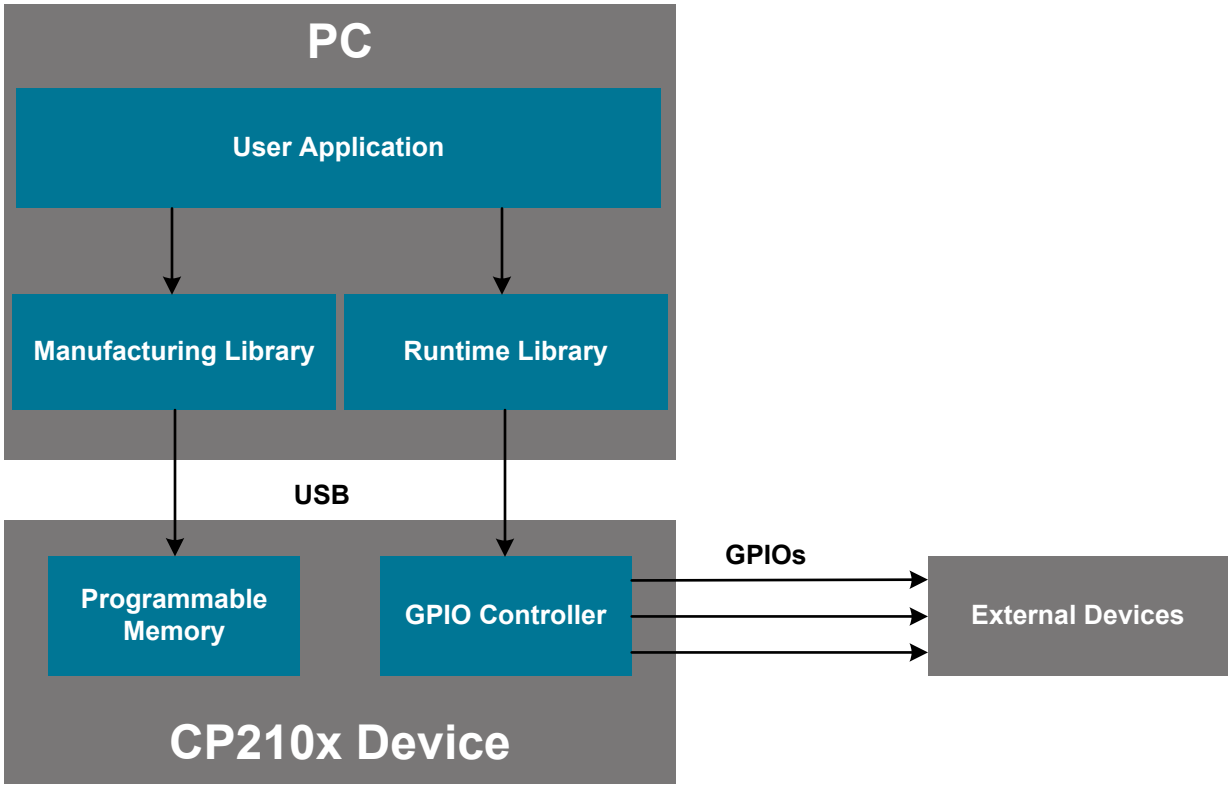
AN978: CP210x USB-to-UART API Specification

This document describes the API for the CP210x Manufacturing Library, used to configure CP210x devices, and the CP210x Runtime Library, used to operate the devices' GPIOs during runtime.

The Silicon Labs CP210x USB-to-UART bridges are devices that communicate over the Universal Serial Bus (USB) to perform Universal Asynchronous Receiver/Transmitter (UART) data transfers. These devices have many programmable options that can be configured via USB. These devices also often include flexible GPIO functions that can be configured and accessed via USB during runtime. Silicon Labs provides libraries that can be used to configure these devices and access their GPIOs.

KEY POINTS

- Silicon Labs provides public libraries to access all available features on CP210x devices.
- Use the CP210x Manufacturing library to configure a device's programmable settings.
- Use the CP210x Runtime library to control a device's GPIOs at runtime.



1. CP210x Host API Functions

Two DLL files can be used to interface with CP210x devices, `CP210xManufacturing.DLL`, which is responsible for reading and writing the device settings, and `CP210xRuntime.DLL`, which is responsible for interfacing with the device's GPIOs. The APIs for these DLLs are described below.

1.1 CP210xManufacturing.DLL

The CP210x Host API is provided as a means to facilitate production of customized CP210x devices. The API allows access to the CP210x device for retrieving and setting the VID, PID, product string, serial number, self- power attribute, maximum power consumption, and device version.

