaY:MAXimum?

(for R&S SMx and R&S AMU instruments only)
The command queries the maximum marker delay for setting :BB:C2K:TRIG:OUTP:DEL:FIX ON.

Return values: float
Example: BB:C2K:TRIG:OUTP:DEL:FIX ON restricts the marker signal delay setting range to the dynamic range.
Response: 2000 the maximum for the marker delay setting is 2000 chips.

Usage: Query only
Manual operation: See "Current Range without Recalculation" on page 43

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:DELaY:MINimum?

(for R&S SMx and R&S AMU instruments only)
The command queries the minimum marker delay for setting :BB:C2K:TRIGger:OUTPut:DELay:FIXed ON.

Return values: float
Example: BB:C2K:TRIG:OUTP:DEL:FIX ON restricts the marker signal delay setting range to the dynamic range.
BB:C2K:TRIG:OUTP:DEL:MIN queries the minimum of the dynamic range.
Response: 0 the minimum for the marker delay setting is 0 symbols.

Usage: Query only
Manual operation: See "Current Range without Recalculation" on page 43

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:MODE <Mode>
The command defines the signal for the selected marker output.
Remote-Control Commands

Marker Settings

**Parameters:**

<table>
<thead>
<tr>
<th>&lt;Mode&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCGroup</td>
</tr>
</tbody>
</table>

**PCGroup**
- A marker signal is generated at the start of each power control group (every 1.25 ms).

**RFRame**
- A marker signal is generated every 20 ms (traffic channel clock).

**SCFFrame**
- A marker signal is generated at the start of each sync channel frame (every 26.6 ms).

**SFFrame**
- A marker signal is generated every 80 ms (super frame clock).

**ESECond**
- A marker signal is generated every 2 s (even second mark).

**CSPeriod**
- A marker signal is generated at the start of each arbitrary waveform sequence (depending on the set sequence length). The marker signal is also generated if the signal contains no ARB.

**RATio**

**USER**
- A marker signal is generated at the beginning of every user-defined period. The period is defined with command [:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:PERiod.

**TRIGger**
- A received internal or external trigger signal is output at the marker connector.

*RST: RFRame

**Example:**

```
BB:C2K:TRIG:OUTP:MODE RFR
```

selects the traffic channel clock for the corresponding marker signal.

**Manual operation:** See "Marker Mode" on page 42

```
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:ONTime <OnTime>
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:OFFTime <OffTime>
```

The command sets the number of chips in a period (ON time + OFF time) during which the marker signal in setting SOURce:BB:C2K:TRIGger:OUTPut:MODE RATio on the marker outputs is OFF.
### 5.5 Clock Settings

This section lists the remote control commands, necessary to configure the clock.

The clock settings are available for R&S SMx and R&S AMU instruments only.

**Parameters:**

<OffTime> integer

<table>
<thead>
<tr>
<th>Range</th>
<th>1 chip to 16777215 chips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increment</td>
<td>1 chip</td>
</tr>
</tbody>
</table>

*RST:* 1 chip

**Example:**

sets an OFF time of 2000 chips for the corresponding marker signal on path A.

sets an OFF time of 2000 chips for the corresponding marker signal.

sets an OFF time of 2000 chips for the corresponding marker signal.

**Manual operation:** See "Marker Mode" on page 42

**[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:PERiod <Period>**

The command sets the repetition rate for the signal at the marker outputs, expressed in terms of chips. The setting is only valid for selection USER in :BB:C2K:TRIG:OUTP:MODE.

**Parameters:**

<Period> integer

<table>
<thead>
<tr>
<th>Range</th>
<th>2 to (2^{32}-1) chips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increment</td>
<td>1 chip</td>
</tr>
</tbody>
</table>

*RST:* 2 chips

**Example:**

BB:C2K:TRIG:OUTP:MODE USER
selects the user marker for the corresponding marker signal.

BB:C2K:TRIG:OUTP:PER 1600
sets a period of 1600 chips, i.e. the marker signal is repeated every 1600th chip.

**Manual operation:** See "Marker Mode" on page 42
[:SOURce<hw>]:BB:C2K:CLOCk:MODE ................................. 112
[:SOURce<hw>]:BB:C2K:CLOCk:MULTiplier .............................. 112
[:SOURce<hw>]:BB:C2K:CLOCk:SOURce .................................. 112
[:SOURce<hw>]:BB:C2K:CLOCk:SYNChronization:EXECute .............. 113
[:SOURce<hw>]:BB:C2K:CLOCk:SYNChronization:MODE ............... 113

[:SOURce<hw>]:BB:C2K:CLOCk:MODE <Mode>

The command enters the type of externally supplied clock (:C2K:CLOCk:SOURce EXTernal). When MChip mode is used, a multiple of the sample clock is supplied and the clock is derived internally from it. The multiplier is entered with the command [:SOURce<hw>]:BB:C2K:CLOCk:MULTiplier.

For two-path instruments, the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Parameters:
- <Mode>  
  - CHIP | MChip
  - *RST: CHIP

Example:
SOURcel:BB:C2K:CLOCk:MODE CHIP
selects clock type "Chip", i.e. the supplied clock is a chip clock.

Manual operation: See "Clock Mode" on page 45

[:SOURce<hw>]:BB:C2K:CLOCk:MULTiplier <Multiplier>

Sets the multiplier for clock type "Multiplied" (:BB:C2K:CLOCk:MODE MChip) in the case of an external clock source.

For two-path instruments, the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Parameters:
- <Multiplier> integer
  - Range: 1 to 64
  - Increment: 1
  - *RST: 4

Example:
SOURcel:BB:C2K:CLOCk:SOURce EXTERNAL
selects the external clock source.
BB:C2K:CLOCk:MODE MChip
selects clock type "Multiplied", i.e. the supplied clock has a rate which is a multiple of the chip rate.
BB:C2K:CLOCk:MULTiplier 12
the multiplier for the external clock rate is 12.

Manual operation: See "Clock Multiplier" on page 45

[:SOURce<hw>]:BB:C2K:CLOCk:SOURce <Source>

The command selects the clock source.
For two-path instruments, selecting **EXTernal** is only possible for path A, since the external clock source is permanently allocated to path A. Selection **AINTernal** is only possible for path B.

**Parameters:**

- **<Source>**
  - **INTernal | EXTernal | AINTernal**
  - **INTernal**
    - The internal clock reference is used.
  - **EXTernal**
    - The external clock reference is supplied to the CLOCK connector. Commands `[:SOURce<hw>:]BB:C2K:CLOCk:MULTiplier` are used to enter the type of the external clock.
  - **AINTernal**
    - The clock source of path A is used for path B.

**Example:**

- `*RST: INTernal`

- `BB:C2K:CLOC:SOUR EXT`
  - selects the external clock source. The clock is supplied via the CLOCK connector.

- `BB:C2K:CLOC:MODE MCH`
  - selects clock type “Multiplied”, i.e. the supplied clock has a rate which is a multiple of the chip rate.

- `BB:C2K:CLOC:MULT 12`
  - the multiplier for the external clock rate is 12.

**Manual operation:**

See “Clock Source” on page 44

**[:SOURce<hw>:]BB:C2K:CLOCk:SYNChronization:EXECute**

(for R&S SMBV only)

Performs automatically adjustment of the instrument's settings required for the synchronization mode, set with the command `[:SOURce<hw>:]BB:C2K:CLOCk:SYNChronization:MODE`.

**Example:**

- `BB:C2K:CLOC:SYNC:MODE MAST`
  - the instrument is configured to work as a master one.

- `BB:C2K:CLOC:SYNC:EXEC`
  - all synchronization's settings are adjusted accordingly.

**Usage:**

- Event

**Manual operation:**

See “Set Synchronization Settings” on page 44

**[:SOURce<hw>:]BB:C2K:CLOCk:SYNChronization:MODE <Mode>**

(for R&S SMBV only)

Selects the synchronization mode.
This parameter is used to enable generation of very precise synchronous signal of several connected R&S SMBVs.

**Note:** If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type. Avoid unnecessary cable length and branching points.

**Parameters:**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>The instrument is working in stand-alone mode.</td>
</tr>
<tr>
<td>MASTer</td>
<td>The instrument provides all connected instrument with its synchronisation (including the trigger signal) and reference clock signal.</td>
</tr>
<tr>
<td>SLAVe</td>
<td>The instrument receives the synchronisation and reference clock signal from another instrument working in a master mode.</td>
</tr>
</tbody>
</table>

*RST: NONE

**Example:**

```
BB:C2K:CLOC:SYNC:MODE MAST
```

the instrument is configured to work as a master one.

**Manual operation:** See "Sync. Mode" on page 44

### 5.6 Predefined Settings

The R&S Signal Generator gives you the opportunity to generate predefined test settings for base station 1. These predefined settings enable the creation of highly complex scenarios for the downlink by presetting the channel table of base station 1. The settings take effect only after execution of command `[:SOURce<hw>]:BB:C2K:PPARameter:EXECute`.

```
[:SOURce<hw>]:BB:C2K:PPARameter:CRESt
[:SOURce<hw>]:BB:C2K:PPARameter:EXECute
[:SOURce<hw>]:BB:C2K:PPARameter:PCHannel[:STATe]
[:SOURce<hw>]:BB:C2K:PPARameter:PICHannel[:STATe]
[:SOURce<hw>]:BB:C2K:PPARameter:RCONfiguration
[:SOURce<hw>]:BB:C2K:PPARameter:SCHannel[:STATe]
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:COUNt
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:DATA:RATE
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:DCCChannel[:STATe]
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FCHannel[:STATe]
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FLENgth
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:SChannel:COUNt
```

115 115 116 116 116 116 117 117 118 118 118 118 119
[:SOURce<hw>]:BB:C2K:PPARameter:CRESt <Crest>

This command selects the desired range for the crest factor of the test scenario. The crest factor of the signal is kept in the desired range by automatically setting appropriate Walsh codes and timing offsets.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute.

The setting of command [:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:WCODe is adjusted according to the selection.

Parameters:

- MINimum
  - The crest factor is minimized. The Walsh codes are spaced as closely as possible.
- AVERage
  - An average crest factor is set. The Walsh codes are distributed uniformly over the code domain.
- WORSt
  - The crest factor is set to an unfavorable value (i.e. maximum). The Walsh codes are as wildly spaced as possible.

*RST: MINimum

Example:

```
BB:C2K:PPAR:CRES WORS
```

sets the crest factor to an unfavorable value.

Manual operation: See "Crest Factor - Predefined Settings" on page 48

[:SOURce<hw>]:BB:C2K:PPARameter:EXECute

This command presets the channel table of base station 1 with the parameters defined by the PPARameter commands.

Example:

```
BB:C2K:PPAR:EXEC
```

configures the signal sequence as defined by the :BB:C2K:PPARameter commands.

Usage: Event

Manual operation: See "Accept - Predefined Settings" on page 49

[:SOURce<hw>]:BB:C2K:PPARameter:PCHannel[:STATE] <State>

The command activates/deactivates the paging channel.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute.
Remote-Control Commands

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON

Example: BB:C2K:PPAR:PCH ON
activates F-PCH.

Manual operation: See "Use Paging Channel (F-PCH) - Predefined Settings" on page 47

[:SOURce<hw>]:BB:C2K:PPARameter:PICHannel[:STATe] <State>

The command activates/deactivates the pilot channel.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON

Example: BB:C2K:PPAR:PICH ON
activates F-PICH.

Manual operation: See "Use Pilot (F-PICH) - Predefined Settings" on page 47

[:SOURce<hw>]:BB:C2K:PPARameter:RCONfiguration <RConfiguration>

Selects the radio configuration for the traffic channel.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute.

Parameters:

<RConfiguration> 1 | 2 | 3 | 4 | 5
*RST: 1

Example: BB:C2K:PPAR:RCON 1
selects radio configuration 1.

Manual operation: See "Radio Configuration - Predefined Settings" on page 47

[:SOURce<hw>]:BB:C2K:PPARameter:SChannel[:STATe] <State>

The command activates/deactivates the F-SYNC.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON
Example:  
\[BB:C2K:PPAR:SCH \text{ ON}\]  
activates the F-SYNC.

**Manual operation:**  
See "Use Sync (F-Sync) - Predefined Settings" on page 47

\[:\text{SOURce<hw>:}BB:C2K:PPARameter:TChannel:COUNt \text{ <Count>}\]  
This command sets the number of activated traffic channels.  
The setting takes effect only after execution of command \[:\text{SOURce<hw>:}BB:C2K:PPARameter:EXECute].

**Parameters:**  
\(<\text{Count}>\)  
integer  
Range: \(0 \text{ to } 8\)  
*RST: 1

**Example:**  
\[BB:C2K:PPAR:TCH:COUN 2\]  
the predefined signal contains 2 traffic channels.

**Manual operation:**  
See "Number of Traffic Channels - Predefined Settings" on page 47

\[:\text{SOURce<hw>:}BB:C2K:PPARameter:TChannel:DATA:RATE \text{ <Rate>}\]  
This command sets the data rate of F-FCH and F-SCH. The set value is specific for the selected radio configuration.  
The setting takes effect only after execution of command \[:\text{SOURce<hw>:}BB:C2K:PPARameter:EXECute]. It is specific for the selected radio configuration.  
The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.  
The data rate affects the Walsh code (spreading factor) that are possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.

