1. Introduction

The CC2430 is the first single chip IEEE 802.15.4 compliant and ZigBee™ SoC (System on Chip) RF Transceiver with integrated 8051 microcontroller and memory flash. Method of the flash programming in production is discussed in this application note.

This application note describes flash programming of the CC2430 using the GangPro-CC programmer from Elprotronic. A single GangPro-CC programmer can simultaneously program and automatically assign an IEEE address for up to six target devices. When more than six target devices should be programmed simultaneously, then more GangPro-CC programmers can be used and controlled via the Multi-FPA API-DLL. Up to eight programmers can be controlled from external software written in MS Visual C++, Borland C++, MS Visual Basic, LabVIEW etc. which allow simultaneous programming of up to 48 target devices. Effectively, this method allows for programming of whole PCB panel before depanelization and speeds-up the programming process.

A target device can be used by any board with CCxx SoC that has access to the SoC 2-wire debug interface (Debug Clock (DC), Debug Data (DD) and Reset line). In this application note the CC2430 ZigBee Development Kit as a target device (Battery Board SOC_BB 1.1 and CC2430EM 1.2) has been used as an example. This development kit is described in detail in TI’s application note SWRU073B “CC2430ZDK and CC2431ZDK ZigBee Development Kit Pro”. The GangPro-CC is described in Elprotronic’s manuals PM025A01 “GangPro-CC Programmer User’s Guide” and PM025A02 “GangPro-CC API-DLL User’s Guide” available on http://www.elprotronic.com/download.html
The GangPro-CC programmer package consists of a microcontroller based adapter (Figure 1-1), Windows™ based software, a Gang Splitter to connect up to 6 devices to the adapter, and a cable to connect the adapter with the computer’s USB port. The internal firmware software allows for communication with the programmed device at a high speed. The effective programming speed (write only) is around 20 kbytes/s simultaneously for up to six target devices which is equivalent to 120 kbytes/s programming speed per one programmed target device. For example, six devices with 128 kB Flash, such as CC2430F128, can be programmed in 12 seconds. This time includes initialization, erasing memory, blank checking, programming and fast verification.

To simplify the production process the programming software package can assign IEEE address, serial number, model type, and revision. Each IEEE address and serial number are unique for each programmed device and are assigned automatically. Several serial number formats are available.

There are a number of erase/write options available as well. This allows to erase/write all flash memory, or just the specified fragment of memory. This feature is very useful when only part of programmed data/code should be replaced. For example one can download the serial number, calibration data or personality data without erasing existing program code.
2. Hardware connection

TI’s development board (Figure 2-1) uses a 10 pin connector (Figure 2-2) for communication with the CCxx devices, which allows to program target device via “SoC debug” interface (via connector P5 - SoC debug/flash on the SOC_BB board).

From all available pins only 5 pins (pin numbers 1, 2, 3, 4, 7 - respectively GND, Vdd, DC, DD, RST) should be used for communication with the MCU via SoC debug interface (Table 2.1). All other pins are used for other applications.

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Vdd / Sense</td>
<td>Vdd used to set correct voltage for the voltage level connector and can be used to supply target device.</td>
</tr>
<tr>
<td>3</td>
<td>DC</td>
<td>Debug Clock</td>
</tr>
<tr>
<td>4</td>
<td>DD</td>
<td>Debug Data</td>
</tr>
<tr>
<td>5</td>
<td>do not use</td>
<td>do not use</td>
</tr>
<tr>
<td>6</td>
<td>do not use</td>
<td>do not use</td>
</tr>
<tr>
<td>7</td>
<td>RST</td>
<td>RESET - Active LOW</td>
</tr>
<tr>
<td>8</td>
<td>do not use</td>
<td>do not use</td>
</tr>
<tr>
<td>9</td>
<td>Vdd / alt NC</td>
<td>Deliver Vdd from external source (OPTIONAL)</td>
</tr>
</tbody>
</table>

Table 2.1 Target’s Device connector

Figure 2-1

Figure 2-2
The GangPro-CC Flash Programmers (Figure 2-3) use the 14-pin connector to facilitate connections with six target devices. Connector layout and pin descriptions are shown on Figure 2-4 and Table 2.2. When the GangPro-CC programming adapter is connected to target devices then all clock signals (DC) should be connected in parallel to target devices and all six bidirectional data lines (DD) should be connected to each target device. Remaining lines (RST, Vdd, GND) are connected to all target devices in parallel (Figure 2-5).
Table 2.2 GangPro-CC Interface connector