The CP210x Host API is provided in the form of a Windows Dynamic Link Library (DLL), `CP210xManufacturing.DLL`. The host interface DLL communicates with the bridge controller device via the provided device driver and the operating system's USB stack. The following is a list of the available host API functions:

`CP210x_GetNumDevices()`	Returns the number of CP210x devices connected.
`CP210x_GetProductString()`	Returns a descriptor from the registry for a CP210x USB device.
`CP210x_GetPartNumber()`	Returns the 1-byte Part Number of a CP210x device.
`CP210x_Open()`	Opens a CP210x device as a USB device and returns a handle.
`CP210x_Close()`	Closes a CP210x device handle.
`CP210x_SetVid()`	Sets the 2-byte vendor ID of a CP210x device.
`CP210x_SetPid()`	Sets the 2-byte product ID of a CP210x device.
`CP210x_SetManufacturerString()`	Sets the manufacturer description string of a CP210x device.
`CP210x_SetProductString()`	Sets the product description string of a CP210x device.
`CP210x_SetInterfaceString()`	Sets the interface string of a CP2105 device.
`CP210x_SetSerialNumber()`	Sets the serial number string of a CP210x device.
`CP210x_SetSelfPower()`	Sets the self-power attribute of a CP210x device.
`CP210x_SetMaxPower()`	Sets the maximum power consumption of a CP210x device.
`CP210x_SetFlushBufferConfig()`	Sets the flush buffer configuration of CP2104/5 devices.
`CP210x_SetDeviceMode()`	Sets the operating modes of both interfaces of a CP2105 device.
`CP210x_SetDeviceVersion()`	Sets version number of the CP210x device.
`CP210x_SetBaudRateConfig()`	Sets the baud rate configuration data of a CP210x device.
`CP210x_SetLockValue()`	Sets the 1-byte Lock Value of a CP210x device.
`CP210x_SetPortConfig()`	Sets the port configuration of a CP2101/2/3/4 device.
`CP210x_SetDualPortConfig()`	Sets the port configuration of a CP2105 device.
`CP210x_SetQuadPortConfig()`	Sets the port configuration of a CP2108 device.
`CP210x_SetConfig()`	Programs the entire configuration of a CP2102N device.

`CP210x_GetDeviceManufacturerString()`	Gets the manufacturer description string of a CP210x device.
`CP210x_GetDeviceProductString()`	Gets the product description string of a CP210x device.
`CP210x_GetDeviceInterfaceString()`	Gets the interface string of a CP2105 device.
`CP210x_GetDeviceSerialNumber()`	Gets the serial number string of a CP210x device.
`CP210x_GetDeviceVid()`	Gets the vendor ID of a CP210x device.
`CP210x_GetDevicePid()`	Gets the product ID of a CP210x device.
`CP210x_GetSelfPower()`	Gets the self-power attribute of a CP210x device.
`CP210x_GetMaxPower()`	Gets the maximum power consumption value of a CP210x device.
`CP210x_GetFlushBufferConfig()`	Gets the flush buffer configuration of CP2104/5 devices.
`CP210x_GetDeviceMode()`	Gets the operating modes of interfaces of a CP2105 device.
`CP210x_GetDeviceVersion()`	Gets the version number of a CP210x device.
`CP210x_GetBaudRateConfig()`	Gets the baud rate configuration data of a CP210x device.
`CP210x_GetLockValue()`	Gets the 1-byte Lock Value of a CP210x device.
`CP210x_GetPortConfig()`	Gets the port configuration of a CP210x device.
`CP210x_GetDualPortConfig()`	Gets the port configuration of a CP2105 device.
`CP210x_GetQuadPortConfig()`	Gets the port configuration of a CP2108 device.
`CP210x_GetFirmwareVersion()`	Gets the firmware version of a CP210x device.
`CP210x_GetConfig()`	Gets the entire configuration of a CP2102N device as a byte array.
`CP210x_Reset()`	Resets a CP210x device.

In general, the user initiates communication with the target CP210x device by making a call to `CP210x_GetNumDevices()`. This call returns the number of CP210x target devices. This number is used as a range when calling `CP210x_GetProductString()` to build a list of devices connected to the host machine.

A handle to the device must first be opened by a call to `CP210x_Open()` using an index determined from the call to `CP210x_GetNumDevices()`. The handle will be used for all subsequent accesses. When I/O operations are complete, the device handle is closed by a call to `CP210x_Close()`. When programming a CP2105 device to configure the mode, the following functions must be called in the following order:

```
CP210x_SetDeviceMode()
CP210x_SetDualPortConfig()
```

The remaining functions are provided to allow access to customizable values contained in the CP210x programmable area.

1.1.1 CP210x_GetNumDevices

Description : This function returns the number of CP210x devices connected to the host.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_GetNumDevices(LPDWORD NumDevices)`

Parameters :
1. NumDevices—Pointer to a `DWORD` that will contain the number of devices.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_INVALID_PARAMETER`

1.1.2 CP210x_GetProductString

Description : This function returns a NULL-terminated serial number (S/N) string, product description string, or full path string for the device specified by an index passed in the DeviceNum parameter. The index of the first device is 0, and the index of the last device is the value (NumDevices) returned by `CP210x_GetNumDevices()` – 1.