**Parameters:**  
\(<\text{Rate}>\)  
\(\text{DR1K2} \ | \ \text{DR1K3} \ | \ \text{DR1K5} \ | \ \text{DR1K8} \ | \ \text{DR2K4} \ | \ \text{DR2K7} \ | \ \text{DR3K6} \ | \ \text{DR4K8} \ | \ \text{DR7K2} \ | \ \text{DR9K6} \ | \ \text{DR14K4} \ | \ \text{DR19K2} \ | \ \text{DR28K8} \ | \ \text{DR38K4} \ | \ \text{DR57K6} \ | \ \text{DR76K8} \ | \ \text{DR115K2} \ | \ \text{DR153K6} \ | \ \text{DR230K4} \ | \ \text{DR259K2} \ | \ \text{DR307K2} \ | \ \text{DR460K8} \ | \ \text{DR518K4} \ | \ \text{DR614K4} \ | \ \text{DR1036K8} \ | \ \text{NUSed}\)  
*RST: \text{DR1K2}

**Example:**  
\[BB:C2K:PPAR:TCH:DATA:RATE \text{ D240K}\]  
sets the data rate of F-FCH and F-SCH to 240 kbps.

**Manual operation:**  
See "Data Rate - Predefined Settings" on page 48
[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:DCChannel[:STATe] <State>

The command activates/deactivates the dedicated control channel. F-DCCH can not be selected for RC1 and RC2.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute. It is specific for the selected radio configuration.

Parameters:
<State>
0 | 1 | OFF | ON
*RST: ON

Example: BB:C2K:PPAR:TCH:DCCH ON activates F-DCCH.

Manual operation: See "Use Dedicated Control (F-DCCH) - Predefined Settings" on page 47

[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FChannel[:STATe] <State>

The command activates/deactivates the fundamental channel.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute. It is specific for the selected radio configuration.

Parameters:
<State>
0 | 1 | OFF | ON
*RST: ON

Example: BB:C2K:PPAR:TCH:FCH ON activates F-FCH.

Manual operation: See "Use Fundamental (F-FCH) - Predefined Settings" on page 48

[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:FLENgth <FLength>

The command activates/deactivates the fundamental channel. The set value is specific for the selected radio configuration.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute. It is specific for the selected radio configuration.

The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate and this in turn may bring about a change of Walsh code.

Parameters:
<FLength>
20 | 40 | 80
*RST: 20 ms

Example: BB:C2K:PPAR:TCH:FLEN 20 ms sets the frame length of the code channels to 20 ms.
Manual operation: See "Frame Length - Predefined Settings" on page 48

[:SOURce<hw>]:BB:C2K:PPARameter:TChannel:SChannel:COUNt <Count>

The command defines the number of supplemental channels. The maximum number of supplemental channels depends on the selected radio configuration.

The setting takes effect only after execution of command [:SOURce<hw>]:BB:C2K:PPARameter:EXECute. It is specific for the selected radio configuration.

Parameters:

<Count> integer

Range: 0 to 7
Increment: 1
*RST: 1

selects two F-SCHs.

Manual operation: See "Number of Supplemental (F-SCH) - Predefined Settings" on page 48

5.7 Setting Base Stations

The SOURce:BB:C2K:BSTation system contains commands for setting base stations.

The commands of this system only take effect if the CDMA2000 standard is activated, the DOWN transmission direction is selected and the particular base station is enabled:

- SOURce:BB:C2K:STATe ON
- SOURce:BB:C2K:LINK DOWN
- SOURce:BB:C2K:BSTation2:STATe ON
Suffixes

The channel table for the base station is configured from fourteen special channels and up to eight traffic channels. Each traffic channel consists of four to eight code channels. The type and number of code channels depends on the radio configuration chosen for the traffic channel.

The individual channels are selected in SCPI via the suffixes to keywords `CGRoup` and `COFFset`.

The special channel have the suffix 0 to `CGRoup` and 1 to 14 to `COFFset` corresponding to the channel index 0-1 to 0-14 in the channel table.

The code channels of a traffic channel are addressed by means of suffixes 1 to 8 for the traffic channel and 1 to 8 to `COFFset` for the sub channels of the selected traffic channel. Thus `CGRoup2:COFFset1` is the code channel F-FCH of the traffic channel 2 and equates to the channel index 2-1 in the channel table.

| Table 5-1: Structure of the traffic channel for different radio configurations. |
|--------------------------------------------------|---------------------------------|
| Radio Configuration 1, 2 | Radio Configuration 3,4,5 |
| 1-1 (`CGRoup1:COFFset1`) | F-FCH | F-FCH |
| 1-2 (`CGRoup1:COFFset2`) | F-SCH1 | F-SCH1 |
| 1-3 (`CGRoup1:COFFset3`) | F-SCH2 | F-SCH2 |
| 1-4 (`CGRoup1:COFFset4`) | F-SCH3 | F-DCCH |
| 1-5 (`CGRoup1:COFFset5`) | F-SCH4 | - |
| 1-6 (`CGRoup1:COFFset6`) | F-SCH5 | - |
| 1-7 (`CGRoup1:COFFset7`) | F-SCH6 | - |
| 1-8 (`CGRoup1:COFFset8`) | F-SCH7 | - |

Regardless of the radio configuration, in all traffic channels the `COFFset1` corresponds to the F-FCH, and the `COFFset2` and `COFFset3` correspond to the F-SCH1 and F-SCH2, respectively. In radio configurations 1 and 2 the `COFFset4` corresponds to the F-SCH3, and in radio configurations 3, 4, 5 to the F-DCCH. `COFFset5`, `COFFset6`, `COFFset7` and `COFFset8` exist only in radio configurations 1 and 2, where they correspond to the F-SCH4 to F-SCH7.

For the code channels of a traffic channels, the settings of the channel table parameters are specific for the selected radio configuration. I.e. a complete set of settings exists for each of the five possible radio configurations.

**BSTation<st>**

Determines the base station. Value range `<st> = [1]|2|3|4`

**CGRoup<di0>**

Value range `<di0>= 0[1]|..8`
COFFset<ch>

Value range <ch> = [1]..13

[:SOURce<hw>]:BB:C2K:BSTation:PRESet

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:CNUMber

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:LCState

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:MPRev

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:NID

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:PREV

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:SID

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:STIMe

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:
   BINTerleaver?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:BITFrame?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:CRC?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:DATA:
   RATE?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:DATA:
   SPUNcture?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:
   SREPetition?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:
   TYPE?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:
   DSELect

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:
   PATTern

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:
   RATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BIT:
   RATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BIT:
   STATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BLOCk:
   RATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BLOCk:
   STATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:FLENghth

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:LCMask

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:POWer

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:QWCode:STATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:REALtime:STATE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:STATe

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA:
   DSELect

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA:
   PATTern

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:MiSuSe

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:PSTeP

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:READ

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:TYPE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:WCODE

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:WLENgth?

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DCONfiguration

[:SOURce<hw>]:BB:C2K:BSTation<st>:DCONflict:MODE
Remote-Control Commands

CDMA2000® incl. 1xEV-DV

Setting Base Stations

[:SOURce<hw>]:BB:C2K:BSTation<st>:DCONflict:RESolve

[:SOURce<hw>]:BB:C2K:BSTation<st>:DCONflict:STATe?

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel<PIN>erval

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel<PSET>up

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:ID

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:PARameters

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:STATe


[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:WCODes?

[:SOURce<hw>]:BB:C2K:BSTation<st>:PNOFFset

[:SOURce<hw>]:BB:C2K:BSTation<st>:QWSet

[:SOURce<hw>]:BB:C2K:BSTation<st>:STATe

[:SOURce<hw>]:BB:C2K:BSTation:PRESet

A standardized default for all the base stations. The settings correspond to the *RST values specified for the commands.

All base station settings are preset. An overview is provided in "Reset All Base Stations" on page 27.

Example: BB:C2K:BST:PRES

resets all the base station settings to default values.

Usage: Event

Manual operation: See "Reset All Base Stations" on page 27

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:CNUM<ber> <CNumber>

Sets the CDMA Channel Number which corresponds to the RF.

Parameters:

<CNumber> integer

Range: 0 to 2047

*RST: 387

Example: BB:C2K:BST:SYNC:CNUM 400

sets the channel number

Manual operation: See "CDMA Channel Number - More Params BS" on page 70

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:LCState <LcState>

(available for R&S SMBV and R&S WinIQSIM2 only)

Defines the long code state in hexadecimal format.
Parameters:

<LcState> 42 bit
Range: 0 to 3FFFFFFF
*RST: 0

Example: BB:C2K:BST:SYNC:LCST #H0001F3A002E1
sets the Long Code state parameter.

Manual operation: See "LC State (hex) - More Params BS" on page 71

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:MPRev <MPrev>
Sets the Minimum Protocol Revision Level.
The base station sets this field to prevent mobile stations which can not be supported by the base station from accessing the CDMA system.

Parameters:

<MPrev> 2 | 8
Range: 2 to 8
*RST: 2

sets the MIN_P_REV parameter

Manual operation: See "MIN_P_REV - More Params BS" on page 71

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:NID <Nid>
Sets the Network Identification.
The NID serves as a sub-identifier of a CDMA system as defined by the owner of the SID.

Parameters:

<Nid> integer
Range: 1 to 65535
*RST: 1

sets the network identification parameter

Manual operation: See "NID - More Params BS" on page 72

[:SOURce<hw>]:BB:C2K:BSTation:SYNC:PREV <Prev>
Sets the Protocol Revision Level, i.e. specifies the CDMA2000 system release number.
The table below gives the cross-reference between the P_REV values and the CDMA2000 Releases.
### P_REV

<table>
<thead>
<tr>
<th>P_REV</th>
<th>CDMA2000 Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Korean PCS(Band Class4), USPCS(Band Class1)</td>
</tr>
<tr>
<td>2</td>
<td>IS-95</td>
</tr>
<tr>
<td>3</td>
<td>TBS74</td>
</tr>
<tr>
<td>4</td>
<td>IS-95A</td>
</tr>
<tr>
<td>5</td>
<td>IS-95B</td>
</tr>
<tr>
<td>6</td>
<td>IS2000 Release 0</td>
</tr>
<tr>
<td>7</td>
<td>IS2000 Release A</td>
</tr>
<tr>
<td>8</td>
<td>IS2000 Release B</td>
</tr>
</tbody>
</table>

**Parameters:**
- `<Prev>`: integer
- **Range:** 1 to 8
- **RST:** 6

**Example:**
```
BB:C2K:BST:SYNC:PREV 4
```
sets the P_REV parameter

**Manual operation:** See "P_REV - More Params BS" on page 71

### [:SOURce<hw>]:BB:C2K:BSTation:SYNC:SID <Sid>

Displays the System Identification.

The base station sets the system identification number.

**Parameters:**
- `<Sid>`: integer
- **Range:** 0 to 32767
- **RST:** 10

**Example:**
```
BB:C2K:BST:SYNC:SID 10
```
sets the system identification parameter

**Manual operation:** See "SID - More Params BS" on page 71

### [:SOURce<hw>]:BB:C2K:BSTation:SYNC:STIMe <Systime>

(available for R&S SMBV and R&S WinIQSIM2 only)

Displays the system time.

**Parameters:**
- `<Systime>`: integer
  - **Range:** 0 to 68719476735
  - **Increment:** 1
  - **RST:** 0
Example:  
```
BB:C2K:BST:SYNC:STIM 4
```
sets the system time.

**Manual operation:** See "System Time - More Params BS" on page 71

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:
BINTerleaver?
```

The command queries the number of symbols per block which are processed by the interleaver. This value is only available for channel coding modes "Complete" and "Without Interleaving"  
```
```

For the traffic channels, this value is specific for the selected radio configuration.

**Return values:**

- `<BInterleaver>`
  - 48 | 96 | 128 | 144 | 192 | 288 | 384 | 576 | 768 | 1152 | 1536 | 2304 | 3072 | 4608 | 6144 | 9216 | 12288 | 18432 | 36864 | NONE

**Example:**

```
```
selects channel coding mode "Complete" for F-FCH of the third traffic channel.

