

Clave2 Basic

API Reference Version 2.3.1.0

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About the Guide

Type	Model	Hardware Version	Guide Version	Releasing Date
Local	Basic	V1.x.x,V3.0.x	V2.3.1.0	2017.03.20

CONVENTIONS USED

The following conventions are used throughout this document:

<i>Italic</i>	File Names and Directory Names.
Bold	Keystrokes, Menu Items, and Window Names and Fields
Consolas	API parameter
Arial	API Macro, Error Code
CAP	API Struct
	Critical Information

DOCUMENT IMPROVEMENT

Document Writing Team dedicates to insure the accuracy and completeness of context. Your feedback will assist them to make continuous improvement on Clave2 document. Please do not hesitate to email us, sales@sense.com.cn.

Brief Description

The Generic API of device.

LC_open

Open a matching device according to a valid Developer ID and index (in case of multiple devices plugged in).

```
int LCAPI LC_open(  
    IN int vendor,  
    IN int index,  
    OUT lc_handle_t *handle  
);
```

Parameters

vendor	[IN] Developer ID (0=all)
Index	[IN] Index of devices (0=first, and so on)
handle	[OUT] Returned device handle

Return Value

Device not found	LC_FIND_DEVICE_FAILED
Device found but failed to open	LC_OPEN_DEVICE_FAILED
Device open	LC_SUCCESS
handle returns device handle	

Remarks

Open in exclusive mode.

LC_close

Close a device.

```
int LCAPI LC_close(  
    IN lc_handle_t handle  
);
```

Parameters

handle	[IN] Opened device handle
--------	---------------------------

Return Value

Device closed successfully	LC_SUCCESS
Device failed to close	Go to error code

Remarks

Device cannot be closed repeatedly.

Closing device will also clear out the password validation status.

LC_passwd

Validate a password.

```
int LCAPI LC_passwd(  
    IN lc_handle_t handle,  
    IN int type,  
    IN unsigned char *passwd  
);
```

Parameters

handle	[IN] Opened device handle
type	[IN] Password type (0=Admin, 1=User, 2=Authentication)
password	[IN] Password (8 bytes)

Return Value

Invalid password	LC_INVALID_PASSWORD
Valid password	LC_SUCCESS

Remarks

Valid password grants corresponding privileges.

LC_read

Read data from specified block.

```
int LCAPI LC_read(  
    IN lc_handle_t handle,  
    IN int block,  
    OUT unsigned char *buffer  
);
```

Parameters

handle	[IN] Opened device handle
block	[IN] Block number (0~9)
buffer	[OUT] Read from data buffer (>=512 bytes), the number 3 block is 384 bytes

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires to verify a password before reading data. (any type password)

LC_write

Write data to specified block.

```
int LCAPI LC_write(  
    IN lc_handle_t handle,  
    IN int block,  
    IN unsigned char *buffer  
);
```

Parameters

handle	[IN] Opened device handle
block	[IN] Block number (0~9)
buffer	[IN] Write into data buffer (>=512 bytes), the number 3 block is 384 bytes

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires to verify a password before writing data. (Block 0 is writable to any privileges, Block 1~9 is only writable to admin privileges.)

LC_encrypt

Use internal AES algorithm to encrypt data.

```
int LCAPI LC_encrypt(  
    IN lc_handle_t handle,  
    IN unsigned char *plaintext,  
    OUT unsigned char *ciphertext  
);
```

Parameters

handle	[IN] Opened device handle
plaintext	[IN] Plaintext to be encrypted (16 bytes)
ciphertext	[OUT] Ciphertext, after being encrypted (16 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires user privileges.

LC_decrypt

Use internal AES algorithm to decrypt data.

```
int LCAPI LC_decrypt(  
    IN lc_handle_t handle,  
    IN unsigned char *ciphertext,  
    OUT unsigned char *plaintext  
);
```

Parameters

handle	[IN] Opened device handle
ciphertext	[IN] Ciphertext to be decrypted (16 bytes)
plaintext	[OUT] Plaintext, after being decrypted (16 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires User privileges.

LC_set_passwd

Set up a new password.

```
int LCAPI LC_set_passwd(  
    IN lc_handle_t handle,  
    IN int type,  
    IN unsigned char *passwd,  
    IN int retries  
);
```

Parameters

handle	[IN] Opened device handle
type	[IN] Password type (0=Admin, 1=User, 2=Authentication)
passwd	[IN] New password (8 bytes)
retries	[IN] Retries counter (1~15), setting -1 disables the function of retries. Retries is not applicable on Admin and User Password.