Note: This function may return cached data, or data from the device driver. To access the data from the device directly, please use 1.1.24 CP210x_GetDeviceProductString.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetProductString(DWORD DeviceNum, LPVOID DeviceString, DWORD Options)
```

Parameters :

1. DeviceNum—Index of the device for which the product description string, serial number, or full path is desired.
2. DeviceString—Variable of type `CP210x_DEVICE_STRING` returning the NULL-terminated serial number, device description or full path string.
3. Options—Flag that determines if DeviceString contains the product description, serial number, or full-path string. Available options:
   - `CP210x_RETURN_SERIAL_NUMBER`
   - `CP210x_RETURN_DESCRIPTION`
   - `CP210x_RETURN_FULL_PATH`

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_INVALID_PARAMETER`

1.1.3 CP210x_GetPartNumber

Description : Returns the 1-byte Part Number contained in a CP210x device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetPartNumber(HANDLE cyHandle, LPBYTE lpbPartNum)
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. PartNum—Pointer to a 1-byte value returning the Part Number of the device. For example, a `CP210x_CP2101_DEVICE` denotes a CP2101 device, and a `CP210x_CP2102_DEVICE` denotes a CP2102 device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.4 CP210x_Open

Description : Opens and returns a handle to a device using a device number determined by the number returned from `CP210x_GetNumDevices()`.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_Open( DWORD DeviceNum, HANDLE* Handle )`

Parameters :

1. DeviceNum—Device index
2. Handle—Pointer to a variable where the handle to the device will be stored. This handle is used for all subsequent accesses to the device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_INVALID_PARAMETER`

1.1.5 CP210x_Close

Description : Closes an open device handle.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_Close( HANDLE Handle )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`

1.1.6 CP210x_SetVid

Description : Sets the 2-byte Vendor ID field of the Device Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_SetVid( HANDLE Handle, WORD Vid )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. VID—2-byte Vendor ID value.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.7 CP210x_SetPid

Description : Sets the 2-byte Product ID field of the Device Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_SetPid( HANDLE Handle, WORD Pid )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. PID—2-byte Product ID value.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.8 CP210x_SetManufacturerString

Description : Sets the Manufacturer Description String of the String Descriptor of a CP210x device. If the string is not already in Unicode format, the function will convert the string to Unicode before committing it to programmable memory. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_PRODUCT_STRLEN` or `CP2105_MAX_PRODUCT_STRLEN`.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_SetManufacturerString( HANDLE cyHandle, LPVOID lpvManufacturer
,BYTE bLength, BOOL bConvertToUnicode=TRUE )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Product—Buffer containing the Manufacturer String value.
3. Length—Length of the string in characters (not bytes), NOT including a NULL terminator.
4. ConvertToUnicode—Boolean flag that tells the function if the string needs to be converted to Unicode. The flag is set to TRUE by default (i.e., the string is in ASCII format and needs to be converted to Unicode).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.9 CP210x_SetProductString

Description : Sets the Product Description String of the String Descriptor of a CP210x device. If the string is not already in Unicode format, the function will convert the string to Unicode before committing it to programmable memory. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_PRODUCT_STRLEN` or `CP2105_MAX_PRODUCT_STRLEN`.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_SetProductString( HANDLE Handle, LPVOID Product,BYTE Length, B
OOL ConvertToUnicode=TRUE )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Product—Buffer containing the Product String value.
3. Length—Length of the string in characters (not bytes), NOT including a NULL terminator.
4. ConvertToUnicode—Boolean flag that tells the function if the string needs to be converted to Unicode. The flag is set to TRUE by default (i.e., the string is in ASCII format and needs to be converted to Unicode).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.10 CP210x_SetInterfaceString

Description : Sets the Interface String for the one of the interfaces available on the CP2105 or CP2108. If the string is not already in Unicode format, the function will convert the string to Unicode before committing it to programmable memory. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP2105_MAX_INTERFACE_STRLEN`.

Supported Devices : CP2105, CP2108

Prototype :
```
CP210x_STATUS CP210x_SetInterfaceString( HANDLE Handle, BYTE Interfa- ceNumber, LPV
OID Interface, BYTE Length, BOOL ConvertToUnicode)
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. InterfaceNumber—Set to 0 for Enhanced Interface String, or 1 for Standard Interface String on the CP2105. 0-3 for the CP2108 which has 4 interfaces.
3. Interface—Buffer containing the Interface String.
4. Length—Length of the string in characters (not bytes), NOT including a NULL terminator.
5. ConvertToUnicode—Boolean flag that tells the function if the string needs to be converted to Unicode. The flag is set to TRUE by default (i.e., the string is in ASCII format and needs to be converted to Unicode).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.11 CP210x_SetSerialNumber