```
```
queries the number of symbols per block which are processed by the interleaver.

**Response:** 384

384 symbols per block are processed.

**Usage:** Query only

**Manual operation:** See "Block Interleaver - More Params BS" on page 70

```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:
BITFrame?
```

The command queries the number of input bits per frame for the channel coder. This value is only available for channel coding modes "Complete" and "Without Interleaving"  
```
```

For the traffic channels, this value is specific for the selected radio configuration.

**Return values:**

- `<BitFrame>`
  - integer
  - Range: 16 to 20712
  - Increment: 1
  - *RST: 16
selects channel coding mode "Complete" for F-FCH of the third traffic channel.
queries the number of input bits per frame.
Response: 16
16 bits per frame.

Usage:  Query only
Manual operation:  See "Source Bits / Frame - More Params BS" on page 69

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:CRC?
The command queries the CRC (cyclic redundancy code) type (length). This value is only available for channel coding modes "Complete" and "Without Interleaving" (SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN).
For the traffic channels, this value is specific for the selected radio configuration.
Return values:
  <Crc>  integer
  Range:  0 to 16
  Increment:  1
  *RST:  0

selects channel coding mode "Complete" for F-FCH of the first traffic channel.
BB:C2K:BST:CGR1:COFF1:CCOD:CRC?
queries the CRC type.
Response: 6
CRC type 6 is used.

Usage:  Query only

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:DATA:RATE?
The command queries the effective data rate in Hz. This value is only available for channel coding modes "Off" and "Interleaving Only" (SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE OFF | OINT).
When channel coding is switched off, the effective data rate differs from the data rate set in the channel table. The data are read out with the effective rate.
For the traffic channels, this value is specific for the selected radio configuration.
Return values:
  <Rate>  float
Example: \texttt{BB:C2K:BST:CGR3:COFF1:CCOD:MODE OINT}
selects channel coding mode "Interleaving Only" for F-FCH of
the third traffic channel.

queries the effective data rate.
Response: 19200
the effective data is 19.2 kbps.

Usage: Query only
Manual operation: See "Effective Data Rate - More Params BS" on page 69

\texttt{[:SOURce<hw>:]BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:MODE <Mode>}
The command selects channel coding mode. For the traffic channels, this value is spe-
cific for the selected radio configuration.

Parameters: \texttt{<Mode>}
\begin{itemize}
  \item \texttt{OFF} | \texttt{COMPLETE} | \texttt{NOINTERLEAVING} | \texttt{INTERLEAVING}
  \item \texttt{OFF}
  Channel coding is deactivated.
  \item \texttt{COMPLETE}
  The complete channel coding is performed. The channel coding
  procedure may slightly vary depending on channel type, frame
  length and data rate.
  \item \texttt{INTERLEAVING}
  Except for the block interleaver, the whole channel coding pro-
  cedure is carried out. In this mode the frame structure and the
  convolutional coder of an receiver can be tested.
  \item \texttt{NOINTERLEAVING}
  In this mode only block interleaver is used for coding. This
  allows the deinterleaver in the receiver to be tested independ-
  ently of the remaining (de-)coding process.
\end{itemize}
*RST: \texttt{COMPLETE}

Example: \texttt{BB:C2K:BST:CGR3:COFF1:CCOD:MODE OFF}
deactivates channel coding for F-FCH of the third traffic channel.

Manual operation: See "Channel Coding Mode - More Params BS" on page 68

\texttt{[:SOURce<hw>:]BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:SPUNcture?}
The command queries the symbol puncture rate. This value is only available for chan-
nel coding modes "Complete" and "Without Interleaving"
\texttt{(SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN).}

For the traffic channels, this value is specific for the selected radio configuration.
Return values:

- `<SPuncture>`: 8OF24 | 1OF5 | 1OF9 | 4OF12 | 2OF18 | 2OF6 | T2OF18 | T4OF12 | NONE
  - xOFy: a symbol puncture rate of x out of y is used
  - TxOFy: a symbol puncture rate of x out of y Turbo is used

Example:

```
```
selects channel coding mode "Complete" for F-FCH of the third traffic channel.

```
```
queries the symbol puncture rate.

Response: 8OF24
a symbol puncture rate of 8 out of 24 is used.

Usage: Query only

Manual operation: See "Symbol Puncture - More Params BS" on page 70

[[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:SREPition?]

The command queries symbol repetition rate. This value is only available for channel coding modes "Complete" and "Without Interleaving" (SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN).

For the traffic channels, this value is specific for the selected radio configuration.

Return values:

- `<SRepetition>`: integer
  - Range: 1 to 16
  - Increment: 1
  - *RST: 0

Example:

```
```
selects channel coding mode "Complete" for F-FCH of the third traffic channel.

```
```
queries symbol repetition rate.

Response: 8
a symbol repetition rate of 8 is used.

Usage: Query only

Manual operation: See "Symbol Repetition - More Params BS" on page 70

[[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:CCODing:TYPE <Type>]

The command sets the channel coding type.
This value is only available for channel coding modes "Complete" and "Without Interleaving" (SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN). For the traffic channels, this value is specific for the selected radio configuration.

**Parameters:**

<table>
<thead>
<tr>
<th>&lt;Type&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON2</td>
</tr>
<tr>
<td>NONE</td>
</tr>
<tr>
<td>TURx</td>
</tr>
<tr>
<td>CONx</td>
</tr>
</tbody>
</table>

*RST: Channel-specific

**Example:**

selects channel coding mode "Complete" for F-SCH1 of the third traffic channel.

selects turbo coder with a rate of 1/4 for F-SCH1 of the third traffic channel.

**Manual operation:**  See "Channel Coder Type - More Params BS" on page 69

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA <Data>

The command selects the data source for the specified channel.

For the traffic channels, this value is specific for the selected radio configuration.

The data source for the power control bits is selected with the command :BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:TPC:DATA.
Parameters:

- <Data>
  - ZERO | ONE | PATTern | PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt
  - PNxx
    The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.
  - DLISt
    A data list is used. The data list is selected with the command :BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:DATA: DSEL.
  - ZERO | ONE
    Internal 0 and 1 data is used.
  - PATTern
    Internal data is used. The bit pattern for the data is defined by the command :BB:C2K:BST:CGRoup:COFFset:DATA:PATT.

*RST: F-PICH; F-TDPICH; F-APICH; F-ATDPICH: ALL0; all other channels: PN9

Example:

BB:C2K:BST2:CGR3:COFF1:DATA PATT
selects as the data source for the F-FCH of the third traffic channel of base station 2, the bit pattern defined with the following command:

defines the bit pattern.

Manual operation: See "Data List Management " on page 24

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA: DSElect <DSelect>
The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user’s choice. The directory applicable to the following commands is defined with the command MMEMory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:

- <DSelect> string

Example:

BB:C2K:BST2:CGR3:COFF1:DATA DLIS
selects the Data Lists data source for the F-FCH of the third traffic channel of base station2.

MMEM:CDIR "<root>Lists"
selects the directory for the data lists.

BB:C2K:BST2:CGR3:COFF1:DATA:DLIS "cdma_list1"
selects file "cdma_list1" as the data source. This file must be in specified directory and it must have the file extension *.dm_iqd.
Manual operation: See "Data List Management " on page 24

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:PATTern <Pattern>

The command sets the bit pattern for the PATTern selection. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use. The maximum length is 64 bits.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:
<Pattern> 64bit pattern
*RST: 0


Manual operation: See "Data - BS" on page 62

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DATA:RATE <Rate>

The command sets the data rate for the specified channel. The value range depends on the channel type, the selected radio configuration and the frame length. Parameter NUSed is returned for channel 0-1 to 0-4.

For the traffic channels, this value is specific for the selected radio configuration.

The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

The data rate affects the Walsh code (spreading factor) that are possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.

Parameters:
<Rate> DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 |
DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 |
DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 |
DR230K4 | DR307K2 | NUSed
*RST: Channel-specific


Manual operation: See "Data Rate - BS" on page 61

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BIT:RATE <Rate>

The command sets the bit error rate.
Parameters:

<Rate>  
float
Range: 1E-7 (0.0000001) to 1E-1 (0.1)
Increment: 1E-7
*RST: 1E-3

Example:
activates the real time generation of F-SCH2 of the first traffic channel of base station 1.
sets a bit error rate of 0.0001.

Manual operation: See "Bit Error Rate - More Params BS" on page 72

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:
BIT:STAtE <State>

The command activates bit error generation.

Parameters:

<State>  
0 | 1 | OFF | ON
*RST: OFF

Example:
activates the real time generation of F-SCH2 of the first traffic channel of base station 1.
activates bit error generation.

Manual operation: See "Bit Error State - More Params BS" on page 72

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:
BLOCk:RATE <Rate>

The command sets the block error rate.

Block error generation is only possible when channel coding is activated. For the traffic channels, this value is specific for the selected radio configuration.

Parameters:

<Rate>  
float
Range: 1E-4 (0.0001) to 1E-1 (0.1)
Increment: 1E-4
*RST: 1E-1
Example:

activates the real time generation of F-SCH2 of the first traffic channel of base station 1.

activates complete channel coding.

sets the block error rate to 0.01.

activates block error generation.

Manual operation:

See "Block Error Rate - More Params BS" on page 73

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:DERRor:BLOCk:STATE <State>

The command activates or deactivates block error generation.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: OFF

Example:

activates the real time generation of F-SCH2 of the first traffic channel of base station 1.

activates complete channel coding.

sets the block error rate to 0.01.

activates block error generation.

Manual operation:

See "Block Error State - More Params BS" on page 72

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:FLENgth <FLength>

The command sets the frame length of the selected channel. The value range is channel specific.

For the traffic channels, this value is specific for the selected radio configuration.

The value range of the frame length depends on the channel type and the selected radio configuration.

The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate and this in turn may bring about a change of Walsh code.
Parameters:

<FLength>  5 | 10 | 20 | 26.6 | 40 | 80 | 160 | NUSed
26 ms
Frame length of 26.6. Also all inputs between 26.6 and 26.7 ms are allowed.

*RST:  F-SYNC: 26.6; F_BCH: 40 ms; F_CACH: 5 ms; all other channels: 20 ms

Example:  BB:C2K:BST:CGR3:COFF4:FLEN 5 ms
sets the frame length of sub channel 3-4 to 5 ms.

Manual operation:  See "Frame Length- BS" on page 61

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:LCMask
<LcMask>

The command sets the mask of the Long Code Generator of the base station.
For the traffic channels, this value is specific for the selected radio configuration.
The LC Mask is the same for all sub channels of a traffic channel. If the mask is modified for one of the sub channels the new value is then automatically used by all other subchannels of this traffic channel.

Parameters:

<LcMask>
integer
Range:  #H0 to #H3FF FFFF FFFF
*RST:  #H0

sets the Long Code Mask to #H55.

Manual operation:  See "LC Mask - More Parameters BS" on page 65

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:POWer
<Power>

The command sets the channel power relative to the powers of the other channels.
This setting also determines the starting power of the channel for Misuse Output Power Control.

With the command [:SOURce<hw>]:BB:C2K:POWer:ADJjust, the power of all the activated channels is adapted so that the total power corresponds to 0 dB. This will not change the power ratio among the individual channels.
For the traffic channels, this value is specific for the selected radio configuration.

Parameters:

<Power>
float
Range:  -80 dB to 0 dB
Increment:  0.01 dB
*RST:  Channel-specific
Example: \[\text{BB:C2K:BST2:CGR3:COFF4:POW} -10\text{dB}\] sets the channel power of sub channel 3-4 of base station 2 to -10 dB relative to the power of the other channels.

Manual operation: See "Power - BS" on page 62

\[[:\text{SOURce<hw>}:\text{BB:C2K:BStation<st>:CGRoup<di0>:COFFset<ch>:QWCode:STATe<State>\}
This command activates/deactivates the use of the quasi orthogonal Walsh codes for the channel.

The quasi orthogonal Walsh Code set is selected for all channels of the base station with command \[[:\text{SOURce<hw>}:\text{BB:C2K:BStation<st>:QWSet}\].

For the traffic channels, this value is specific for the selected radio configuration. It is only available for radio configuration 3 and higher.

Parameters: 
\(<\text{State}>\) 0 | 1 | OFF | ON
*\text{RST}: OFF

\[\text{BB:C2K:BSt1:CGR3:COFF4:QWC:STAT ON}\] activates the use of the quasi orthogonal Walsh code for sub channel 3-4.

Manual operation: See "Quasi Orthogonal Walsh Code State - BS" on page 62

\[[:\text{SOURce<hw>}:\text{BB:C2K:BStation<st>:CGRoup<di0>:COFFset<ch>:REALtime:STATe<State>\}
This command activates/deactivates realtime generation of the selected channel. Real-time generation is possible for F-SYNC and the first traffic channel of base station 1.

For the traffic channel, this value is specific for the selected radio configuration.

Parameters: 
\(<\text{State}>\) 0 | 1 | OFF | ON
*\text{RST}: OFF


Manual operation: See "Real Time - BS1" on page 60

\[[:\text{SOURce<hw>}:\text{BB:C2K:BStation<st>:CGRoup<di0>:COFFset<ch>:STATe<State>\}
This command activates/deactivates the selected channel.

For the traffic channels, this value is specific for the selected radio configuration.
Remote-Control Commands

Setting Base Stations

Parameters:
**<State>**
0 | 1 | OFF | ON
*RST:* OFF

Example:
BB:C2K:BST2:CGR1:COFF2:STAT OFF
deactivates sub channel 1-2 of base station 1.

Manual operation:
See "Channel State - BS" on page 63

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA
<Data>

The command determines the data source for the power control bits of the selected F-FCH or F-DCCH.

Power control is available for sub channel types F-FCH and F-DCCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:
**<Data>**
ZERO | ONE | PATTern | DLIS\t

**DLIS\t**
A data list is used. The data list is selected with the command

ZERO | ONE
Internal 0 and 1 data is used.

PATTern
Internal data is used The bit pattern for the data is defined by the command
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA:PATTern. The
maximum length is 64 bits.
*RST:* ZERO

Example:
BB:C2K:BST2:CGR1:RCON 4
selects radio configuration4 for the first traffic channel of base station 2. This setting is valid for all sub channels of this traffic channel. With RC4, the traffic channel includes a F-DCCH.
selects as the data source for the power control bits of F-DCCH
the bit pattern defined with the following command.
defines the bit pattern.

Manual operation:
See "Data List Management " on page 24


The command selects the data list for the DLIS\t data source selection.
Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command \texttt{MMEMory:CDIR}. To access the files in this directory, you only have to give the file name, without the path and the file extension.

For the traffic channels, this value is specific for the selected radio configuration.

\textbf{Parameters:}
\texttt{<DSel> \text{string}}

\textbf{Example:}
\texttt{BB:C2K:BST2:CGR1:RCON \text{4}}
selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.
\texttt{:BB:C2K:BST2:CGR1:COFF4:TPC:DATA DLIS}
selects the DLIS data source.
\texttt{MMEM:CDIR "\text{<root>Lists}"
selects the directory for the data lists.
selects the file \text{cdma\_ch4} as the data source. This file must be in specified directory and it must have the file extension \text{*_.dm_iqd}.}

\textbf{Manual operation:} See "Data List Management " on page 24

\texttt{[:SO\text{URce<hw>}:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:DATA: PATTern <Pattern>}

The command determines the bit pattern for the \texttt{PAT\text{tern}} selection. The maximum bit pattern length is 64 bits.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

\textbf{Parameters:}
\texttt{<Pattern> 64 \text{bit pattern}}
\texttt{*RST: \#H0,1}

\textbf{Example:}
\texttt{BB:C2K:BST2:CGR1:RCON \text{4}}
selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.
defines the bit pattern for the power control-bits.

\textbf{Manual operation:} See "Data Source - Power Control - BS" on page 66
The command activates "mis-" use of the power control bits of the selected F-DCCH or F-CH for controlling the channel powers of these channels.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

The bit pattern (see commands [:SOURce<hw>:]:BB:C2K:BSTation<n>:CGRoup<n>:COFFset<n>:TPC...) of the power control bits of each channel is used to control the channel power. A "1" leads to an increase of channel powers, a "0" to a reduction of channel powers. Channel power is limited to the range 0 dB to -80 dB. The step width of the change is defined with the command [:SOURce<hw>:]:BB:C2K:BSTation<n>:CGRoup<n>:COFFset<n>:TPC:PSTep.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:

<MisUse> 0 | 1 | OFF | ON
*RST: OFF

Example:
BB:C2K:BST2:CGR1:RCON 4 selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.
BB:C2K:BST2:CGR1:COFF4:TPC:MIS ON activates regulation of channel power for DCCH of the first traffic channel of base station 2 via the power control bit pattern.
BB:C2K:BST2:CGR1:COFF4:TPC:PST 1 dB sets the step width for the change of channel powers to 1 dB.

Manual operation: See "Misuse for Output Power Control - BS" on page 67

The command defines the step width for the change of channel powers in the case of "mis-" use of the power control bits.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:

<PStep> float
Range: -10 dB to 10 dB
Increment: 0.01 dB
*RST: 0 dB
Example:  
BB:C2K:BST2:CGR1:RCON 4  
selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

sets the step width for the change of channel powers to 1 dB.

Manual operation:  See "Power Step (DPCCH) - BS" on page 68

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TPC:READ  
<Read>

The command sets the read out mode for the bit pattern of the power control bits. 

The bit pattern is defined with the commands :BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:TPC....

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:  
<Read>

CONTInuous | S0A | S1A | S01A | S10A  

CONTInuous  
The bit pattern is used cyclically.

S0A  
The bit pattern is used once, then the power control bit sequence continues with 0 bits.

S1A  
The bit pattern is used once, then the power control bit sequence continues with 1 bits.

S01A  
The bit pattern is used once and then the power control bit sequence is continued with 0 and 1 bits alternately.

S10A  
The bit pattern is used once and then the power control bit sequence is continued with 1 and 0 bits alternately.

*RST: CONTInuous

Example:  
BB:C2K:BST2:CGR1:RCON 4  
selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

BB:C2K:BST2:CGR1:COFF4:TPC:READ S0A  
'the bit pattern is used once, after which a 0 sequence is generated (applies to F-DCCH of the first traffic channel of base station 2).
Manual operation: See "Read Out Mode (Power Control) - BS" on page 66

[:SOURce<hw>]:BB:C2K:BSTation<st>:CGRoup<di0>:COFFset<ch>:TYPE?

The command queries the channel type.

The channel type is firmly fixed for channel numbers 0-1 to 0-14 (CGR0: COFF1 to CGR0:COFF14), i.e. for the special channels (control and packet channels). The remaining channel numbers are assigned to the individual code channels of the eight possible traffic channels. In this case the first traffic channel occupies the range 1-1 to 1-8 (CGR1:COFF1 to CGR1:COFF8), the second occupies the range 2-1 to 2-8 (CGR2:COFF1 to CGR2:COFF8), etc. Since the type and number of code channels depends on the radio configuration of the channel, the channels x-2 to x-8 are variously occupied. X-1 is always the fundamental channel (F-FCH) of the traffic channel.
Return values:

\[ \text{<Type>} \]

- **F-PICH**: Pilot Channel
- **F-SYNC**: Sync Channel
- **F-PCH**: Paging Channel
- **F-TDPICH**: Transmit Diversity Pilot Channel
- **F-APICH**: Auxiliary Pilot Channel
- **F-ATDPICH**: Auxiliary Transmit Diversity Pilot Channel
- **F-BCH**: Broadcast Channel
- **F-CPCCH**: Common Power Control Channel
- **F-QPCH**: Quick Paging Channel
- **F-CACH**: Common Assignment Channel
- **F-CCCH**: Common Control Channel
- **F-DCCH**: Dedicated Control Channel
- **F-FCH**: Fundamental Channel
- **F-SCH**: Supplemental Channel
- **F-PDCCH**: Packet Data Control Channel
- **F-PDCH**: Forward Packet Data Channel

**Example:**