<table>
<thead>
<tr>
<th>Pin # (Red)</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DD-1</td>
<td>Debug Data output / Input - 1</td>
</tr>
<tr>
<td>2</td>
<td>Vdd / Sense</td>
<td>Vdd supplied to the target (2.2 to 3.6V/ max 100 mA) and the target’s Vdd voltage sense. This pin should be connected to target’s device Vdd if device is supplied from the Flash Programming Adapter. If the target’s device is supplied from its own battery or from external power supply then the pin 2 or 4 (Vdd sense) should be connected to device’s Vdd.</td>
</tr>
<tr>
<td>3</td>
<td>Busy</td>
<td>BUSY - 1 when the communication with target is active.</td>
</tr>
<tr>
<td>4</td>
<td>Sense</td>
<td>Target’s Device Vdd Sense (see pin-2 description)</td>
</tr>
<tr>
<td>5</td>
<td>do not use</td>
<td>do not use</td>
</tr>
<tr>
<td>6</td>
<td>DD-2</td>
<td>Debug Data output / Input - 2</td>
</tr>
<tr>
<td>7</td>
<td>DC</td>
<td>Debug Clock - common clock to all target devices</td>
</tr>
<tr>
<td>8</td>
<td>Vdd-En</td>
<td>Used to control external power supply. Voltage 2 to 5V -&gt; Power Supply ON</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>10</td>
<td>DD-3</td>
<td>Debug Data output / Input - 3</td>
</tr>
<tr>
<td>11</td>
<td>\RST</td>
<td>Reset output</td>
</tr>
</tbody>
</table>

Figure 2-5
To simplify connections between programming adapter and six target devices the GangPro-CC splitter can be used (Figure 2-6). Gang Splitter contains one 14-pin connector that should be connected to programming adapter, and six 10-pin connectors that should be connected to six target devices. Pinout of the six 10-pin connectors is the same as the pinout in TI’s development boards. Figure 2-7 (block diagram) and Figure 2-8 show connection that allows to program up to 48 target devices from one PC using eight GangPro-CC programmers with Gang Splitters and D-Link USB-HUB.

Figure 2-6

Figure 2-7
When a lot of target devices are programmed simultaneously in production, it is not convenient to connect all cables from programming adapters to each target device separately. It is recommended to prepare test bench with nails, that allows to connect all boards from the panel (before depanelization) to GangPro-CC directly or via GangPro Splitters (Figure 2-8). Target device boards should be specially designed for it and should contain test points that can be connected via nails to programmer. When all boards are programmed (and eventually partially tested) then all boards can be depanelized.
During the programming process target devices can be supplied directly from programming adapters or from external power supply. When target devices are supplied from programming adapters then voltage level can be programmable from 2.2V to 3.6V with step of 0.2V. Current load up to 100 mA (this means - up to 16 mA per target device if up to six target devices are connected to one programming adapter). If this current is not sufficient, then external power supply should be used to supply target devices. GangPro-CC allows to control ON/OFF (enable/disable) and external power supply. Figure 2-10 show connection of the target devices supplied from programming adapter or from external power supply. If an external power supply is used, then it is recommended to connect pull-down load (eg. resistor 10k) between power’s supply enable input and ground.

Pin 2 (Vdd/Sense) of the programming adapter must be connected to Vdd of target devices, even if the external power supply is used. The Vdd level from the target devices is used to supply the voltage level translator, that allows to convert logic levels from/to programming adapter’s microcontroller from 3.3V to/from levels required by the target devices (2.2V to 3.6V).

![Diagram](image-url)
3. Software

GangPro-CC programmer package contains two types of software that allow to program target devices via USB-FPA programming adapter.

First - application software contains graphic user interface (GUI). This software allows to control one programming adapter (USB-FPA) connected up to six target devices to this adapter. Software allows to erase, blank check, program and verify memory flash in target device. Full or part of the flash memory can be erased, programmed and verified. The IEEE address and serialization can be automatically generated and saved in the flash memory. Available script file option allows to create custom defined programming sequence. See Elprotronic’s manual PM025A01 “GangPro-CC Programmer User's Guide” for details.