Description : Sets the Serial Number String of the String Descriptor of a CP210x device. If the string is not already in Unicode format, the function will convert the string to Unicode before committing it to programmable memory. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_SERIAL_STRLEN`.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_SetSerialNumber( HANDLE Handle,LPVOID SerialNumber, BYTE Lengt
h, BOOL ConvertToUnicode=TRUE )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. SerialNumber—Buffer containing the Serial Number String value.
3. Length—Length in characters (not bytes), NOT including a NULL terminator.
4. ConvertToUnicode—Boolean flag that tells the function if the string needs to be converted to Unicode. The flag is set to TRUE by default, i.e. the string is in ASCII format and needs to be converted to Unicode.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.12 CP210x_SetSelfPower

Description : Sets or clears the Self-Powered bit of the Power Attributes field of the Configuration Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_SetSelfPower( HANDLE Handle, BOOL SelfPower )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. SelfPower—Boolean flag where TRUE means set the Self-Powered bit, and FALSE means clear the Self-Powered bit.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.13 CP210x_SetMaxPower

Description : Sets the Max Power field of the Configuration Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_SetMaxPower( HANDLE Handle, BYTE MaxPower )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. MaxPower—1-byte value representing the maximum power consumption of the CP210x USB device, expressed in 2 mA units.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.14 CP210x_SetFlushBufferConfig

Description : Sets the Flush Buffer configuration of a CP210x device.

Supported Devices : CP2104, CP2105, CP2108

Prototype : `CP210x_STATUS CP210x_SetMaxPower( HANDLE Handle,BYTE FlushBufferConfig )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. FlushBufferConfig—Set to determine which buffer(s) to flush (TX and/or RX) and upon which event (Open and/or Close). See the header file for the bit defintions for this byte value.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_FUNCTION_NOT_SUPPORTED`
- `CP210x_DEVICE_NOT_FOUND`

1.1.15 CP210x_SetDeviceMode

Description : Sets the operating mode (GPIO or Modem) or each Interface of a CP210x device.

Supported Devices : CP2105

Prototype : `CP210x_STATUS CP210x_SetMaxPower( HANDLE Handle,BYTE DeviceModeECI, BYTE DeviceModeSCI)`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. DeviceModeECI—Set to 0 for modem mode for Enhanced interface
3. DeviceModeSCI—Set to 0 for modem mode for Standard interface

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_FUNCTION_NOT_SUPPORTED`

1.1.16 CP210x_SetDeviceVersion

Description : Sets the Device Release Version field of the Device Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_SetDeviceVersion( HANDLE Handle, WORD Version )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Version—2-byte Device Release Version number in Binary-Coded Decimal (BCD) format with the upper two nibbles containing the two decimal digits of the major version and the lower two nibbles containing the two decimal digits of the minor version.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.17 CP210x_SetBaudRateConfig

Description : Sets the baud rate configuration data of a CP210x device.

Supported Devices : CP2102, CP2103

Prototype : `CP210x_STATUS WINAPI CP210x_SetBaudRateConfig(HANDLE cyHandle, BAUD_CON- FIG* baudConfigData);`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. BaudConfigData—Pointer to a `BAUD_CONFIG` structure containing the Baud Config data to be set on the device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.18 CP210x_SetLockValue

Description : Sets the 1-byte Lock Value of a CP210x device.

Note: Setting the lock value locks ALL customizable data and cannot be reset; only use this function to keep all customizable data on the part permanently.

Supported Devices : CP2102, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS WINAPI CP210x_SetLockValue(HANDLE cyHandle);`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.19 CP210x_SetPortConfig

Description : Sets the current port pin configuration from the CP210x device.

Supported Devices : CP2103, CP2104

Prototype : `CP210X_STATUS CP210x_SetPortConfig(HANDLE Handle, PORT_CONFIG* PortConfig)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. PortConfig—Pointer to a `PORT_CONFIG` structure

Return Value : `CP210x_STATUS`
- `CP210X_SUCCESS`
- `CP210X_INVALID_HANDLE`
- `CP210X_DEVICE_IO_FAILED`
- `CP210X_UNSUPPORTED_DEVICE`

1.1.20 CP210x_SetDualPortConfig

Description : Sets the current port pin configuration from the CP210x device. `SetDeviceMode()` must be called before calling this function.

Supported Devices : CP2105

Prototype : `CP210X_STATUS CP210x_SetDualPortConfig(HANDLE Handle, DUAL_PORT_CONFIG* DualPortConfig)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. DualPortConfig—Pointer to a `DUAL_PORT_CONFIG` structure

Return Value : `CP210x_STATUS`
- `CP210X_SUCCESS`
- `CP210X_INVALID_HANDLE`
- `CP210X_DEVICE_IO_FAILED`
- `CP210X_UNSUPPORTED_DEVICE`

1.1.21 CP210x_SetQuadPortConfig

Description : Sets the current port pin configuration from the CP2108 device.

Supported Devices : CP2108

Prototype :
```
CP210x_STATUS CP210x_SetQuadPortConfig( HANDLE Handle, QUAD_PORT_CONFIG* QuadPortConfig )
```

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. QuadPortConfig—Pointer to a `QUAD_PORT_CONFIG` structure.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_UNSUPPORTED_DEVICE`

1.1.22 CP210x_SetConfig

Description : Programs the device's configurable area with the given byte array.