```plaintext
BB:C2K:BST2:CGR0:COFF12:TYPE?
```

queries type of channel 0-12 of base station 2.

Response: **F-PDCCH**

channel 0-12 is a Packet Dedicated Control Channel.

**Usage:**

Query only

**Manual operation:**

See "Channel Type - BS" on page 58
The command assigns the Walsh Code to the channel. The standard assigns a fixed walsh code to some channels (F-PICH, for example, always uses Walsh code 0). Generally, the Walsh code can only be varied within the range specified by the standard.

For the traffic channels, this value is specific for the selected radio configuration.

The value range of the Walsh code depends on the frame length, the channel coding type and the data rate.

If one of these parameters is changed so that the set Walsh code gets invalid, the next permissible value is automatically set.

Parameters:

\[ \text{<WCode> \text{ integer} \text{ Range: } 0 \text{ to } 255 \text{ Increment: } 1 \text{ *RST: Channel-specific}} \]

Example: 

\[ \text{BB:C2K:BST1:CGR3:COFF5:WCODE 23} \]

assigns Walsh code 23 to sub channel 3-5 of base station 1.

Manual operation: See "Walsh Code - BS" on page 61

The command queries the Walsh Code length of the channel. For the traffic channels, this value is specific for the selected radio configuration.

Return values:

\[ \text{<WLength> \text{ integer} \text{ Range: } 0 \text{ to } 255 \text{ Increment: } 1 \text{ *RST: } 0} \]

Example: 

\[ \text{BB:C2K:BST1:CGR3:COFF5:WLEN?} \]

queries Walsh code length of sub channel 3-5 of base station 1.

Response: 64

the Walsh code length is 64.

Usage: Query only

Manual operation: See "Walsh Length - More Parameters BS" on page 65

Selects the radio configuration for the traffic channel. The settings of the channel table parameters are specific for the selected radio configuration.
**Remote-Control Commands**

**CDMA2000® incl. 1xEV-DV**

**Parameters:**

- `<RConfiguration>`: 1 | 2 | 3 | 4 | 5
- *RST:* Traffic channel 1/2: 3; all other traffic channels: 1

**Example:**

```
BB:C2K:BST2:CGR1:RCON 4
```

selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

**Manual operation:** See "Radio Configuration (RC) - BS" on page 60

**[:SOURce<hw>:]BB:C2K:BSTation<st>:DCONflict:MODE <Mode>**

The command switches the order of the spreading codes.

**Parameters:**

- `<Mode>`: HAD | BREV
  - **HAD**
    - the code channels are displayed in the order determined by the Hadamard matrix. The codes are numbered as Walsh codes according to the standard.
  - **BREV**
    - the code channels are displayed in the order defined by the Orthogonal Variable Spreading Factor (OVSF) code tree (3GPP code).
- *RST:* HAD

**Example:**

```
BB:C2K:BST2:DCON:MODE HAD
```

selects that the codes are numbered as Walsh codes according to the standard.

**Manual operation:** See "Order - Code Domain BS" on page 55

**[:SOURce<hw>:]BB:C2K:BSTation<st>:DCONflict:RESolve**

The command resolves existing domain conflicts by modifying the Walsh codes of the affected channels.

**Example:**

```
BB:C2K:BST2:DCON:STAT?
```

queries whether a code domain conflict exists for base station 2.

Response: 1

there is a conflict.