Second - the Multi-FPA API DLL allows to simultaneously control up to eight programming adapters (USB-FPA). Up to six target devices can be connected to each programming adapter. In total - up 48 target devices can be programmed simultaneously using Multi-FPA API-DLL. When the Multi-FPA API-DLL is used then the application software which uses this DLL should be written by the user. Application software can be written in Visual C++, Visual Basic, LabVIEW etc. The IEEE address and serialization should be generated by application software if these numbers are required. List of available instructions are specified and described in the Elprotronic’s manual PM025A02 “GangPro-CC API-DLL User's Guide”.

3.1 Application software with GUI

To start the GangPro-CC programmer click on the GangPro-CC Elprotronic icon (Figure 3-1).

Once started the software will attempt to access the programming adapter. If no error messages appear then the software has initialized without a problem and you may begin using it. However, if the programming adapter is not detected an error message will appear. To correct the problem, make sure that the connection cable is properly attached and the USB driver is installed.

Figure 3-1
The programming dialogue box (Figure 3-2) contains a pull down menu, interface selection box, lock protection bits box, device action buttons, report (status) window, open file buttons, target device information box, IEEE addresses and serial number box, power DC status and check sum result boxes. At the beginning, desired target device type should be selected. In our example when the TI’s CC2430ZDK boards are used, in the **SoC Device Type** group it should be selected device - CC2430F128 (Flash size 128 kB). When the target devices are supplied power from programming adapter, then in the **Power Device from Adapter** group desired voltage and **Enable** box should be selected. Using **Open Code File** button requested code file should be opened. Three code formats are accepted - TI hex (*.txt), Intel hex (*.hex) and Motorola s (*.s19, *.s28 or *.s37). In the **Target Devices Programming Result** group the **Target Enable** should be selected. A minimum of one target device should be enabled. If more then one target device are connected to programmer, then all target devices must be the same type. Size of the desired flash memory to be erased and programmed can be defined in the **Memory Option** dialogue screen (Figure 3-3) accessible from pull down menu - **Setup->Memory Option**. Typically **All Memory** option should be selected. In the **Retain Flash Data** group a part of flash memory can be selected, of which the contents will be restored after erase and programming. This option is useful if flash contains calibrated data and data should not be erased after programming process. Retain data block sizes can be up to 2048 bytes and can be located at any place - in one or more flash sectors. When the programmed contents are modified only in part of flash memory, then the **Used Defined** option can specify.
four flash blocks that can be erased and programmed. It should be noted, that if any part of flash segment is specified in the defined block, then full segment will be erased (typical flash segment size is 2 kB for flash size 128 kB), however only specified flash address range will be programmed and verified. In the field **Flash Lock Bits after Autoprogram** the desired option that allows to protect selected part of flash memory (selected flash memory, boot sector or access to debug option) when flash is programmed should be selected. Selected flash segments cannot be modified by application program when they are protected. User should know if their application program has access to modify flash memory, otherwise application program cannot work if access to write protected flash is required. If the lock bits are programmed in target devices and access to target device is blocked, it is possible to get access to target device again, but only if full flash memory will be erased. It is not possible to retain any data if debug bit is locked. To automatically unlock and erase full memory contents if lock bits are programmed in the target device, the **Unlock debug** option should be selected in the **Memory Erase/Program and Verify** group (Figure 3-3).

When desired configuration is selected then in the Main Dialogue screen (Figure 3-2) the **Lock Protection Bits** option can be used to enable or disable programming of selected lock bits.
When Autoprogram is pressed, then selected target devices should be erased, programmed and verified. Following information should be displayed in the Report window (Figure 3-4). If serialization and IEEE address are not selected, then the lines related to these items will not be displayed.

![Report Window](image)

In the Target Device Programming Result (Figure 3-5) should be displayed all OK icons if all targets are programmed and verified successfully. If programming process in one target failed (eg. erase failed) then process in all other targets is continued as long as minimum one target is programmed without errors. At the end one programmer target without errors will have green (OK) icon, while others - red (ERROR) icons in location where the errors has been detected.

![Target Devices Programming Result](image)

### 3.1.1 IEEE Address and Serialization

The GangPro-CC programming software has the ability to automatically create the target device’s IEEE Address and Serial Number and save it in flash memory. These numbers are also saved in the database file. The new IEEE Address and Serial Number can be created automatically by incrementing the IEEE Address and Serial Number or can be taken from a file created by the user. Furthermore, model name, group, and revision can be downloaded to target device. The IEEE Address format contains 8 bytes located at the end of the flash memory or specified location of the
flash memory and can be saved in order - LSB or MSB byte first. The \textit{Serial Number} format and location in the device’s flash memory must be specify by the user.