Supported Devices : CP2102N

Prototype :
```
CP210x_STATUS CP210x_GetConfig( HANDLE Handle, LPBYTE lpbConfig, WORD bLength)
```

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. lpbConfig—A byte array that holds the configuration to be programmed to the device.
3. bLength—The length of the given byte array.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.23 CP210x_GetDeviceManufacturerString

Description : Returns the Manufacturer Description String of the String Descriptor of a CP210x device. If the Convert-ToASCII parameter is set, the string will be converted to ASCII format before being returned to the caller. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_PRODUCT_STRLEN`.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetDeviceManufacturerString( HANDLE cyHandle,LPVOID lpManufacturer, LPBYTE lpbLength, BOOL bConvertToASCII=TRUE )
```

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Product—Pointer to a buffer returning the Manufacturer String value.
3. Length—Pointer to a BYTE value returning the length of the string in characters (not bytes), NOT including a NULL terminator.
4. ConvertToASCII—Boolean flag that tells the function whether the string needs to be converted to ASCII before it is returned to the caller. The flag is set to TRUE by default (i.e., the caller is expecting the string in ASCII format).

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.24 CP210x_GetDeviceProductString

Description : Returns the Product Description String of the String Descriptor of a CP210x device. If the ConvertToASCII parameter is set, the string will be converted to ASCII format before being returned to the caller. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_PRODUCT_STRLEN`.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetDeviceProductString( HANDLE Handle,LPVOID Product, LPBYTE Length, BOOL ConvertToASCII=TRUE )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Product—Pointer to a buffer returning the Product String value.
3. Length—Pointer to a BYTE value returning the length of the string in characters (not bytes), NOT including a NULL terminator.
4. ConvertToASCII—Boolean flag that tells the function whether the string needs to be converted to ASCII before it is returned to the caller. The flag is set to TRUE by default (i.e., the caller is expecting the string in ASCII format).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.25 CP210x_GetDeviceInterfaceString

Description : Gets the specified interface string from a CP210x device. If the ConvertToASCII parameter is set, the string will be converted to ASCII format before being returned to the caller. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_SERIAL_STRLEN`.

Supported Devices : CP2105, CP2108

Prototype :
```
CP210x_STATUS CP210x_GetDeviceInterfaceString( HANDLE Handle,BYTE InterfaceNumber, LPVOID Interface, BYTE Length, BOOL ConvertToAS- CII)
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. InterfaceNumber —Set to 0 for Enhanced Interface.
3. Interface—Pointer to buffer returning the selected Interface String value.
4. Length—Pointer to a BYTE value returning the length of the string in characters (not bytes), NOT including a NULL terminator.
5. ConvertToASCII—Boolean flag that tells the function whether the string needs to be converted to ASCII before it is returned to the caller. The flag is set to TRUE by default (i.e., the caller is expecting the string in ASCII format).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.26 CP210x_GetDeviceSerialNumber

Description : Gets the Serial Number String of the String Descriptor of a CP210x device. If the ConvertToASCII parameter is set, the string will be converted to ASCII format before being returned to the caller. The character size limit (in characters, not bytes), NOT including a NULL terminator, is `CP210x_MAX_SERIAL_STRLEN`.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetDeviceSerialNumber( HANDLE Handle,LPVOID SerialNumber, LPBYTE Length, BOOL ConvertToASCII=TRUE )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. SerialNumber —Pointer to a buffer returning the Serial Number String value.
3. Length—Pointer to a BYTE value returning the length of the string in characters (not bytes), NOT including a NULL terminator.
4. ConvertToASCII—Boolean flag that tells the function whether the string needs to be converted to ASCII before it is returned to the caller. The flag is set to TRUE by default (i.e., the caller is expecting the string in ASCII format).

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.27 CP210x_GetDeviceVid

Description : Returns the 2-byte Vendor ID field of the Device Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetDeviceVid( HANDLE Handle, LPWORD Vid )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. VID—Pointer to a 2-byte value that returns the Vendor ID of the CP210x device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.28 CP210x_GetDevicePid

Description : Returns the 2-byte Product ID field of the Device Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype :
```
CP210x_STATUS CP210x_GetDevicePid( HANDLE Handle, LPWORD Pid )
```

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. PID—Pointer to a 2-byte value that returns the Product ID of the CP210x device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.29 CP210x_GetSelfPower

Description : Returns the state of the Self-Powered bit of the Power Attributes field of the Configuration Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_GetSelfPower( HANDLE Handle, LPBOOL SelfPower )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. SelfPower—Pointer to a boolean flag where TRUE means the Self-Powered bit is set, and FALSE means the Self-Powered bit is cleared.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.30 CP210x_GetMaxPower

Description : Returns the 1-byte Max Power field of the Configuration Descriptor of a CP210x device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_GetMaxPower( HANDLE Handle, LPBYTE MaxPower )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. MaxPower—Pointer to a 1-byte value returning the Maximum power consumption of the CP210x USB device expressed in 2 mA units.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.31 CP210x_GetFlushBufferConfig

Description : Returns the flush buffer configuration of a CP210x device.