```
BB:C2K:BST2:DCON:RES
```

resolves the code domain error by modifying the Walsh codes of the affected channels.

**Usage:** Event

**Manual operation:** See "Domain Conflict - BS" on page 63
[:SOURce<hw>]:BB:C2K:BSTation<st>:DCONflict[:STATe]?

The command queries whether there is (response 1) or is not (response 0) a conflict (overlap) in the hierarchically-structured Walsh codes.

Return values:
<State> 0 | 1 | OFF | ON

Example:
BB:C2K:BST2:DCON:STAT?
queries whether a code domain conflict exists for base station 2.
Response: 0
there is no conflict.

Usage:
Query only

Manual operation: See "Domain Conflict - BS" on page 63

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:PINTerval <PInterval>

The command sets the interval between two data packets for F-PDCH. The range depends on the ARB settings sequence length (:BB:C2K:SLENgth). The values 80 ms, 40 ms, 20 ms, 10 ms and 5 ms can always be set, and the maximum value is 2000 ms. All intermediate values must satisfy the condition:

Sequence Length * 80ms/2^n, where n is a whole number.

Parameters:
<PInterval> float
Range: 5 ms to 2000 ms
Increment: 0.005
*RST: 20 ms

Example:
BB:C2K:BST2:PDCH:PINT 10 ms
sets an interval of 10 ms between two data packets.

Manual operation: See "Packet Interval - More Params F-PDCHs BS" on page 74

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:PSETup <PSetup>

The command selects for F-PDCH if all subpackets are generated using the same settings or if the settings of subchannel 1 are valid for all sub channels. However, the value of "Number of Bits per Encoder Packet" is a quality of the complete encoder packet, therefore it is always set for all sub packet channels via the entry for sub channel 1.
Remote-Control Commands

CDMA2000® incl. 1xEV-DV

Parameters:

<PSetup>  
0 | 1 | OFF | ON

ON
Packet parameters can be changed only for sub packet 1, all sub packets are generated with these settings.

OFF
Packet parameters can be set individually for each sub packet.

*RST: ON

Example:

BB:C2K:BST2:PDCH:PSET OFF
selects that all sub packets can be configured separately.

Manual operation: See "Same Packet Setup... - More Params F-PDCHs BS" on page 75

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDChannel:SUBPacket<di>:ID <Id>

The command selects the sub packet ID for F_PDCH. The sub packet ID determines the sub packet symbol selection and selects one of four available subpackets of the encoder packets. The SPID of sub packet 1 is always 1.

Parameters:

<Id>  
0 | 1 | 2 | 3

Range: 0 to 3

*RST: 0

Example:

selects SPID 3 for sub packet 3.

Manual operation: See "Subpacket ID (SPID) - More Params F-PDCHs BS" on page 76


The command selects a fixed combination of parameters "Bits per Encoder Packet", "Number of 32-Chip Walsh Channels", "Subpacket Data Rate", "Number of Slots per Subpackets" and "Modulation Order". These combinations are shown in the following list in the form of a table for all five parameters.

The complete range of 127 possible combinations is only available for subpacket 1. If "Same Packet Setup for all Subpackets" is enabled (SOUR:BB:C2K:BST2:PDCH: PSET ON), this command is only valid for subpacket 1.
<table>
<thead>
<tr>
<th>Parameter of command</th>
<th>Number of Bits per Encoder Packet</th>
<th>Number of 32-Chip Walsh Channels</th>
<th>Subpacket Data Rate (kbps)</th>
<th>Number of Slots per Subpacket</th>
<th>Modulation Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2328</td>
<td>28</td>
<td>1862.4</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>2</td>
<td>3864</td>
<td>27</td>
<td>1545.6</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>3</td>
<td>3096</td>
<td>26</td>
<td>2476.8</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>4</td>
<td>3864</td>
<td>26</td>
<td>3091.2</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>5</td>
<td>1560</td>
<td>25</td>
<td>1248.0</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>6</td>
<td>2328</td>
<td>25</td>
<td>1862.4</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>7</td>
<td>3096</td>
<td>25</td>
<td>1238.4</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>8</td>
<td>3864</td>
<td>25</td>
<td>1545.6</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>9</td>
<td>2328</td>
<td>23</td>
<td>931.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>10</td>
<td>2328</td>
<td>23</td>
<td>1862.4</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>11</td>
<td>3096</td>
<td>23</td>
<td>2476.8</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>12</td>
<td>3864</td>
<td>23</td>
<td>1545.6</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>13</td>
<td>1560</td>
<td>22</td>
<td>1248.0</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>14</td>
<td>3096</td>
<td>22</td>
<td>1238.4</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>15</td>
<td>1560</td>
<td>21</td>
<td>1248.0</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>16</td>
<td>3096</td>
<td>21</td>
<td>1238.4</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>17</td>
<td>3096</td>
<td>21</td>
<td>2476.8</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>18</td>
<td>3864</td>
<td>21</td>
<td>1545.6</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>19</td>
<td>1560</td>
<td>20</td>
<td>624.0</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>20</td>
<td>2328</td>
<td>20</td>
<td>465.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>21</td>
<td>2328</td>
<td>20</td>
<td>931.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>22</td>
<td>2328</td>
<td>20</td>
<td>1862.4</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>23</td>
<td>3096</td>
<td>20</td>
<td>619.2</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>24</td>
<td>408</td>
<td>19</td>
<td>326.4</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>25</td>
<td>792</td>
<td>19</td>
<td>316.8</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>26</td>
<td>792</td>
<td>19</td>
<td>633.6</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>27</td>
<td>1560</td>
<td>19</td>
<td>1248.0</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>28</td>
<td>3096</td>
<td>19</td>
<td>1238.4</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>29</td>
<td>3864</td>
<td>19</td>
<td>772.8</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>30</td>
<td>3864</td>
<td>19</td>
<td>1545.6</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>31</td>
<td>2328</td>
<td>18</td>
<td>1862.4</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>Parameter of command</td>
<td>Number of Bits per Encoder Packet</td>
<td>Number of 32-Chip Walsh Channels</td>
<td>Subpacket Data Rate (kbps)</td>
<td>Number of Slots per Sub-packet</td>
<td>Modulation Order</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------</td>
<td>-------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>SOUR:BB:C2K:BST:PDCH:PAR</td>
<td>32</td>
<td>1560</td>
<td>17</td>
<td>1248.0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>2328</td>
<td>17</td>
<td>931.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>3096</td>
<td>17</td>
<td>1238.4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>3864</td>
<td>17</td>
<td>1545.6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>2328</td>
<td>16</td>
<td>1862.4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>3096</td>
<td>16</td>
<td>619.2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>3864</td>
<td>16</td>
<td>772.8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>792</td>
<td>15</td>
<td>633.6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>1560</td>
<td>15</td>
<td>624.0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>41</td>
<td>1560</td>
<td>15</td>
<td>1248.0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>2328</td>
<td>15</td>
<td>931.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>3096</td>
<td>15</td>
<td>1238.4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>3864</td>
<td>15</td>
<td>1545.6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>1560</td>
<td>14</td>
<td>312.0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>2328</td>
<td>14</td>
<td>465.6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>3864</td>
<td>14</td>
<td>772.8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>3864</td>
<td>14</td>
<td>1545.6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>792</td>
<td>13</td>
<td>633.6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>1560</td>
<td>13</td>
<td>624.0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>1560</td>
<td>13</td>
<td>1248.0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>2328</td>
<td>13</td>
<td>931.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>3096</td>
<td>13</td>
<td>619.2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>54</td>
<td>3096</td>
<td>13</td>
<td>1238.4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>3864</td>
<td>13</td>
<td>1545.6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>1560</td>
<td>12</td>
<td>1248.0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>57</td>
<td>3096</td>
<td>12</td>
<td>1238.4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>58</td>
<td>3864</td>
<td>12</td>
<td>772.8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>408</td>
<td>11</td>
<td>326.4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>792</td>
<td>11</td>
<td>158.4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>61</td>
<td>792</td>
<td>11</td>
<td>316.8</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>62</td>
<td>792</td>
<td>11</td>
<td>633.6</td>
<td>1</td>
</tr>
<tr>
<td>Parameter of command</td>
<td>Number of Bits per Encoder Packet</td>
<td>Number of 32-Chip Walsh Channels</td>
<td>Subpacket Data Rate (kbps)</td>
<td>Number of Slots per Subpacket</td>
<td>Modulation Order</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>-----------------------------</td>
<td>-------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>63</td>
<td>1560</td>
<td>11</td>
<td>624.0</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>64</td>
<td>1560</td>
<td>11</td>
<td>1248.0</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>65</td>
<td>2328</td>
<td>11</td>
<td>465.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>66</td>
<td>2328</td>
<td>11</td>
<td>931.2</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>67</td>
<td>3096</td>
<td>11</td>
<td>619.2</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>68</td>
<td>3096</td>
<td>11</td>
<td>1238.4</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>69</td>
<td>3864</td>
<td>11</td>
<td>772.8</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>70</td>
<td>792</td>
<td>10</td>
<td>633.6</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>71</td>
<td>1560</td>
<td>10</td>
<td>624.0</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>72</td>
<td>2328</td>
<td>10</td>
<td>931.2</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>73</td>
<td>3096</td>
<td>10</td>
<td>619.2</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>74</td>
<td>792</td>
<td>9</td>
<td>633.6</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>75</td>
<td>1560</td>
<td>9</td>
<td>312.0</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>76</td>
<td>1560</td>
<td>9</td>
<td>624.0</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>77</td>
<td>2328</td>
<td>9</td>
<td>465.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>78</td>
<td>2328</td>
<td>9</td>
<td>931.2</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>79</td>
<td>3096</td>
<td>9</td>
<td>619.2</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>80</td>
<td>3864</td>
<td>9</td>
<td>772.8</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>81</td>
<td>408</td>
<td>8</td>
<td>163.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>82</td>
<td>408</td>
<td>8</td>
<td>326.4</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>83</td>
<td>792</td>
<td>8</td>
<td>316.8</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>84</td>
<td>792</td>
<td>8</td>
<td>633.6</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>85</td>
<td>1560</td>
<td>8</td>
<td>624.0</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>86</td>
<td>2328</td>
<td>8</td>
<td>465.6</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>87</td>
<td>2328</td>
<td>8</td>
<td>931.2</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>88</td>
<td>3096</td>
<td>8</td>
<td>619.2</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>89</td>
<td>3864</td>
<td>8</td>
<td>772.8</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>90</td>
<td>408</td>
<td>7</td>
<td>326.4</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>91</td>
<td>792</td>
<td>7</td>
<td>316.8</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>92</td>
<td>792</td>
<td>7</td>
<td>633.6</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>93</td>
<td>1560</td>
<td>7</td>
<td>312.0</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>Parameter of command</td>
<td>Number of Bits per Encoder Packet</td>
<td>Number of 32-Chip Walsh Channels</td>
<td>Subpacket Data Rate (kbps)</td>
<td>Number of Slots per Subpacket</td>
<td>Modulation Order</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>94</td>
<td>1560</td>
<td>7</td>
<td>624.0</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>95</td>
<td>2328</td>
<td>7</td>
<td>465.6</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>96</td>
<td>3096</td>
<td>7</td>
<td>619.2</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>97</td>
<td>3864</td>
<td>7</td>
<td>772.8</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>98</td>
<td>408</td>
<td>6</td>
<td>326.4</td>
<td>1</td>
<td>QPSK</td>
</tr>
<tr>
<td>99</td>
<td>792</td>
<td>6</td>
<td>158.4</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>100</td>
<td>792</td>
<td>6</td>
<td>316.8</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>101</td>
<td>792</td>
<td>6</td>
<td>633.6</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>102</td>
<td>1560</td>
<td>6</td>
<td>312.0</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>103</td>
<td>1560</td>
<td>6</td>
<td>624.0</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>104</td>
<td>2328</td>
<td>6</td>
<td>465.6</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>105</td>
<td>3096</td>
<td>6</td>
<td>619.2</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>106</td>
<td>408</td>
<td>5</td>
<td>163.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>107</td>
<td>408</td>
<td>5</td>
<td>326.4</td>
<td>1</td>
<td>8-PSK</td>
</tr>
<tr>
<td>108</td>
<td>792</td>
<td>5</td>
<td>316.8</td>
<td>2</td>
<td>8-PSK</td>
</tr>
<tr>
<td>109</td>
<td>1560</td>
<td>5</td>
<td>312.0</td>
<td>4</td>
<td>8-PSK</td>
</tr>
<tr>
<td>110</td>
<td>2328</td>
<td>5</td>
<td>465.6</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>111</td>
<td>408</td>
<td>4</td>
<td>81.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>112</td>
<td>408</td>
<td>4</td>
<td>163.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>113</td>
<td>408</td>
<td>4</td>
<td>326.4</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>114</td>
<td>792</td>
<td>4</td>
<td>158.4</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>115</td>
<td>792</td>
<td>4</td>
<td>316.8</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>116</td>
<td>1560</td>
<td>4</td>
<td>312.0</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>117</td>
<td>2328</td>
<td>4</td>
<td>465.6</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>118</td>
<td>408</td>
<td>3</td>
<td>81.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>119</td>
<td>408</td>
<td>3</td>
<td>163.2</td>
<td>2</td>
<td>QPSK</td>
</tr>
<tr>
<td>120</td>
<td>408</td>
<td>3</td>
<td>326.4</td>
<td>1</td>
<td>16-QAM</td>
</tr>
<tr>
<td>121</td>
<td>792</td>
<td>3</td>
<td>158.4</td>
<td>4</td>
<td>QPSK</td>
</tr>
<tr>
<td>122</td>
<td>792</td>
<td>3</td>
<td>316.8</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td>123</td>
<td>1560</td>
<td>3</td>
<td>312.0</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td>124</td>
<td>408</td>
<td>2</td>
<td>81.6</td>
<td>4</td>
<td>QPSK</td>
</tr>
</tbody>
</table>
Remote-Control Commands

### Parameters:

<table>
<thead>
<tr>
<th>Parameter of command</th>
<th>Number of Bits per Encoder Packet</th>
<th>Number of 32-Chip Walsh Channels</th>
<th>Subpacket Data Rate (kbps)</th>
<th>Number of Slots per Subpacket</th>
<th>Modulation Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUR:BB: C2K:BST: PDCH:PAR</td>
<td>408</td>
<td>2</td>
<td>163.2</td>
<td>2</td>
<td>16-QAM</td>
</tr>
<tr>
<td></td>
<td>792</td>
<td>2</td>
<td>158.4</td>
<td>4</td>
<td>16-QAM</td>
</tr>
<tr>
<td></td>
<td>408</td>
<td>1</td>
<td>81.6</td>
<td>4</td>
<td>16-QAM</td>
</tr>
</tbody>
</table>

#### Parameters:

<Parameters>

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127

Range: 1 to 127
*RST: 1

#### Example:

BB:C2K:BST2:PDCH:SUBP1:PAR 48

selects combination of parameters with index 48 (see following table).

#### Manual operation:

See "PDCH Subpacket Table Parameters - More Params F-PDCHs BS" on page 76

---

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:STATe <State>

This command activates/deactivates the selected sub packet for F_PDCH. Sub packet 1 is always active.

#### Parameters:

<State>

0 | 1 | OFF | ON

*RST: OFF

#### Example:

BB:C2K:BST2:PDCH:SUBP3:STAT ON

activates sub packet 3.

#### Manual operation:

See "Subpacket State - More Params F-PDCHs BS" on page 75
<TOffset>

The command sets start of the sub packet relative to the start of the packet interval. The offset is entered in slots. Sub packet 1 has offset 0. The value range for the individual subpackets depends on the settings of the other subpackets. The time slot offsets of the other sub packet have to be entered in ascending order. Also, two packets cannot be sent at the same time.

In total the maximum value depends on the selected packet interval and the number of slots per sub packet as follows:

Packet Interval/1.25 ms - Number of Slots per Subpacket.

Parameters:

<TOffset> float
Range: 0 Slots to 1000 Slots
*RST: 0


Manual operation: See "Time Slot Offset - More Params F-PDCHs BS" on page 76

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:WCODes?

The command queries the resulting Walsh codes for the selected sub packet of F-PDCH. Packet channels may be assigned to more than one code channel.

Return values:

<WCodes> string

queries the resulting Walsh codes for sub packet 3 of F-PDCH of base station 2.
Response: "31, 15, 23"
The resulting walsh codes are 31,15,23.

Usage: Query only

Manual operation: See "Resulting Walsh Codes for Subpacket - More Params F-PDCHs BS" on page 78

[:SOURce<hw>]:BB:C2K:BSTation<st>:PDCHannel:WINDex <WIndex>

The command selects a standard Walsh set for F-PDCH. Four different sets are defined in the standard.

Parameters:

<WIndex> 0 | 1 | 2 | 3
*RST: 0
Example:  
```
BB:C2K:BST2:PDCH:WIND 2
```
selects set 2 for PDCH of base station 2.

Manual operation:  See "Walsh Code Column Index - More Params F-PDCHs BS" on page 75

`[:SOURce<hw>]:BB:C2K:BSTation<st>:PNOFfset <PnOffset>`

The command sets the PN offset (short code) of the base station. The PN offset permits signals of different base stations to be distinguished.

Parameters:
```
<PnOffset>
integer
Range: 0 to 511
*RST: 0
```

Example:  
```
BB:C2K:BST3:PNOF 123
```
sets a PN offset of 123 for base station 3.

Manual operation:  See "PN Offset - BS" on page 52

`[:SOURce<hw>]:BB:C2K:BSTation<st>:QWSet <QwSet>`

The command selects the quasi orthogonal Walsh code set. The standard defines three different sets.

The quasi-orthogonal Walsh codes are used for a given channel if  
```
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGROUP<di0>:COFFset<ch>:QWCode:STATE
```

is ON.

Parameters:
```
<QwSet>
integer
Range: 1 to 3
*RST: 1
```

Example:  
```
BB:C2K:BST2:QWS 2
```
selects set 2 for base station 2.

Manual operation:  See "Quasi orth Walsh Set - BS" on page 52

`[:SOURce<hw>]:BB:C2K:BSTation<st>:STATe <State>`

The command activates and deactivates the specified base station.

Parameters:
```
<State>
0 | 1 | OFF | ON
*RST: OFF
```

Example:  
```
BB:C2K:BST2:STAT OFF
```
deactivates base station 2.

Manual operation:  See "Base Station or Mobile Station On" on page 30
Remote-Control Commands

Operating Manual 1171.5225.12 ─ 14

[:SOURce<hw>]:BB:C2K:BSTation<st>:TDELay <TDelay>
The command sets the time shift of the selected base station compared to base station 1 in chips.

Parameters:
<TDelay> float
Range: 0 chips to 98304 chips
*RST: 0 chips

Example: BB:C2K:BST2:TDEL 256
shifts base station 2 by 256 chips compared to base station 1.

Manual operation: See "Time Delay - BS" on page 52

[:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity <TDiversity>
The command activates and deactivates signal calculation with transmit diversity (OFF). To activate transmit diversity, the antenna must be specify whose signals are to be simulated (ANT1 or ANT2).

The diversity scheme is selected using command [:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity:MODE.

Parameters:
<TDiversity> OFF | ANT1 | ANT2
OFF
No transmit diversity.
ANT1
Calculate and apply the output signal for antenna 1.
ANT2
Calculate and apply the output signal for antenna 2.
*RST: OFF

Example: BB:C2K:BST2:TDIV ANT2
activates transmit diversity, the signal of antenna 2 is simulated.

Manual operation: See "Transmit Diversity - BS" on page 51

[:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity:MODE <Mode>
The command selects the diversity scheme.

Command [:SOURce<hw>]:BB:C2K:BSTation<st>:TDIVersity activates transmit diversity and selects the antenna.
Parameters:

**<Mode>**
- **OTD | STS**
  - **OTD** Orthogonal Transmit Diversity Mode.
  - **STS** Space Time Spreading Mode.

*RST: OTD

Example:

```
BB:C2K:BST2:TDIV:MODE OTD
```
selects scheme OTD for Transmit Diversity.