\textit{IEEE Address} and \textit{Serial Number} are created when the \textit{Auto Program} or \textit{Write SN /Write IEEE Addr} button is pressed and the Serialization feature is enabled. When the \textit{Auto Program} function is activated then the \textit{IEEE Address} and/or \textit{Serial Number} are programmed to the target device’s memory along with the code data. If the \textit{Auto Program} function fails for any reason then new \textit{IEEE Address / Serial Number} is not created.

The software also allows the device to retain its \textit{IEEE Address / Serial Number} if one has already been assigned to it. Every time a device is programmed and serialization is enabled the contents of the target’s memory are scanned for existing \textit{IEEE Address} and \textit{Serial Number}. If numbers are found in the database, the dialogue screen will appear and allow you to decide if you wish to keep the old \textit{IEEE Address / Serial Number}, new or manually entered once. See \textit{User’s Guide} for details. The IEEE Address setup and Serialization setup are accessible from pull-down menu \textit{IEEE/Serialization Setup}. When the \textit{IEEE Address and Serialization Setup} is selected then following dialogue screen is displayed (Figure 3-6).

The IEEE address can be created automatically by incrementing the IEEE address from specified value (see Figure 3-6), or can be taken sequentially from user defined file containing list of required IEEE Addresses. All assigned IEEE addresses are
saved in database file specified in the **SN/IEEE Record File** line. When the assigned IEEE address has also been found in the database, then warning will be displayed.

The GangPro-CC software allows to generate unique serial numbers that can be saved in any flash location. Serialization format and location in flash memory should be specified by user (see Figure 3-6). All serialization options are described in detail in the *User’s Guide*.

It should be noticed that Serial Number and IEEE address should be saved in location where the application program is empty. Not any data (even 0xFF) can be specified in the code data in the location where the serial number, model or IEEE Address should be saved. Otherwise warning will be created and verification can fail. Verification procedure will find data in FLASH location other than data (even 0xFF) specified in the code data at location where the serial number, model or IEEE address has been written.

### 3.1.2 Configuration setup

Programming software can save configuration settings. This allows the user to create several configuration files, one for each particular task, and thus eliminate the need to manually change settings every time a different configuration is desired. Furthermore, the config.ini file contains the most recently used settings and those settings will be used as default whenever the software is started.

To create a configuration file simply select *Save Setup* from the *File* menu. Current settings will be saved for future use. To restore configuration settings select *Load Setup* from *File* menu and select a file containing the settings you wish to restore.

In order to prevent accidental setup changes the GangPro-CC Programmer provides the option to Lock configuration settings. When the user selects the *Lock/Unlock Setup* option from the Setup menu, the Programmer will prevent the user from modifying the setup. The only options that are available when the programmer is locked are *Verify, Read, Autoprogram* and *Next*. Notice that the *Next* button will immediately change to implement the *Autoprogram* function. To unlock the programmer the user must select the *Lock/Unlock Setup* option from the Setup menu.

Configuration setup file (or Code file) can be opened using *Load Setup (Load Code)* option from *File* menu or can also be opened using command line combined with the executable file name. Following command line switches are available

- `-sf` **Setup_file_name** (Download setup file)
- `-cf` **Code_file_name** (Download Code file)
- `-nf` **IEEE/SN_ file_name** (Download IEEE addresses / Serial number list file)
- `-rf` **Script_file_name** (Run programming sequence from the Script File)
- `-lock` (Lock almost all buttons. Prevent the user from modifying the setup)

Using Windows *START* button (left bottom) select *Run..* Using *Browse..* find and select executable file
“C:\Program Files\Elprotronic\CCxx\USB GangPro-CC\GangPro-CC.exe”

and at the end enter the required key with name of the setup file and extra key “-lock” can be added if required, eg.

“C:\Program Files\Elprotronic\CCxx\USB GangPro-CC\GangPro-CC.exe” -lock -sf C:\MFG\prg-04.cfg

On Figure 3-7 the Main GUI dialogue screen is presented with locked buttons when the “-lock” option is used. Only few buttons are active that can run programmer, but all buttons/pull down menu that can modify programmer’s setup are blocked. Instead writing above command every time when the programmed is activated, it is possible to create icons with parameters listed above and use selected icon from the desktop to activate programmer with required switches. See User’s Guide for details.