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires Admin privileges.

LC_change_passwd

Change Authentication password.

```
int LCAPI LC_change_passwd(  
    IN lc_handle_t handle,  
    IN int type,  
    IN unsigned char *oldpasswd,  
    IN unsigned char *newpasswd  
);
```

Parameters

handle	[IN] Opened device handle
type	[IN] Password type
oldpasswd	[IN] Old password (8 bytes)
newpasswd	[IN] New password (8 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Only Authentication privileges can change password by using this function. Other users can only use **LC_set_passwd** to reset.

LC_get_hardware_info

Read device information.

```
int LCAPI LC_get_hardware_info(  
    IN lc_handle_t handle,  
    OUT LC_hardware_info *info  
);
```

Parameters

handle	[IN] Opened device handle
info	[OUT] Struct pointer storing hardware information

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

LC_get_software_info

Read version information.

```
int LCAPI LC_get_software_info(  
    OUT LC_software_info *info  
);
```

Parameters

info	[OUT] Struct pointer storing software information
------	---

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

LC_Hmac()

Calculate HMAC value by hardware.

```
int LCAPI LC_hmac (  
    IN lc_handle_t handle,  
    IN unsigned char *text,  
    IN int textlen,  
    OUT unsigned char *digest  
);
```

Parameters

handle	[IN] Opened device handle
text	[IN] The data that needs to be HMAC value
textlen	[IN] Length of text (by byte, >=0)
digest	[OUT] HMAC value (20 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

It requires Authentication privileges.

LC_Hmac_software()

Calculate HMAC value by software.

```
int LCAPI LC_hmac_software (  
    IN unsigned char *text,  
    IN int textlen,  
    IN unsigned char *key  
    OUT unsigned char *digest  
);
```

Parameters

text	[IN] The data that needs to be HMAC value
textlen	[IN] Length of text (by byte, >=0)
key	[IN]key of HMAC algorithm (20 bytes Hex string)
digest	[OUT, RETVAL] HMAC value (20 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

It requires authentication privileges.

While using the device to authenticate, parameter key must be identical to the device Authentication Key.

LC_update

Update remotely.

```
int LCAPI LC_update(  
    IN lc_handle_t handle,  
    IN unsigned char *buffer  
);
```

Parameters

handle	[IN] Opened device handle
buffer	[IN] Buffer area of remote updating package

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires User privileges.



Must not plug out the device while updating, for it will cause the alteration of Admin Password.

LC_set_key

Reset Remote Update Key and Authentication Key.

```
int LCAPI LC_update(  
    IN lc_handle_t handle,  
    IN int type,  
    IN unsigned char *key,  
);
```

Parameters

handle	[IN] Opened device handle
type	[IN] key type (0=Remote Update Key, 1=Authentication Key)
key	[IN] Key (20 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It requires Admin privileges.

LC_gen_update_pkg

Generate remote updating package.

```
int LCAPI LC_gen_update_pkg (  
    IN unsigned char *serial,  
    IN int block,  
    IN unsigned char *buffer,  
    IN unsigned char *key,  
    OUT unsigned char *uptPkg  
);
```

Parameters

serial	[IN] Serial number of updating dongle
block	[IN] Block number (1~9)
buffer	[IN] Updating content (Block in byte)
key	[IN] Remote updating key (in byte)
uptPkg	[OUT] Generated updating package (in byte)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

It is operatable without any devices.

LC_get_version_info

Get device version information.

```
int LCAPI LC_get_version_info (  
    IN lc_handle_t handle,  
    OUT LC_version_info *versioninfo  
);
```

Parameters

handle	[IN] Opened device handle
versioninfo	[OUT] Struct pointer storing device version information

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

LC_flash_led

Get device version information.

```
int LCAPI LC_flash_led (  
    IN lc_handle_t handle,  
    IN unsigned char types  
);
```

Parameters

handle	[IN] Opened device handle
types	[IN] the led of device turn off or not,when the value is "0xff",it means to turn off LED; when the other value,it means to turn on LED