```
BB:C2K:BST2:TDIV ANT2
```
activates transmit diversity, the signal of antenna 2 is simulated.

Manual operation: See "Diversity Mode - BS" on page 52

### 5.8 Mobile Station Settings

The **SOURce:BB:C2K:MSTation** system contains commands for setting mobile stations.

The commands of this system only take effect when the CDMA2000 standard is activated, the **UP** transmission direction is selected and the particular mobile station is enabled:

- **SOURce:BB:C2K:STATe** **ON**
- **SOURce:BB:C2K:LINK** **UP**
- **SOURce:BB:C2K:MSTation2:STATe** **ON**

The channels of mobile station 1 are always generated in real time.

For the code channels of a traffic channels, the settings of the channel table parameters are specific for the selected radio configuration. I.e. a complete set of settings exists for each of the four possible radio configurations.

**Suffixes**

**MSTation<st>**
Determines the mobile station. Value range **<st>** = [1]|2|3|4

**CHANnel<ch>**
Value range **<ch>** = 0[1]|..8

```
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:COUNt...................................................... 155
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:LCMask:STEP........................................... 155
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:POWer:OFFSet........................................ 156
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:STATe...................................................... 156
[:SOURce<hw>]:BB:C2K:MSTation:ADDitional:TDELay:STEP........................................... 156
[:SOURce<hw>]:BB:C2K:MSTation:PRESet..................................................................... 157
[:SOURce<hw>]:BB:C2K:MSTation<st>:CCODing:MODE...................................................... 157
```
Remote-Control Commands

CDMA2000® incl. 1xEV-DV

Mobile Station Settings

[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:DATA........................................... 157
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:DATA:DSELect...............................158
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:DATA:RATE...................................159
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:DATA:FLENgh........................................ 160
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:POWer.......................................... 160
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:SPReading?....................................160
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:STATE..........................................161
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:TYPE?...........................161
[:SOURce<hw>]:BB:C2K:MStation<st>:CHANnel<ch>:WCODe?.......................................162
[:SOURce<hw>]:BB:C2K:MStation<st>:LCMask..............................................................163
[:SOURce<hw>]:BB:C2K:MStation<st>:MODE..................................................................163
[:SOURce<hw>]:BB:C2K:MStation<st>:RCONfiguration....................................................163
[:SOURce<hw>]:BB:C2K:MStation<st>:STATE.................................................................164
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:DATA.......................................................... 164
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:DATA:DSELect.............................................165
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:DATA:PATTern.............................................165
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:MISuse.....................................................165
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:PSTep.......................................................... 166
[:SOURce<hw>]:BB:C2K:MStation<st>:TPC:READ.......................................................... 166

[:SOURce<hw>]:BB:C2K:MStation:ADDitional:COUNt <Count>

Sets the number of additional mobile stations.

Parameters:

- `<Count>`
  - integer
  - Range: 1 to 64
  - *RST:* 4

Example:

  - sets 20 additional mobile stations.
  - sets the power offset to -3 dB.
- `BB:C2K:MST:ADD:LCM:STEP #H1`
  - sets the step width for increasing the LC mask to 1.
- `BB:C2K:MST:ADD:STAT ON`
  - connects the 20 mobile stations to the CDMA signal.

Manual operation: See "Number of Additional MS" on page 49

[:SOURce<hw>]:BB:C2K:MStation:ADDitional:LCMask:STEP <Step>

The command sets the step width for increasing the LC mask of the additional mobile stations. The start value is the LC mask of MS4.

Parameters:

- `<Step>`
  - integer
  - Range: #H1 to #HFFFFF
  - Increment: #H1
Example: \[BB\text{-}C2K\text{-}MST\text{-}ADD\text{-}LCM\text{-}STEP \ #55\]
sets the step width for increasing the long code mask to \#55.

Manual operation: See "LC Mask Step" on page 49

\[[:\text{SOURce<hw>}:BB\text{-}C2K\text{-}MSTation\text{-}ADDitional\text{-}POWER\text{-}OFFSet <Offset>\]

The command sets the power offset of the active channels of the additional mobile stations relative to the power of the active channels of the reference station MS4. The offset applies to all the additional mobile stations. The resultant overall power must fall within the range 0 .. - 80 dB. If the value is above or below this range, it is limited automatically.

Parameters:
<Offset> float
  Range: -80 dB to 0 dB
  Increment: 0.01 dB
  *RST: 0 dB

Example: \[BB\text{-}C2K\text{-}MST\text{-}ADD\text{-}POW\text{-}OFFS -3.0\]
sets the offset to -3 dB.

Manual operation: See "Power Offset" on page 50

\[[:\text{SOURce<hw>}:BB\text{-}C2K\text{-}MSTation\text{-}ADDitional\text{-}STATe <State>\]

The command activates additional mobile stations.

Parameters:
<State> 0 | 1 | OFF | ON
  *RST: OFF

Example: \[BB\text{-}C2K\text{-}MST\text{-}ADD\text{-}STAT ON\]
connects the additional mobile stations to the CDMA2000 signal.

Manual operation: See "State" on page 49

\[[:\text{SOURce<hw>}:BB\text{-}C2K\text{-}MSTation\text{-}ADDitional\text{-}TDELay\text{-}STEP <Step>\]

The command sets the step width for the time delay of the additional mobile stations to one another. The start value returns the time delay of MS4. Entry is made in chips and can be a maximum of 1 frame.

Parameters:
<Step> integer
  Range: 0 chips to 1535 chips
  Increment: 1 chip
  *RST: 0 chips

Example: \[BB\text{-}C2K\text{-}MST\text{-}ADD\text{-}TDEL\text{-}STEP 256\]
shifts each of the mobile stations 256 chips apart, starting from the time delay of MS4.
Manual operation: See "Time Delay Step" on page 50

[:SOURce<hw>]:BB:C2K:MSTation:PRESet

The command produces a standardized default for all the mobile stations. The settings correspond to the “RST” values specified for the commands. An overview is provided in "Reset All Mobile Stations" on page 28.

All mobile station settings are preset.

Example: BB:C2K:MST:PRES

resets all the mobile station settings to default values.

Usage: Event

Manual operation: See "Reset All Mobile Stations" on page 28

[:SOURce<hw>]:BB:C2K:MSTation<st>:CCODing:MODE <Mode>

The command selects the channel coding mode.

Parameters:

<Mode>  OFF | COMPLETE | NOINTERLEAVING | OINTERLEAVING

OFF  Channel coding is deactivated.

COMPLETE  The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

OINTERLEAVING  Except for the block interleaver, the whole channel coding procedure is carried out.

NOINTERLEAVING  In this mode only block interleaver is used for coding.

*RST: COMPLETE


deactivates channel coding for mobile station 1.

Manual operation: See "Channel Coding - MS" on page 80

[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:DATA <Data>

The command sets the data source for the specified channel.

The data source for the power control bits is selected with the command [:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA. For the traffic channels, this value is specific for the selected radio configuration.
Parameters:

\(<\text{Data}>\)

- ZERO
- ONE
- PATTern
- PN9
- PN11
- PN15
- PN16
- PN20
- PN21
- PN23
- DLISt
- PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

**DLIST**

A data list is used. The data list is selected with the command

\([:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>}:\text{DATA:DSELe}ct\).

**ZERO | ONE**

Internal 0 and 1 data is used.

**PATTern**

Internal data is used. The bit pattern for the data is defined by the command

\([:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>}:\text{DATA:PATTern}\).

\(*\text{RST}: \text{PN9}\)

**Example:**

BB:C2K:MST1:CHAN2:DATA PN16

selects as the data source for channel 2 of mobile station 1, internal PRBS data with a sequence length of \(2^{16}-1\).

**Manual operation:** See "Data List Management" on page 24

\([:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>}:\text{DATA:DSELe}ct\ <\text{DSelect}>\)

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command \(\text{MMEMory:CDIR}\). To access the files in this directory, you only have to give the file name, without the path and the file extension.

For the traffic channels, this value is specific for the selected radio configuration.

**Parameters:**

\(<\text{DSelect}>\)

- string

**Example:**

BB:C2K:MST1:CHAN1:DATA DLIS

selects the Data Lists data source.

MMEM:CDIR "<root>Lists"

selects the directory for the data lists.

BB:C2K:MST1:CHAN1:DATA:DSEL "dpdch_13"

selects file 'cdma_13' as the data source. This file must be in specified directory and it must have the file extension *.dm_iqd.

**Manual operation:** See "Data List Management" on page 24
[:SOURce<hw>:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:PATTern <Pattern>

The command determines the bit pattern for the data component when the PATTern data source is selected. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use. The maximum length is 64 bits.

For the traffic channels, this value is specific for the selected radio configuration.

Parameters:
- **<Pattern>**: 64-bit pattern
- **RST**: 0

Example:
- `BB:C2K:MST1:CHAN1:DATA PATT #H800FFFF80003FFE, 60` defines the bit pattern.

Manual operation: See "Data - MS" on page 85

[:SOURce<hw>:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:RATE <Rate>

The command sets the data rate for the specified channel. The value range depends on the channel type, the selected radio configuration and the frame length.

For the traffic channels, this value is specific for the selected radio configuration.

The value range of the data rate depends on the channel type and the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

Parameters:
- **<Rate>**: DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8 | NUSed
- **RST**: R-DCCH: DR9K6; R-FCH: DR1K5; R-SCH: DR1K5; R-ACC: DR4K8

Example:
- `BB:C2K:MST2:MODE TRAF` selects operating mode traffic.
- `BB:C2K:MST2:RCON 3` selects radio configuration 3 for the traffic channel.
- `BB:C2K:MST2:CHAN3:DATA:RATE DR4K8` sets a data rate of 4.8 kbps for channel 3 for mobile station 2 (R-FCH in this configuration).

Manual operation: See "Data Rate - MS" on page 84
The command sets the frame length of the selected channel. The value range depends on the channel type and the selected radio configuration.

For the traffic channels, this value is specific for the selected radio configuration.

The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate.

**Parameters:**
- `<FLength>`
  - 5 | 10 | 20 | 26.6 | 40 | 80
- *RST:* 20 ms

**Example:**

```
BB:C2K:MST:CHAN3:FLEN 5 ms
```

sets the frame length of sub channel 3 to 5 ms.

**Manual operation:**
See "Frame Length- MS" on page 84

---

The command sets the channel power relative to the powers of the other channels. This setting also determines the starting power of the channel for Misuse Output Power Control.

With the command [:SOURce<hw>:BB:C2K:POWer:ADJust, the power of all the activated channels is adapted so that the total power corresponds to 0 dB. This will not change the power ratio among the individual channels.

For the traffic channels, this value is specific for the selected radio configuration.

**Parameters:**
- `<Power>`
  - float
  - Range: -80 dB to 0 dB
  - Increment: 0.01 dB
  - *RST:* 0 dB

**Example:**