3.1.3 User defined programming sequence - Scrip File

Programming sequence can be customized using script file. Script file prepared as a text file (using any editor like notepad) can contain customized programming sequences in any order. Generally, all buttons available on the main dialogue screen can be used in the script file. All other options available on others screens like memory options, serialization type etc. cannot be modified from the script file directly, but can be reloaded in fully using configuration file. From the script file any configuration files can be called at any time that allows to modify programmer configuration. This method can simplify programming process using script file and
allows to use full options available in the programmer. Programming sequence conditions can be taken from user defined procedures attached as an independent DLL. Function should be created using Visual C++ and attached to GangPro-CC software. See Elprotronic’s manuals PM025A01 “GangPro-CC Programmer User’s Guide” for details.

**LIMITATIONS:**
1. Up to 1000 script lines commands can be used. Empty lines and lines with comments only are ignored and not counted.
2. Up to 50 CALL’s deep stack is used (CALL in CALL in CALL......).

**SYNTAX:**
white spaces before instructions, labels etc are ignored.

`; comment - all contents after semicolon are ignored.  
>label - character ‘>’ without spaces must be placed before label name.  
NOTE: After label ca not be specified any command in the same line. Line can contain label only.

**LIST OF INSTRUCTIONS:**

MESSAGEBOX type FCTEXT - pop-up message box with buttons.
- message taken from the FCONTROL function (User’s DLL)
MESSAGEBOX type - pop-up message box with buttons.
" message - line -1 " - Text displayed in message box.
" message - line -2 " - Each line contents must be located between characters “ ”
" max up to 50 lines “ - Number of content lines - up to 50 lines.

Message box type list
OK - One button OK
OKCANCEL - Two buttons OK, CANCEL
YESNO - Two buttons YES, NO
YESNOCANCEL - Three buttons YES, NO, CANCEL

GOTO label
CALL label - CALL procedure.
RETURN - return from CALL.

IF condition GOTO label
IF condition CALL label
condition list:
BUTTONOK - if button OK pressed in the message box.
BUTTONYES - if button YES pressed in the message box.
BUTTONNO - if button NO pressed in the message box.
BUTTONCANCEL - if button CANCEL pressed in the message box.
DONE - if selected process e.g. AUTOPROGRAM finished successfully.
FAILED - if selected process e.g. AUTOPROGRAM failed.
CONTROL = number - if status from the FCONTROL function = NUMBER

FCONTROL type argument - call the external function from FxControl DLL
PAUSE number
- pause in milliseconds - 1 to 100000 range (1ms to 100 s).

OPENDLLFILE filename
- FxControl DLL file - Full path and DLL File name.

LOADCFGFILE filename
- Configuration file - Full path and File name.

LOADCODEFILE filename
- Code file - Full path and File name.

LOADSNFILE filename
- IEEE/SN file - Full path and File name.

VCCOFF
- Turn OFF Vcc from programming adapter to target device.

VCCON
- Turn ON Vcc from programming adapter to target device.

Note: Vcc from FPA must be enabled first using configuration file.

RESET
- equivalent to pressed button RESET on the main dialogue screen.

AUTOPROGRAM
- equivalent to pressed button AUTOPROGRAM on the main dialogue screen.

VERIFYACCESS
- equivalent to pressed button VERIFY LOCK BIT on the main dialogue screen.

ERASEFLASH
- equivalent to pressed button ERASE FLASH on the main dialogue screen.

BLANKCHECK
- equivalent to pressed button BLANK CHECK on the main dialogue screen.

WRITEFLASH
- equivalent to pressed button WRITE FLASH on the main dialogue screen.

VERIFYFLASH
- equivalent to pressed button VERIFY FLASH on the main dialogue screen.

READFLASH
- equivalent to pressed button READ/COPY on the main dialogue screen.

READSN
- equivalent to pressed button READ SN on the main dialogue screen.

READIEEE
- equivalent to pressed button READ IEEE Addr on the main dialogue screen.

LOCKFLASH
- equivalent to pressed button LOCKFLASH on the main dialogue screen.

TRACEOFF
- trace OFF.

TRACEON
- trace ON and saved in the “Trace-Scr.txt” file in current working directory.

Option useful for debugging. Trace file contains sequence of all executed commands from script file in the run time. On the left side of all lines the current line numbers correspondent to the line number in the script file are printed. Line numbers are counted without empty lines and without lines contains comments only.

END
- end of script program.

Below are the contents of an easy script file that allows to create following sequence;

1. Vcc supplied to target device is turn-OFF and first message box with buttons OK/CANCEL is displayed. Programmer is waiting until button OK or CANCEL is pressed.

