

5003 -> 7001 -> 1019 -> 4004 (tx)
3004 -> 1418 -> 7001 -> 5003 (rx)

Objective:

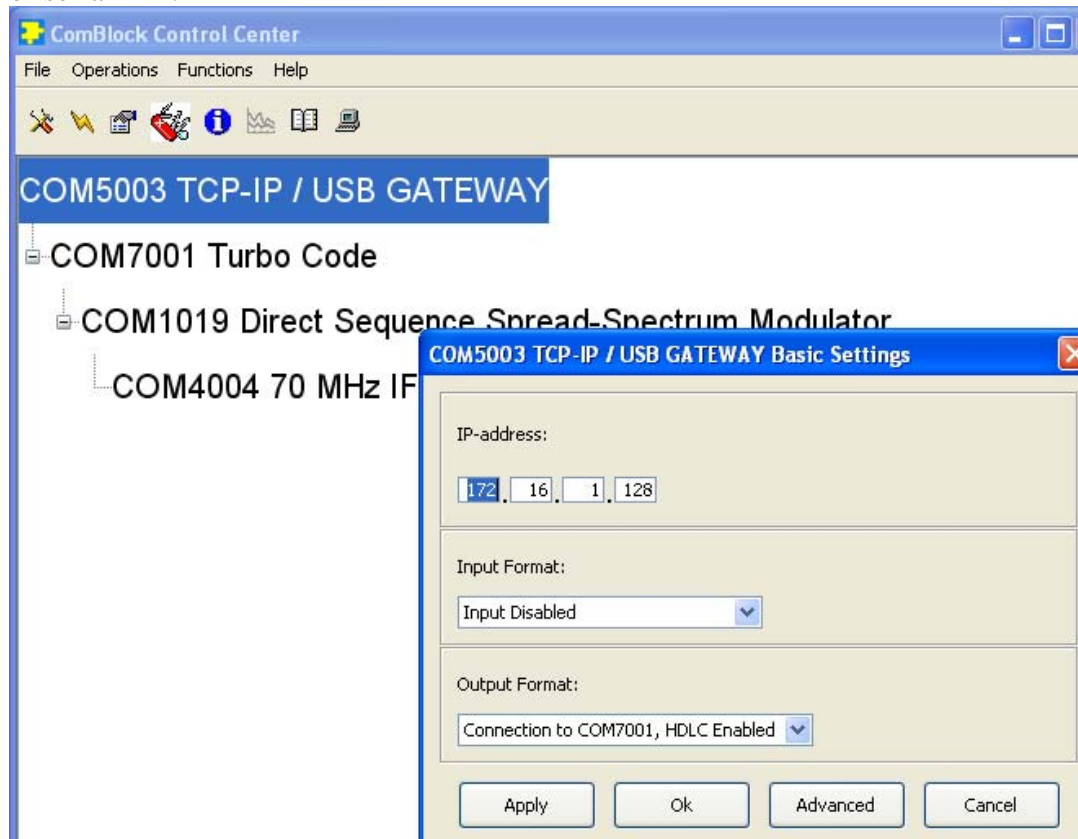
Transmit data from end to end over direct-sequence spread-spectrum modems.

Configuration:

- 70 MHz center frequency
- 19.9 Mc/s DSSS modulation, QPSK
- Barker code length 13
- 3.06 Mbits/s
- rate 0.66 2-D turbo product code
- HDLC enabled for asynchronous to synchronous conversion
- IP addresses 172.16.1.128 (tx) and 172.16.1.129 (rx). Port 1024 for data.
- 20 to 40 dB attenuator between the transmitter and receiver.