Supported Devices : CP2104, CP2105, CP2108

Prototype : `CP210x_STATUS CP210x_GetFlushBufferConfig( HANDLE Handle,LPWORD FlushBufferConfig )`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. FlushBufferConfig—Pointer to the values which indicates which buffer(s) are flushed (TX and/ or RX) and upon which event (Open and/or Close). See the header file for the bit defintions for this byte value.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_INVALID_HANDLE`
- `CP210x_FUNCTION_NOT_SUPPORTED`

1.1.32 CP210x_GetDeviceMode

Description : Gets the operating mode (GPIO or Modem) or each Interface of a CP210x device.

Supported Devices : CP2105

Prototype : `CP210x_STATUS CP210x_SetMaxPower( HANDLE Handle,BYTE DeviceModeECI, BYTE DeviceModeSCI)`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. DeviceModeECI—Pointer to a 1-byte value returning the 0 if interface is in Modem mode, or 1 if GPIO mode.
3. DeviceModeSCI—Pointer to a 1-byte value returning the 0 if interface is in Modem mode, or 1 if GPIO mode.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_NOT_FOUND`
- `CP210x_FUNCTION_NOT_SUPPORTED`

1.1.33 CP210x_GetBaudRateConfig

Description : Returns the baud rate configuration data of a CP210x device.

Supported Devices : CP2102, CP2103, CP2109

Prototype : `CP210x_STATUS WINAPI CP210x_GetBaudRateConfig(HANDLE cyHandle, BAUD_CONFIG* baudConfigData);`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. BaudConfigData—Pointer to a `BAUD_CONFIG` array containing structures returning the Baud Config data of the device.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.34 CP210x_GetLockValue

Description : Returns the 1-byte Lock Value of a CP210x device.

Supported Devices : CP2102, CP2103, CP2104, CP2105, CP2108

Prototype : `CP210x_STATUS WINAPI CP210x_GetLockValue(HANDLE cyHandle,LPBYTE lpbLockValue);`

Parameters :

1. Handle—Handle to the device as returned by `CP210x_Open()`
2. LockValue—Pointer to a 1-byte value returning the Lock Value of the devicethat the device is locked, and a 0x00 denotes that the device is unlocked.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_PARAMETER`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.35 CP210x_GetPortConfig

Description : Gets the current port pin configuration from the CP210x device.

Supported Devices : CP2103, CP2104

Prototype : `CP210X_STATUS CP210x_GetPortConfig(HANDLE Handle, PORT_CONFIG* PortConfig)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. Port Config—Pointer to a `PORT_CONFIG` structure.

Return Value : `CP210x_STATUS`
- `CP210X_SUCCESS`
- `CP210X_INVALID_HANDLE`
- `CP210X_DEVICE_IO_FAILED`
- `CP210X_UNSUPPORTED_DEVICE`

1.1.36 CP210x_GetDualPortConfig

Description : Gets the current port pin configuration from the CP210x device.

Supported Devices : CP2105

Prototype : `CP210X_STATUS CP210x_GetDualPortConfig(HANDLE Handle, DUAL_PORT_CONFIG* DualPortConfig)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. DualPortConfig—Pointer to a `DUAL_PORT_CONFIG` structure.

Return Value : `CP210x_STATUS`
- `CP210X_SUCCESS`
- `CP210X_INVALID_HANDLE`
- `CP210X_DEVICE_IO_FAILED`
- `CP210X_UNSUPPORTED_DEVICE`

1.1.37 CP210x_GetQuadPortConfig

Description : Gets the current port pin configuration from the CP210x device.

Supported Devices : CP2108

Prototype : `CP210X_STATUS CP210x_GetQuadPortConfig(HANDLE Handle, QUAD_PORT_CONFIG* QuadPortConfig)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. QuadPortConfig—Pointer to a `QUAD_PORT_CONFIG` structure.

Return Value : `CP210x_STATUS`
- `CP210X_SUCCESS`
- `CP210X_INVALID_HANDLE`
- `CP210X_DEVICE_IO_FAILED`
- `CP210X_UNSUPPORTED_DEVICE`

1.1.38 CP210x_GetFirmwareVersion

Description : Retrieves the firmware version from the device.

Supported Devices : CP2102N, CP2108

Prototype : `CP210x_STATUS CP210x_GetFirmwareVersion( HANDLE Handle, pFirmware_t lpVersion )`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. lpVersion—3-byte structure that indicates major, minor, and build version numbers.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.39 CP210x_GetConfig

Description : Retrieves the current configuration from the device as a byte array.