```
BB:C2K:MST2:CHAN3:POW -10dB
```

sets the channel power of sub channel 3 of mobile station 2 to -10 dB relative to the power of the other channels.

**Manual operation:**
See "Power - MS" on page 85

---

The command queries the spreading factor of the channel. The spreading factor corresponds to the length of the employed Walsh code. The Walsh codes to be used are specified by the standard and cannot be chosen.

For the traffic channels, this value is specific for the selected radio configuration.
Return values:
<Spreading> integer
Range: 0 to 255
Increment: 1
*RST: 0

Example:
BB:C2K:MST2:CHAN1:SPR?
queries the spreading factor of channel 1 of mobile station 2.
Response: 32

Usage: Query only
Manual operation: See “Spread- MS” on page 85

[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:STATe <State>
This command activates/deactivates the selected channel.
For the traffic channels, this value is specific for the selected radio configuration.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: OFF

Example:
BB:C2K:MST2:CHAN2:STAT OFF
deactivates sub channel 2 of mobile station 2.

Manual operation: See “Channel State- MS” on page 86

[:SOURce<hw>]:BB:C2K:MSTation<st>:CHANnel<ch>:TYPE?
The command queries the channel type. The channel type depends on the selected operating mode and, for the sub channels of the traffic channel, from the selected radio configuration.
Return values:
<Type>
R-PICH | R-ACH | R-EACH | R-CCCH | R-DCCH | R-FCH |
R-SCCH | R-SCH2 | R-SCH1

R-ACH
Access Channel.

R-EACH
Enhanced Access Channel

R-CCCH
Common Control Channel

R-PICH
Pilot Channel.

R-DCCH
Dedicated Control Channel

R-FCH
Fundamental Channel

R-SCHx
Supplemental Channel 1 | 2

R-SCCH
Supplemental Control Channel

Example:
BB:C2K:MST2:CHAN2:TYPE?
queries type of channel 2.
Response: R-SCCH
channel 2 is a Supplemental Control Channel.

Usage:
Query only

Manual operation:
See "Channel Type - MS" on page 83

[:SOURce<hw>:BB:C2K:MSTation<st>:CHANnel<ch>:WCODe?

The command queries the Walsh code. The standard assigns a fixed walsh code to some channels.

For the traffic channels, this value is specific for the selected radio configuration.

Return values:
<WCode>
integer
Range: 0 to 255
Increment: 1
*RST: 0

Example:
BB:C2K:MST1:CHAN3:WCOD?
queries the Walsh code of channel 3 of mobile station 1.
Response: 3
the Walsh code is 3.

Usage:
Query only

Manual operation:
See "Walsh - MS" on page 84
[:SOURce<hw>:]:BB:C2K:MSTation<st>:LCMask <LcMask>

The command sets the mask of the Long Code Generator of the mobile station.

**Parameters:**
- `<LcMask>`: integer
  - Range: #H0 to #H3FF FFFF
  - *RST:* #H0

**Example:**
`BB:C2K:MST1:LCM #H55`
sets the Long Codes to #H55.

**Manual operation:** See "LC Mask (hex) - MS" on page 80

[:SOURce<hw>:]:BB:C2K:MSTation<st>:MODE <Mode>

The command selects operating mode for the mobile station. The channel specific parameters are set with commands `SOUR:BB:C2K:MST<n>:CHANnel<n>:...n`.

**Parameters:**
- `<Mode>`: TRAFFic | ACCess | EACCess | CCONtrol

**TRAFFic**
The mobile station generates a single traffic channel. A traffic channel consists of up to 8 sub channels depending on the selected radio configuration (R-FCH, R-SCCH, R-SCH, R-DCCH). This mode corresponds to the standard mode of a mobile station during voice and data transmission.

**ACCess**
The mobile station generate an access channel (R-ACH). This channel is needed to set up the connection between the mobile station and the base station.

**EACCess**
The mobile station generates an enhanced access channel (R-ACH) and a pilot channel (R-PICH).

**CCONtrol**
The mobile station generates a common control channel (R-ACH) and a pilot channel (R-PICH).

*RST:* TRAFFic

**Example:**
`BB:C2K:MST1:MODE TRAF`
switches the mobile station into standard mode - voice and data transmission.

**Manual operation:** See "Operating Mode - MS" on page 79

[:SOURce<hw>:]:BB:C2K:MSTation<st>:RCONfiguration <RConfiguration>

The command selects the radio configuration for the traffic channel.

The settings of the channel table parameters are specific for the selected radio configuration.
A separate set of settings of all channel table parameters for each radio configuration is provided. If the radio configuration is changed, the set of channel table values belonging to this RC is automatically activated.

**Parameters:**

<RCconfiguration> 1 | 2 | 3 | 4

*RST: 3

**Example:**

BB:C2K:MST2:MODE TRAF
switches mobile station 2 into standard mode - voice and data transmission.
BB:C2K:MST2:RCON 3
selects radio configuration 3. With RC3, the traffic channel includes five sub channels.

**Manual operation:** See "Radio Configuration - MS" on page 79

---

`[:SOURce<hw>:]BB:C2K:MSTation<st>:STATe <State>`

The command activates and deactivates the specified mobile station.

**Parameters:**

<State> 0 | 1 | OFF | ON

*RST: OFF

**Example:**

BB:C2K:MST2:STAT OFF
deactivates mobile station 2.

**Manual operation:** See "Base Station or Mobile Station On" on page 30

---

`[:SOURce<hw>:]BB:C2K:MSTation<st>:TPC:DATA <Data>`

The command sets the data source for the power control bits of the traffic channels.

**Parameters:**

<Data> ZERO | ONE | PATtern | DLISt

**DLISt**

A data list is used. The data list is selected with the command


**ZERO | ONE**

Internal 0 and 1 data is used.

**PATtern**

Internal data is used. The bit pattern for the data is defined by the command

`[:SOURce<hw>:]BB:C2K:MSTation<st>:TPC:DATA:PATtern`. The maximum length is 64 bits.

*RST: ZERO
Remote-Control Commands

**Example:**

```
BB:C2K:MST2:TPC:DATA PATT
```

selects Pattern data source for the power control bits. The bit pattern is defined with the following command.

```
BB:C2K:MST2:TPC:DATA:PATT #H3F,8
```

defines the bit pattern.

**Manual operation:**
See "Data List Management " on page 24

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA:DSELect <DSelect>
```

The command selects the data list for the DL/Ist data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command MMEMory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

**Parameters:**

- `<DSelect>`
  - `<data list name>`

**Example:**

```
BB:C2K:MST2:TPC:DATA DLIS
```

selects the DL/Ist data source.

```
MMEM:CDIR "<root>Lists"
```

selects the directory for the data lists.

```
```

'selects the file "cdma_ch4" as the data source. This file must be in specified directory and it must have the file extension *.dm_iqd.

**Manual operation:**
See "Data List Management " on page 24

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:DATA:PATTern <Pattern>
```

The command determines the bit pattern for the PATTern selection. The maximum bit pattern length is 64 bits.

**Parameters:**

- `<Pattern>`
  - 64 bit pattern

**Example:**

```
BB:C2K:MST2:TPC:DATA:PATT #H0,1
```

*RST:* #H0,1
defines the bit pattern for the power control-bits.

**Manual operation:**
See "Data Source (Power Control) - MS" on page 81