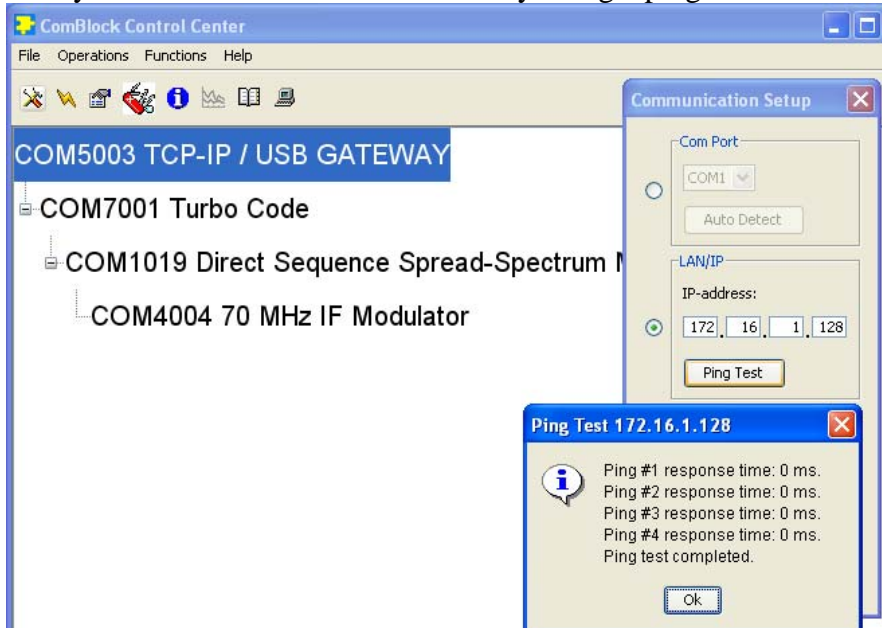
The first configuration step is to select two unique IP addresses consistent with the host PC address. For example, if the host PC address is a.b.c.d, the selected addresses for the COM-5003 should be in the form a.b.c.e and a.b.c.f, where e and f are unique on the LAN network.

Then, using the ComBlock control center, configure the selected IP addresses over USB or serial link.

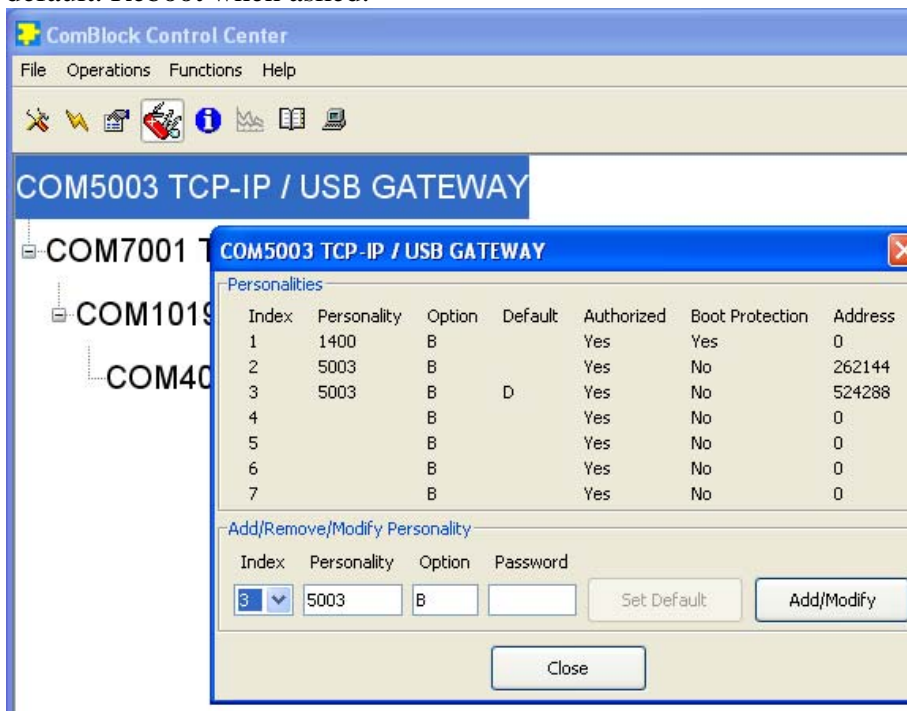


Recycle power.

Verify that the IP address is reachable by doing a ping



Once ping is successful, we can switch the COM-5003 firmware from COM-5003-A (USB high-speed data transfer) to COM-5003-B (TCP-IP high-speed data transfer). To do so, please click on the swiss army knife button and select personality index 3 as default. Reboot when asked.



This process is repeated for the other COM-5003.

Once the communication links are configured, it is time to configure the other ComBlocks. The easiest way is to import the prepared settings (in the ComBlock CD “Basic Settings” folder). From the ComBlock Control Center, go to the File | Import menu and import 5003_7001_1019_4004_3004_1418_7001_5003_tx.stn into the transmitter section 5003_7001_1019_4004_3004_1418_7001_5003_rx.stn into the receiver section

Alternatively, the configuration can be entered manually as illustrated below.