Supported Devices : CP2102N

Prototype : `CP210x_STATUS CP210x_GetConfig( HANDLE Handle, LPBYTE lpbConfig, WORD bLength)`

Parameters :
1. Handle—Handle to the device as returned by `CP210x_Open()`
2. lpbConfig—A byte array to hold the configuration.
3. bLength—The length of the given byte array.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.1.40 CP210x_Reset

Description : Initiates a reset of the USB interface.

Note: There is a delay of ~1 second before the reset is initiated by the device firmware to give the application time to call `CP210x_Close()` to close the device handle. No further operations should be performed with the device until it resets, re-enumerates in Windows, and a new handle is opened.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210x_Reset( HANDLE Handle )`

Parameters :
1. Handle—Handle to the device to close as returned by `CP210x_Open()`.

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.2 CP210xRuntime.DLL

The CP210x Runtime API provides access to the GPIO port latch, and is meant for distribution with the product containing a CP210x device.

`CP210xRT_ReadLatch()`	Returns the GPIO port latch of a CP210x device.
`CP210xRT_WriteLatch()`	Sets the GPIO port latch of a CP210x device.
`CP210xRT_GetPartNumber()`	Returns the 1-byte Part Number of a CP210x device.
`CP210xRT_GetProductString()`	Returns the product string programmed to the device.
`CP210xRT_GetDeviceSerialNumber()`	Returns the serial number programmed to the device.
`CP210xRT_GetDeviceInterfaceString()`	Returns the interface string programmed to the device.

Typically, the user initiates communication with the target CP210x device by opening a handle to a COM port using `CreateFile()` (See *AN197: Serial Communication Guide for CP210x*). The handle returned allows the user to call the API functions listed above. Each of these functions are described in the following sections. Type definitions and constants are defined in the file `CP210xRuntimeDLL.h`.

Note: Functions calls into this API are blocked until completed. This can take several milliseconds depending on USB traffic.

1.2.1 CP210xRT_ReadLatch

Description : Gets the current port latch value from the device.

Supported Devices : CP2102N, CP2103, CP2104, CP2105, CP2108

Prototype : `CP210xRT_ReadLatch( HANDLE cyHandle, LPWORD lpLatch)`

Parameters :
1. Handle—Handle to the Com port returned by `CreateFile()`.
2. Latch—Pointer for 1-byte return GPIO latch value [Logic High = 1, Logic Low = 0].

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_FUNCTION_NOT_SUPPORTED`

1.2.2 CP210xRT_WriteLatch

Description : Sets the current port latch value for the device.

Supported Devices : CP2102N, CP2103, CP2104, CP2105, CP2108

Prototype : `CP210xRT_WriteLatch(HANDLE cyHandle, WORD mask, WORD latch)`

Parameters :
1. Handle—Handle to the Com port returned by `CreateFile()`.
2. Mask—Determines which pins to change [Change = 1, Leave = 0].
3. Latch—1-byte value to write to GPIO latch [Logic High = 1, Logic Low = 0].

Return Value : `CP210x_STATUS`
- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_FUNCTION_NOT_SUPPORTED`

1.2.3 CP210xRT_GetPartNumber

Description : Gets the part number of the current device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210x_STATUS CP210xRT_GetPartNumber(HANDLE Handle, LPBYTE PartNum)`

Parameters :

1. Handle—Handle to the Com port returned by `CreateFile()`.
2. PartNum—Pointer to a byte containing the return code for the part number.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`

1.2.4 CP210xRT_GetDeviceProductString

Description : Gets the product string in the current device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210xRT_GetDeviceProductString(HANDLE cyHandle, LPVOID lpProduct, LPBYTE lpbLength , BOOL bConvertToASCII = TRUE )`

Parameters :

1. Handle—Handle to the Com port returned by `CreateFile()`.
2. lpProduct—Variable of type `CP210x_PRODUCT_STRING` returning the NULL terminated product string.
3. lpbLength—Length in characters (not bytes) not including a NULL terminator.
4. ConvertToASCII—Boolean that determines whether the string should be left in Unicode, or converted to ASCII. This parameter is true by default, and will convert to ASCII.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_INVALID_PARAMETER`

1.2.5 CP210xRT_GetDeviceSerialNumber

Description : Gets the product string in the current device.

Supported Devices : CP2101, CP2102, CP2102N, CP2103, CP2104, CP2105, CP2108, CP2109

Prototype : `CP210xRT_GetDeviceSerialNumber(HANDLE cyHandle, LPVOID lpSerialNumber, LPBYTE lpbLength, BOOL bConvertToASCII = TRUE )`

Parameters :

1. Handle—Handle to the Com port returned by `CreateFile()`.
2. lpSerialNumber—Variable of type `CP210x_SERIAL_STRING` returning the NULL terminated serial string.
3. lpbLength—Length in characters (not bytes) not including a NULL terminator.
4. ConvertToASCII—Boolean that determines whether the string should be left in Unicode, or converted to ASCII. This parameter is true by default, and will convert to ASCII.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_INVALID_PARAMETER`

1.2.6 CP210xRT_GetDeviceInterfaceString

Description : Gets the interface string of the current device.