2. When confirmed, then first configuration file test-A.cfg is downloaded to programmer. Configuration file test-A.cfg should be prepared first using programming software with desired configuration, selected desired code file etc. Programmer’s configuration should be saved using “Save setup us ..” option.

3. When test code is downloaded and processor started (if enabled in test-A.cfg file) then message box is displayed and software is waiting until button YES / NO is press. Meantime manual target’s device test can be done. If test is positive, then button OK should be pressed, or button NO if test failed.

4. When button OK has been pressed then programmer downloads finalcode.cfg configuration file to programmer. Current configuration can activate serialization if required, reload final code to be downloaded etc. When the new configuration is reloaded then final code is downloaded to target device, serialization is created etc.

5. On the end, programmer returns to beginning and waits for the next target device to be connected.
When the executable file GangPro-CC.exe is called with a script path as an argument e.g.

GangPro-CC.exe -rf C:\Program Files\test\script.txt

or when the icon with the GangPro-CC.exe and script file path is executed then programmer starts automatically programming sequences according to procedure specified in the script file.

3.2 Multi-FPA API-DLL

GangPro-CC Flash Programmer can be remotely controlled from other software applications (Visual C++, Visual Basic etc.) via a DLL library. The Multi-FPA - allows to remotely control up to eight Flash Programming Adapters (FPAs) simultaneously significantly reducing programming production time.

Figures 2-7 and 2-8 show the connections between PC and up to eight programming adapters. The FPAs can be connected to PC USB ports directly or via USB-HUB. Direct connection to the PC is faster but if the PC does not have required number of USB ports, then USB-HUB can be used. The USB-HUB should be fast, otherwise speed degradation can be noticed. When the USB hub is used, then the D-Link’s Model No: DUB-H7, P/N BDUBH7..A2 USB 2.0 HUB is recommended.
Block diagram of the Multi-FPA application DLL is presented on Figure 3-8. To support the Multi-FPA API-DLL feature, the software package contains following dll files:

- the Multi-FPA API-DLL selector
- up to eight standard single FPAs API-DLLs

![Diagram of Multi-FPA application DLL](image)

The Multi-FPA API-DLL selector allows to transfer functions coming from application software to desired single application API-DLL (GangProCC-FPA1.dll to GangProCC-FPA8.dll) or to all API-DLL simultaneously.

It should be noticed that all single API-DLLs (GangProCC-FPA1.dll to GangProCC-FPA8.dll) are fully independent from each other. From that point of view it is not required that transferred data to one FPA should be the same as the transferred data to the others FPAs. For example, code data downloaded to FPA-1 can be different than the code data downloaded to FPA-2, FPA-3 etc. The F_AutoProgram can be executed simultaneously with selected all active FPAs. All FPAs will be serviced simultaneously by their own API-DLL and data packages saved in these dlls. Also programmers allow to save unique data to each target devices even if these targets are connected to the same programming adapter (each programming adapter can service up to six target devices). This allows to program unique serial numbers or IEEE addresses, unique calibration data etc. to each target devices separately. This process can be done simultaneously to all targets, even if saved data to each targets are not the same.
Software package provided by Elprotronic Inc. contains all required Multi-FPA API-DLL files, as well as demo programs with source code written under Visual C++. Demo programs software can be modified by user for custom requirements. One of the presented demo program allows to simultaneously control up to eight gang programming adapters that allows to program up to 48 target devices.

Source code and all related project files are located in the following directory:

C:\Program Files\Elprotronic\CCxx\USB GangPro-CC\API-DLL-Demo\Cpp\Demo-8x6

Program can be activated by selecting the GangProCC-8x6-Demo.exe in the release subdirectory, or can be activated from the windows menu:

Start->Program->Elprotronic-Flash Programmer->(CCxx) USB GangPro-CC->API-DLL-8x6-Demo-Cpp

When the program is executed, then following GUI dialogue screen is displayed (see Figure 3-9). See the Elprotronic’s manual PM025A02 “GangPro-CC API-DLL User’s Guide” available on http://www.elprotronic.com/download.html for detailed descriptions of all available instructions in the Multi-FPA API-DLL and description of the demo programs included in the GangPro-CC software package.

![Figure 3-9](image-url)
References

1. “CC2430ZDK and CC2431ZDK ZigBee Development Kit Pro” - TI’s application note SWRU073B


Document History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
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<tr>
<td>1.0</td>
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