Transmitter configuration:

COM5003 TCP-IP / USB GATEWAY Basic Settings	COM7001 Turbo Code Settings																																
<p>IP-address:</p> <p>172 . 16 . 1 . 128</p> <p>Input Format:</p> <p>Input Disabled</p> <p>Output Format:</p> <p>Connection to COM7001, HDLC Enabled</p> <p>Apply Ok Advanced Cancel</p>	<p>Registers</p> <p>All register values in HEX</p> <table><tr><td>Reg 0</td><td>82</td><td>Reg 4</td><td>2A</td><td>Reg 8</td><td>00</td><td>Reg 12</td><td>00</td></tr><tr><td>Reg 1</td><td>02</td><td>Reg 5</td><td>00</td><td>Reg 9</td><td>00</td><td></td><td></td></tr><tr><td>Reg 2</td><td>55</td><td>Reg 6</td><td>00</td><td>Reg 10</td><td>00</td><td></td><td></td></tr><tr><td>Reg 3</td><td>40</td><td>Reg 7</td><td>40</td><td>Reg 11</td><td>00</td><td></td><td></td></tr></table> <p>Configuration</p> <p>Configuration option currently loaded: A, rev M</p> <p>Apply Ok Cancel</p>	Reg 0	82	Reg 4	2A	Reg 8	00	Reg 12	00	Reg 1	02	Reg 5	00	Reg 9	00			Reg 2	55	Reg 6	00	Reg 10	00			Reg 3	40	Reg 7	40	Reg 11	00		
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Reg 3	40	Reg 7	40	Reg 11	00																												

COM1019 Direct Sequence Spread-Spectrum Modulator 20 Mchip/s Basic Settings	
Chip rate:	19899997.711 chips/s
Spreading factor:	13
Code Type:	Barker code
Polynomial G1:	00008E Hex
Polynomial G2:	00008E Hex
GPS satellite ID:	14
Offset carrier frequency:	0 Hz
Signal amplitude:	255 range 0-255
Noise amplitude:	0 range 0-255
<input type="checkbox"/> Tx spectrum inversion <input checked="" type="checkbox"/> Output interpolation <input checked="" type="checkbox"/> Spectrum shaping filter (rrc) <input checked="" type="checkbox"/> Enable spectrum spreading	
Modulation:	QPSK
Test Modes:	Test mode disabled
Output:	to COM-4004, format: 2's complement
<div>Apply Ok Advan... Cancel</div>	

COM4004 70 MHz IF Modulator Basic Settings	
IF Center Frequency:	69999998 Hz
Gain Control:	180
<input type="checkbox"/> 10 MHz External Frequency Reference	
<input type="checkbox"/> Unmodulated Test Mode	
<input checked="" type="checkbox"/> Output On	
<div>Apply Ok Advan... Cancel</div>	

Receiver configuration:

COM5003 TCP-IP / USB GATEWAY Basic Settings

IP-address:
172 . 16 . 1 . 129

Input Format:
1-bit wide from J5, HDLC Enabled

Output Format:
Output Disabled

Apply Ok Advanced Cancel

COM7001 Turbo Code Settings

Registers

All register values in HEX

Reg 0	04	Reg 4	2A	Reg 8	06	Reg 12	00
Reg 1	05	Reg 5	55	Reg 9	00		
Reg 2	55	Reg 6	00	Reg 10	00		
Reg 3	40	Reg 7	40	Reg 11	00		

Configuration

Configuration option currently loaded: A, rev M

Apply Ok Cancel

COM1418 Direct Sequence Spread-Spectrum D...