Supported Devices : CP2105, CP2108

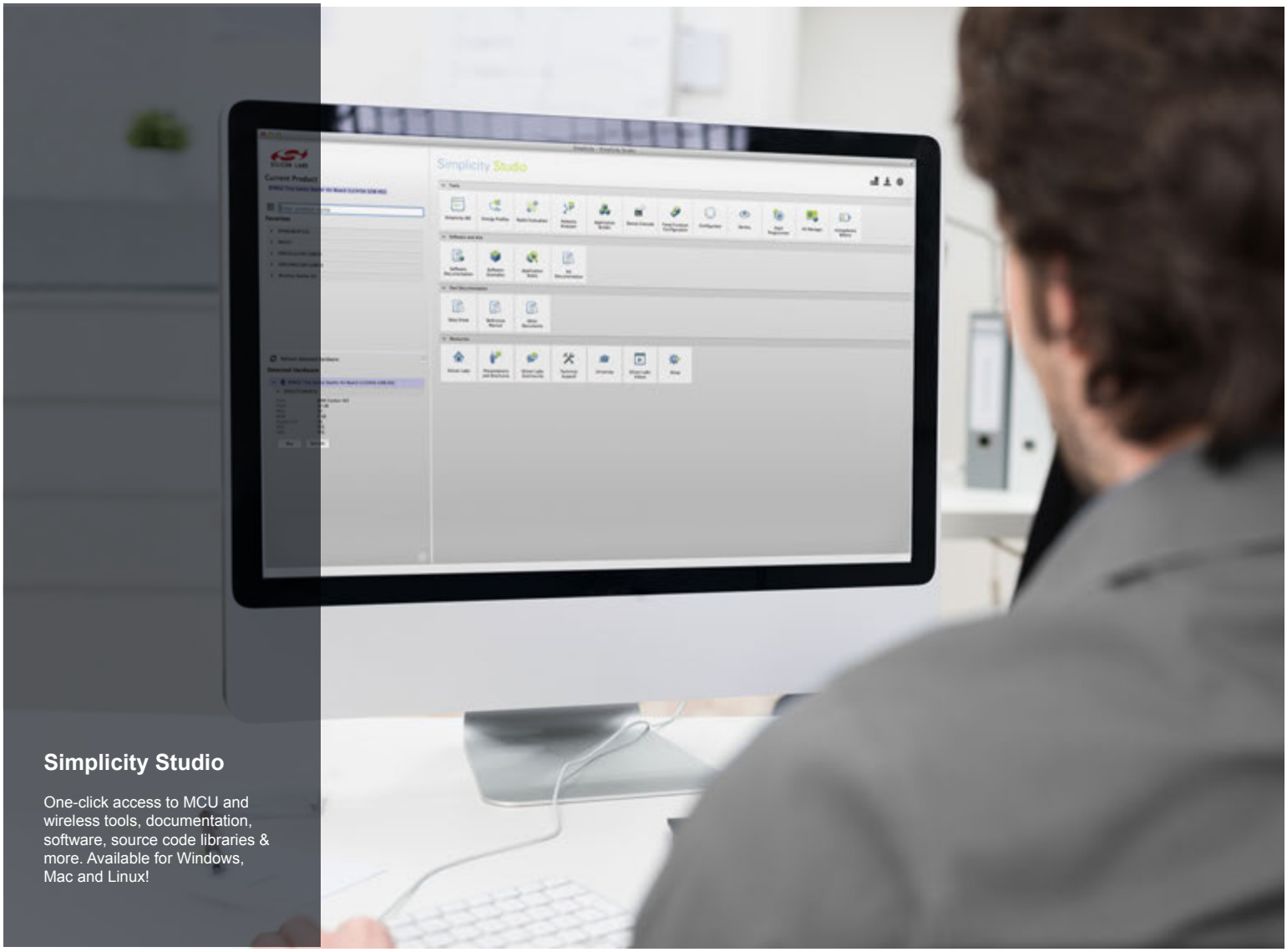
Prototype : `CP210xRT_GetDeviceInterfaceString(HANDLE cyHandle, LPVOID lpInterfaceString, LPBYTE lpbLength, BOOL bConvertToASCII)`

Parameters :

1. Handle—Handle to the Com port returned by `CreateFile()`.
2. lpInterfaceString—Variable of type `CP210x_SERIAL_STRING` returning the NULL terminated serial string.
3. lpbLength—Length in characters (not bytes) not including a NULL terminator.
4. ConvertToASCII—Boolean that determines whether the string should be left in Unicode, or converted to ASCII. This parameter is true by default, and will convert to ASCII.

Return Value : `CP210x_STATUS`

- `CP210x_SUCCESS`
- `CP210x_INVALID_HANDLE`
- `CP210x_DEVICE_IO_FAILED`
- `CP210x_INVALID_PARAMETER`



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