```
[:SOURce<hw>]:BB:C2K:MSTation<st>:TPC:MISuse <MisUse>
```

The command activates/deactives the use of the power control data for controlling the mobile station output power. On the uplink, the power control bits are used exclusively for controlling the mobile station output power. Power control puncturing is not defined for controlling the base station power.
The bit pattern (see commands \( \text{:BB:C2K:MSTation<n>:TPC} \)) of the power control bits \( w \) is used to control the channel power. A "1" leads to an increase of channel powers, a "0" to a reduction of channel powers. Channel power is limited to the range 0 dB to -80 dB. The step width of the change is defined with the command \( \text{[:SOURce<hw>]}: \text{BB:C2K:MSTation<st>:TPC:PS\text{Step}} \).

**Parameters:**

\[
<\text{MisUse}> \quad 0 \mid 1 \mid \text{OFF} \mid \text{ON}  \\ *\text{RST}: \quad \text{OFF}
\]

**Example:**

\( \text{BB:C2K:MST2:TPC:MIS \text{ ON}} \)
activates regulation of channel power for mobile station 2 via the power control bit pattern.

\( \text{BB:C2K:MST2:TPC:PST \ 1 \ dB} \)
sets the step width for the change of channel powers to 1 dB.

**Manual operation:** See "Misuse for Output Power Control - MS" on page 81

\( \text{[:SOURce<hw>]}: \text{BB:C2K:MSTation<st>:TPC:PS\text{Step} <PStep}> \)

The command defines the step width for the change of channel powers in the case of "mis-" use of the power control bits.

**Parameters:**

\[
<P\text{Step}> \quad \text{float}  \\ \text{Range}: \quad -10 \ \text{to} \ 10 \ \text{dB}  \\ \text{Increment}: \quad 0.01 \ \text{dB}  \\ *\text{RST}: \quad 0 \ \text{dB}
\]

**Example:**

\( \text{BB:C2K:MST2:TPC:PST \ 0.1 \ dB} \)
sets the step width for the change of channel powers to 1 dB.

**Manual operation:** See "Power Step - MS" on page 82

\( \text{[:SOURce<hw>]}: \text{BB:C2K:MSTation<st>:TPC:READ <Read}> \)

The command sets the read out mode for the bit pattern of the power control bits. The bit pattern is defined with the commands \( \text{:BB:C2K:MST<n>:TPC} \).
Remote-Control Commands

Parameters:
<Read> CONTinuous | S0A | S1A | S01A | S10A

CONTinuous
The bit pattern is used cyclically.

S0A
The bit pattern is used once, then the power control bit sequence continues with 0 bits.

S1A
The bit pattern is used once, then the power control bit sequence continues with 1 bits.

S01A
The bit pattern is used once and then the power control bit sequence is continued with 0 and 1 bits alternately.

S10A
The bit pattern is used once and then the power control bit sequence is continued with 1 and 0 bits alternately.

*RST: CONTinuous

Example:
BB:C2K:MST2:TFC:READ S0A
the bit pattern is used once, after which a 0 sequence is generated (applies to R-DCCCH of mobile station 2).

Manual operation: See "Read Out Mode (Power Control) - MS" on page 81
List of Commands

[:SOURce]:BB:C2K:VERSion?................................................................. 95
[:SOURce<hw>]:BB:C2K:BSTation:PRESet.............................................. 122
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:CNUMBER.................................. 122
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:LCSTate.................................. 122
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:MPRev.................................. 123
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:NID........................................ 123
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:PREV...................................... 123
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:SID........................................ 124
[:SOURce<hw>]:BB:C2K:BSTation:SYNC:STIme..................................... 124
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:BITFrame?......... 125
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CRC?............. 126
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:DATA:RATE?......... 126
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:MODE.................. 127
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:TPC:READ ............ 139
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:TYPE ....... 128
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:MODE ...... 127
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:DATA ................ 126
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:TPC:READ ............ 139
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:CCODing:TYPE ....... 128
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:MODE ...... 127
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:DATA ................ 126
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:TPC:READ ............ 139
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:CCODing:MODE ...... 127
[:SOURce<hw>]:BB:C2K:BSTation<st>:CGroup<di0>:COFFset<ch>:CCODing:CCODing:CCODing:DATA ... ...

Activity
List of Commands

[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:\text{STATE}\]]......................150
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:PDCHannel:SUBPacket<di>:\text{WCODe}\?\]]................151
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:PDCHannel:WINDEX\]]..............................................151
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:PNOFFset\]].................................................................152
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:QWSet\]]....................................................................152
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:\text{STATE}\]].................................................................152
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:TDELay\]].....................................................................153
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:TDIVersity\]].................................................................153
[\[:\text{SOURce<hw>}:BB:C2K:BSTation<st>:TDIVersity:MODE\]].........................................................153
[\[:\text{SOURce<hw>}:BB:C2K:CLIPping:LEVelo\]]..........................................................................100
[\[:\text{SOURce<hw>}:BB:C2K:CLIPping:MODE\]].............................................................................100
[\[:\text{SOURce<hw>}:BB:C2K:CLIPping:STATe\]]............................................................................101
[\[:\text{SOURce<hw>}:BB:C2K:CLKock:MODE\]]..............................................................................112
[\[:\text{SOURce<hw>}:BB:C2K:CLKock:MULTIPLIER\]].....................................................................112
[\[:\text{SOURce<hw>}:BB:C2K:CLKock:SOURCE\]]...........................................................................112
[\[:\text{SOURce<hw>}:BB:C2K:CLKock:SYNChronization:EXECute\]].............................................113
[\[:\text{SOURce<hw>}:BB:C2K:CLKock:SYNChronization:MODE\]].................................................113
[\[:\text{SOURce<hw>}:BB:C2K:COPY:COFFset\]]...............................................................................88
[\[:\text{SOURce<hw>}:BB:C2K:COPY:DESTination\]].............................................................................89
[\[:\text{SOURce<hw>}:BB:C2K:COPY:EXECute\]].............................................................................89
[\[:\text{SOURce<hw>}:BB:C2K:COPY:SOURce\]]...............................................................................90
[\[:\text{SOURce<hw>}:BB:C2K:CRAte:VARIation\]].........................................................................90
[\[:\text{SOURce<hw>}:BB:C2K:CRATe?\]].......................................................................................90
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:ILENgth\]]..............................................................................96
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:ILENgth:AUTO\]]..................................................................96
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:OSAMpling\]].........................................................................97
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:OSAMpling:AUTO\]].................................................................97
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:APCO25\]].........................................................97
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:COSin\]].............................................................97
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:GAUSS\]]............................................................98
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:LPASs\]]..............................................................98
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:LPASSEVM\]].......................................................98
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:PARameter:SPHase\]]............................................................99
[\[:\text{SOURce<hw>}:BB:C2K:FILTER:TYPE\]]...............................................................................96
[\[:\text{SOURce<hw>}:BB:C2K:IQSSwaP:STATe\]]............................................................................91
[\[:\text{SOURce<hw>}:BB:C2K:LINK\]]............................................................................................91
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:ADDitional:COUN\]].........................................................155
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:ADDitional:LCMask:STEP\]].........................................155
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:ADDitional:POWer:OFFset\]]............................................156
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:ADDitional:STATe\]].........................................................156
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:ADDitional:TDELay:STEP\]].............................................156
[\[:\text{SOURce<hw>}:BB:C2K:MSTation:PRESet\]]..........................................................................157
[\[:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CCODing:MODE\]]......................................................157
[\[:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>:DATA\]]..................................................157
[\[:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:DSELeCT\]].............................158
[\[:\text{SOURce<hw>}:BB:C2K:MSTation<st>:CHANnel<ch>:DATA:PATTern\]].............................159
### List of Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:DATA:RATE</td>
<td>...</td>
<td>159</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:FLENght</td>
<td>...</td>
<td>160</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:POWer</td>
<td>...</td>
<td>160</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:SPReading?</td>
<td>...</td>
<td>160</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:STATE</td>
<td>...</td>
<td>161</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:TYPE?</td>
<td>...</td>
<td>161</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:CHANnel&lt;ch&gt;:WCODE?</td>
<td>...</td>
<td>162</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:LCMask</td>
<td>...</td>
<td>163</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:MODE</td>
<td>...</td>
<td>163</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:RCONfiguration</td>
<td>...</td>
<td>163</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:STATE</td>
<td>...</td>
<td>164</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:DATA</td>
<td>...</td>
<td>164</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:DATA:SELect</td>
<td>...</td>
<td>165</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:PATTern</td>
<td>...</td>
<td>165</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:MISeuse</td>
<td>...</td>
<td>165</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:PSSTEP</td>
<td>...</td>
<td>166</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:MSTation&lt;st&gt;:TPC:READ</td>
<td>...</td>
<td>166</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:POWer&lt;st&gt;:ADJust</td>
<td>...</td>
<td>91</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:POWer&lt;TOTa</td>
<td>?</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:CREST</td>
<td>...</td>
<td>115</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:EXECute</td>
<td>...</td>
<td>115</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:PC</td>
<td>Hannel&lt;st&gt;:STATE</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:PC</td>
<td>Hannel&lt;st&gt;:STATE</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:RCONF</td>
<td>iguration</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:SC</td>
<td>Hannel&lt;st&gt;:STATE</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:TCHannel:COUNT</td>
<td>...</td>
<td>117</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:TCHannel:DATA:RATE</td>
<td>...</td>
<td>117</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:TCHannel:DCCHannel&lt;st&gt;:STATE</td>
<td>...</td>
<td>118</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:TCHannel:FCHannel&lt;st&gt;:STATE</td>
<td>...</td>
<td>118</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:Tchannel:FLEN</td>
<td>ght</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PPARameter:TChannel:COUNT</td>
<td>...</td>
<td>119</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:PRESet</td>
<td>...</td>
<td>92</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SETting:CATalog?</td>
<td>...</td>
<td>92</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SETting:DELeete</td>
<td>...</td>
<td>93</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SETting:LOAD</td>
<td>...</td>
<td>93</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SETting:STORE</td>
<td>...</td>
<td>93</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SETting:STORE:FAST</td>
<td>...</td>
<td>94</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:SLEN</td>
<td>ght</td>
<td>...</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:STATe</td>
<td>...</td>
<td>94</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:ARM:EXECute</td>
<td>...</td>
<td>102</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:EXECute</td>
<td>...</td>
<td>103</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:EXternal:SYNChronize:OUTPut</td>
<td>...</td>
<td>103</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OBASeband:DELay</td>
<td>...</td>
<td>104</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OBASeband:INHibit</td>
<td>...</td>
<td>104</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OUTPut:DELay:FIXed</td>
<td>...</td>
<td>108</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OUTPut&lt;ch&gt;:DELay</td>
<td>...</td>
<td>108</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OUTPut&lt;ch&gt;:MODE</td>
<td>...</td>
<td>109</td>
</tr>
<tr>
<td>[:SOURce&lt;hw&gt;]:BB:C2K:TRIGger:OUTPut&lt;ch&gt;:OFFTime</td>
<td>...</td>
<td>110</td>
</tr>
</tbody>
</table>
List of Commands

CDMA2000® incl. 1xEV-DV

[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:ONTime.................................110
[:SOURce<hw>]:BB:C2K:TRIGger:OUTPut<ch>:PERiod......................................111
[:SOURce<hw>]:BB:C2K:TRIGger:RMODe?..................................................105
[:SOURce<hw>]:BB:C2K:TRIGger:SLENgth..................................................105
[:SOURce<hw>]:BB:C2K:TRIGger:SLUNit...................................................106
[:SOURce<hw>]:BB:C2K:TRIGger:SOURce..................................................106
[:SOURce<hw>]:BB:C2K:TRIGger[:EXTernal<ch>]:DELay...............................107
[:SOURce<hw>]:BB:C2K:TRIGger[:EXTernal<ch>]:INHibit..............................107
[:SOURce<hw>]:BB:C2K:WAVEform:CREate...............................................95
[:SOURce<hw>]:BB:C2K[:TRIGger]:SEQuence...........................................101
Index

Symbols

(Mis-) use for output power control - BS ............. 87, 138
(Mis-) use for output power control - MS .......... 81, 165

A

Accept - Copy ......................................................... 29, 89
Accept - Predefined Settings ............................... 49, 115
Access - MS ................................................................. 79, 163
Additional MS .......................................................... 49, 156
Adjust Total Power to 0 dB ................................. 29, 91
Arm .......................................................... 39
Arm Trigger .......................................................... 102
Armed_Auto .......................................................... 101
Armed_Retrigger ................................................... 101
Auto ........................................................................ 101

B

B x T ........................................................................ 31, 97
Base station default values .................................. 27, 122
Baseband Clipping ................................................ 33
Baseband filter ...................................................... 31, 96
Bit Error Insertion - BS1 ........................................ 72, 132
Bit Error Rate - BS1 ................................................ 72, 131
Bit reversed .......................................................... 55, 143
Block Error Insertion - BS1 .................................... 72, 133
Block Error Rate - BS1 ........................................... 73, 132
Block Interleaver - BS ............................................ 70, 125

C

CDMA Channel Number - BS ............................... 70, 122
CDMA Version .......................................................... 95
Channel Coding ...................................................... 9
Channel Coding Mode - BS .................................. 68, 127
Channel Coding Mode - MS ................................. 80, 157
Channel Graph - BS ............................................... 56
Channel Number - BS ............................................ 58
Channel Number- MS ............................................. 83
Channel Power - BS ............................................... 62, 134
Channel Power - MS .............................................. 85, 160
Channel State - BS ................................................ 63, 135
Channel State - MS ............................................... 86, 161
Channel Type - BS ................................................ 58, 140
Channel Type - MS ............................................... 83, 161
Channel types ......................................................... 9
Chip Rate Variation ............................................... 32, 90
Clipping Level ....................................................... 35, 100
Clipping Mode ...................................................... 35, 100
Clipping State ....................................................... 33
Clock Mode .......................................................... 45
Clock Multiplier .................................................... 45
Clock Source ........................................................ 44
Code Domain ........................................................ 53
Code Domain Conflict - BS ................................. 53, 144
Code Domain Graph - BS ..................................... 53
Coder Type - BS ................................................... 69, 128
Common Control - MS ........................................ 79, 163
Conventions
  SCPI commands ................................................... 87
  Convolution Coder - BS ....................................... 69, 128
  Copy Base Station ............................................... 29, 89

Copy from Source ...................................................... 29, 90
Copy Mobile Station ............................................... 29, 89
CRC Length - BS .................................................... 69, 126
Crest factor ............................................................ 33
Crest factor - Clipping ............................................ 100
Crest Factor, desired range .................................. 48, 115
Current Dynamic Range ....................................... 109
Current Range without Recalculation .................. 43
Cut Off Frequency Factor ....................................... 32

D

Data - BS ............................................................... 129
Data - MS ............................................................... 157
Data pattern .......................................................... 62
MS ......................................................................... 85
Data Rate - BS ....................................................... 61, 131
Data Rate - MS ....................................................... 84, 159
Data Rate - Predefined Settings .......................... 48, 117
Data source
  BS .......................................................................... 62
  MS .......................................................................... 85
  Power control ...................................................... 81
  Power Control ...................................................... 66
Data Source Power Control - BS ......................... 136
Data Source Power Control - MS ......................... 164
Default settings .................................................... 22, 27, 92, 122
Default values MS ................................................ 28, 157
Delay - Marker ...................................................... 108
Delay - Trigger ...................................................... 107
Diversity Mode- BS ................................................ 28, 153
Do Conf - BS ......................................................... 63, 144
Documentation Overview ..................................... 7
Downlink ............................................................. 26

E

Effective Data Rate - BS ........................................... 69, 126
Enhanced Access - MS ........................................... 79, 163
Error Protection - BS ............................................. 69, 128
Execute Trigger .................................................... 103
External Trigger Delay ........................................... 107
External Trigger Inhibit ......................................... 107

F

Filter Parameter ...................................................... 31, 97
Filter Type ........................................................... 31, 96
Filtering, Clipping, ARB Settings ........................ 26, 31
Fix marker to dynamic range ................................. 43
Frame Length - BS .................................................. 61, 133
Frame Length - MS .................................................. 84, 160
Frame Length - Predefined Settings ..................... 48, 118

G

Generate Waveform File - CDMA2000 ...................... 25
Global Trigger/Clock Settings ............................... 45

H

Hadamard ............................................................ 55, 143
Index

P
Packet Interval - BS .................................................. 74, 144
Packet Setup - BS .................................................. 75, 144
Pattern - BS .......................................................... 129
Pattern - MS .......................................................... 157, 159
PN Offset .............................................................. 9
PN Offset - BS ..................................................... 52, 152
Power Offset - Additional MS ................................. 50, 156
Power Step - BS ................................................... 88, 138
Power Step - MS ................................................... 82, 166
Power/dB - BS ...................................................... 82, 134
Power/dB - MS ...................................................... 85, 160
Protocol Revision Level - BS ................................. 71, 123

Q
Quasi Orthogonal Walsh Set ........................................ 9
Quasi Orthogonal Walsh Set - BS ............................. 52, 152
Quasi Orthogonal Walsh Set State - BS .................... 62, 135

R
Radio configuration .................................................. 47
Radio Configuration - BS ......................................... 60
Radio Configuration - MS ......................................... 79, 163
Read Out Mode - BS ............................................. 66, 139
Read Out Mode - MS ............................................. 81, 166
Real Time - BS ...................................................... 60, 135
Reset All Base Stations ........................................... 27, 122
Reset All Mobile Stations ........................................ 28, 157
Resulting Walsh Code for Subpacket - BS .................. 78, 151
Retrigger ............................................................. 101
Roll Off ............................................................... 31, 97
Running ............................................................... 39
Running - Trigger .................................................. 105

S
Same Packet Setup - BS .......................................... 75, 144
Save CDMA settings ............................................... 23
Save-Recall .......................................................... 23
Select Base Station ............................................... 30
Select Mobile Station ............................................ 30
Sequence Length (ARB) .......................................... 36, 94
Set Synchronization Settings ................................... 44, 113
Set to default ......................................................... 22, 92
Signal Duration .................................................... 39
Signal Duration - Trigger ......................................... 105
Signal Duration Unit ............................................... 39
Signal Duration Unit - Trigger .................................. 106
Source Bits / Frame - BS ........................................ 69, 125
Spread - MS ........................................................ 85, 160
Spreading Code Number - BS ................................ 61, 142
Spreading Rate ...................................................... 9, 25, 90
Standard settings .................................................. 22, 92
State ................................................................. 94
Clipping .............................................................. 101
State - BS .......................................................... 152
State - MS .......................................................... 79, 164
Stopped ............................................................... 39
Subpacket # ........................................................ 75
Subpacket Data Rate - BS ....................................... 76
Subpacket State - BS ............................................. 75, 150
Symbol Puncture - BS .......................................... 70, 127
Symbol Repetition - BS ........................................ 70, 128
Sync. Output to External Trigger ............................... 40
Synchronization mode ........................................... 94
Synchronization Mode ............................................ 113
System Identification - BS ....................................... 71, 124
System Time - BS ............................................... 71, 124

T
Time Delay - BS .................................................. 52, 153
Time Delay Step - Additional MS ............................. 50, 156
Time Slot Offset - BS ........................................... 76, 151
To Destination ..................................................... 29, 89
<table>
<thead>
<tr>
<th>Index CDMA2000® incl. 1xEV-DV</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Power</td>
<td>30, 92</td>
</tr>
<tr>
<td>Traffic - MS</td>
<td>79, 163</td>
</tr>
<tr>
<td>Transmission direction</td>
<td>26, 91</td>
</tr>
<tr>
<td>Transmit Diversity - BS</td>
<td>51, 153</td>
</tr>
<tr>
<td>Transmit Diversity Mode - BS</td>
<td>52, 153</td>
</tr>
<tr>
<td>Trigger - Marker</td>
<td>26</td>
</tr>
<tr>
<td>Trigger Delay</td>
<td>41</td>
</tr>
<tr>
<td>Trigger Delay External</td>
<td>107</td>
</tr>
<tr>
<td>Trigger Delay Other Baseband</td>
<td>104</td>
</tr>
<tr>
<td>Trigger Inhibit</td>
<td>41</td>
</tr>
<tr>
<td>Trigger Inhibit External</td>
<td>107</td>
</tr>
<tr>
<td>Trigger Inhibit Other Baseband</td>
<td>104</td>
</tr>
<tr>
<td>Trigger Mode</td>
<td>38, 101</td>
</tr>
<tr>
<td>Armed</td>
<td>38</td>
</tr>
<tr>
<td>Auto</td>
<td>38</td>
</tr>
<tr>
<td>Retrigger</td>
<td>38</td>
</tr>
<tr>
<td>Single</td>
<td>38</td>
</tr>
<tr>
<td>Trigger Source</td>
<td>39</td>
</tr>
<tr>
<td>Turbo Coder - BS</td>
<td>69, 128</td>
</tr>
</tbody>
</table>

**U**

- Uplink | 26 |
- Use Dedicated Control (F-DCCH) - Predef | 47, 118 |
- Use Fundamental (F-FCH) - Predef | 48, 118 |
- Use Paging Channel (F-PCH) - Predef | 47, 115 |
- Use Pilot (F-Pich) - Predef | 47, 116 |
- Use Sync (F-Sync) - Predef | 47, 116 |
- User Marker / AUX I/O Settings | 46 |
- User Period | 42, 111 |

**V**

- Version | 25, 95 |

**W**

- Walsh - MS | 84, 162 |
- Walsh Code - BS | 61, 142 |
- Walsh Code Column Index - BS | 75, 151 |
- Walsh Code Offset | 29, 88 |
- Walsh Length - BS | 65, 142 |