Chip rate: 19900000

Spreading factor: 13

Code Type: Barker code

Polynomial G1: 000000 Hex

Polynomial G2: 000000 Hex

GPS satellite ID: 0

Nominal center frequency: 0 Hz

☒ Spectrum inversion

AFC enable: Automatic AFC selection

Symbol decoding: QPSK

Code sweep period: 16

☒ Software reset

Output: J8 connector I/Q serialized

Apply Ok Advan... Cancel

COM3004 IF receiver [20 - 90 MHz] Basic Settings

Frequency Selection: 0

Frequency 0: 69999999 Hz

Frequency 1: 0 Hz

Frequency 2: 0 Hz

Frequency 3: 0 Hz

Frequency 4: 0 Hz

Frequency 5: 0 Hz

Frequency 6: 0 Hz

Frequency 7: 0 Hz

☐ 10 MHz External Frequency Reference

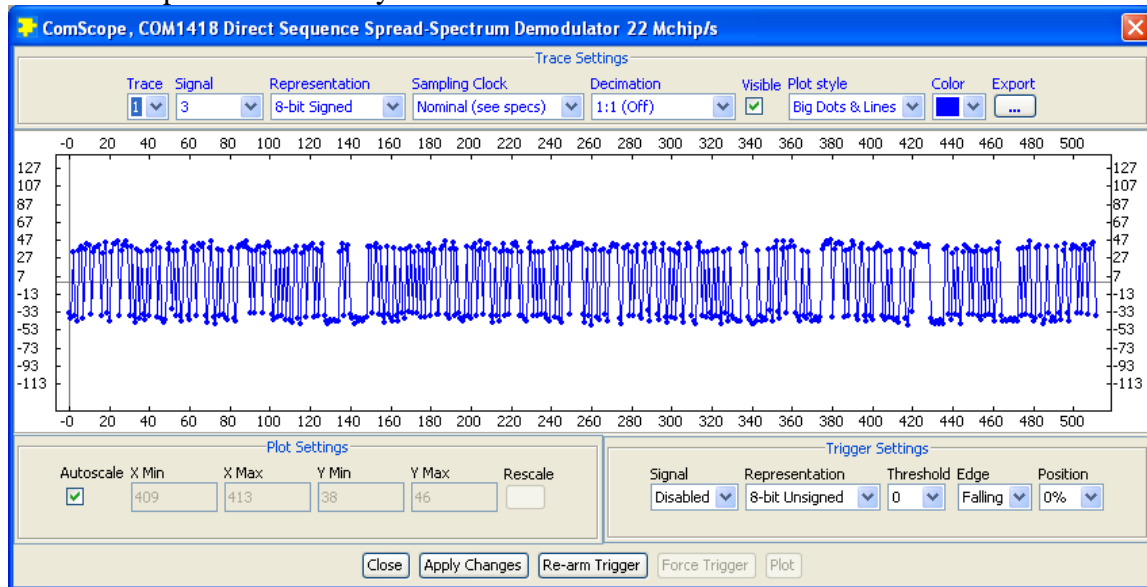
☐ External Trigger

Number of Frequency Hopping Steps: 3

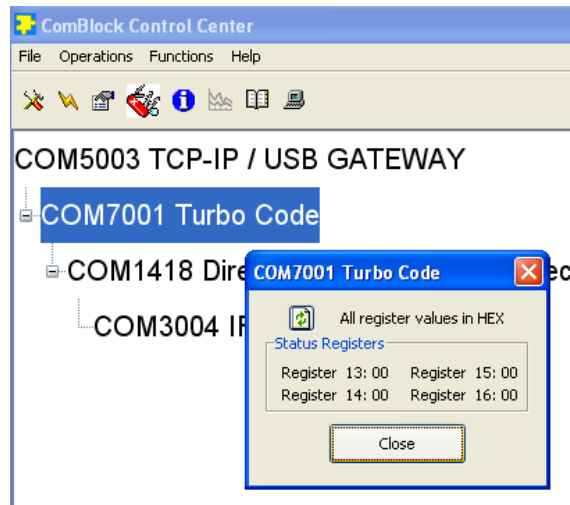
Apply Ok Advan... Cancel

Verification

- Verify that the COM-1418 demodulator is locked (status register SREG5 = 03 to indicate code and carrier lock).
- verify that the received waveform is correct. Using ComScope at the COM-1418 demodulator, one can visualize the spread-spectrum-modulated received waveform at baseband. The dots (demodulated values) should ideally form two perfect lines. Any deviation is due to noise.



- Verify that there are no bit errors in the turbo code header. The number of bit errors detected in a 1024 header bits window is shown in the rx COM-7001 status registers 13/14.



At this point, we are ready to send user text from one side to the other. Start two hyperterminal windows (for more details on how to configure hyperterminals, see the 5003_5003.pdf document in the “Basic Settings” folder).

The connection addresses are a.b.c.e and a.b.c.f (user selected at the start), port 1024.

The hyperterminal windows should show “connected” in the lower left corner.

Text entered on the hyperterminal tx panel should be visible on the hyperterminal rx panel as illustrated below.