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Error Code

Decimal Number Returned	Macro	Definition
0	LC_SUCCESS	Successful
1	LC_OPEN_DEVICE_FAILED	Open device failed
2	LC_FIND_DEVICE_FAILED	No matching device was found
3	LC_INVALID_PARAMETER	Parameter Error
4	LC_INVALID_BLOCK_NUMBER	Block Error
5	LC_HARDWARE_COMMUNICATE_ERROR	Communication error with hardware
6	LC_INVALID_PASSWORD	Invalid Password
7	LC_ACCESS_DENIED	No privileges
8	LC_ALREADY_OPENED	Device is open
9	LC_ALLOCATE_MEMORY_FAILED	Allocate memory failed
10	LC_INVALID_UPDATE_PACKAGE	Invalid update package
11	LC_SYN_ERROR	Synchronization error
12	LC_OTHER_ERROR	Unknown error
13	LC_OPERATION_NOT_SUPPORTED	Other unknown exceptions
14	LC_DEVICE_BLOCKED	device locked
15	LC_WRITE_FAILED	FLASH write failed

Brief Description

The Script ActiveX Control is the second encapsulation based on Generic API. This control can be applied on Internet Explorer, and available to develop web pages using this control by VBScript, Javascript and etc.

Sample codes are provided in the SDK.

The Script ActiveX Control covers most of Generic API. Its API definition is as follows:

CLSID: {D9AD0FA7-7515-48B0-87F5-0A9546F9D5E8}

IID: {D9AD0FA7-7515-48B0-87F5-0A9546F9D5E8}

ProgID: LC_SEC.LCSEC.1

Open()

Open a matching device according to its index.

```
HRESULT Open(  
    IN LONG index  
);
```

Parameters

Index	[IN] Index of devices (0=first, and so on)
-------	--

Return Value

Device not found	LC_FIND_DEVICE_FAILED
Device found but failed to open	LC_OPEN_DEVICE_FAILED
Device open	LC_SUCCESS

Remarks

Open in exclusive mode.

Multi-thread not supported.

Close()

Close an open device.

```
HRESULT Close(  
    );
```

Parameters

Return Value

Device closed successfully

LC_SUCCESS

Device failed to close

Go to [error code](#)

Remarks

Device cannot be closed repeatedly.

Closing device will also clear out the password validation status.

Multi-thread not supported.

Passwd()

Validate a password.

```
HRESULT Passwd(  
    IN LONG type,  
    IN BSTR passwd  
);
```

Parameters

type	[IN] Password type (0=Admin, 2=Authentication)
password	[IN] Password(16 bytes)

Return Value

Invalid password	LC_INVALID_PASSWORD
Valid password	LC_SUCCESS

Remarks

Valid password grants corresponding privileges to owner.

Multi-thread supported.

Set_passwd()

Set up a new password.

```
HRESULT Set_passwd (
    IN    LONG    type,
    IN    BSTR     passwd,
    IN    LONG    retries
);
```

Parameters

type	[IN] Password type (0=Admin, 2=Authentication)
passwd	[IN] New password (16 bytes)
retries	[IN] Retry counter (1~15), setting -1 disables the function of retries. Retries is not applicable on Admin Password.

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

- It requires admin privileges.
- Multi-thread supported.

Change_passwd()

Change authentication password.

```
HRESULT Change_passwd (  
    IN    BSTR    oldpasswd,  
    IN    BSTR    newpasswd  
);
```

Parameters

oldpasswd	[IN] Old password (16 bytes)
newpasswd	[IN] New password (16 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Only authentication privileges can change Authentication password. Other users can only use **Set_passwd()** to reset.

Multi-thread supported.

Get_hardware_info()

Get device information.

```
HRESULT Get_hardware_info (  
    IN          LONG      type,  
    OUT, RETVAL  VARIANT  *info  
);
```

Parameters

type	[IN] Type of hardware information (0=Device SN, 1=Production Date)
info	[OUT, RETVAL] hardware information (32 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Multi-thread supported.

Hmac()

Calculate HMAC value by hardware.

```
HRESULT Hmac (
    IN          BSTR      text,
    IN          LONG      textlen,
    OUT, RETVAL VARIANT    *digest
);
```

Parameters

text	[IN] The data that needs the HMAC value
textlen	[IN] Length of text (by byte, >=0)
digest	[OUT, RETVAL] HMAC value (80 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

It requires authentication privileges.

Multi-thread supported.

Hmac_software()

Calculate HMAC value by software.

```
HRESULT Hmac_software (
    IN          BSTR      text,
    IN          LONG      textlen,
    IN          BSTR      key,
    OUT, RETVAL  VARIANT   *digest
);
```

Parameters

text	[IN] The data that needs the HMAC value
textlen	[IN] Length of text (by byte, >=0)
key	[IN]key of HMAC algorithm (80 bytes Hex string)
digest	[OUT, RETVAL] HMAC value (80 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

- It requires authentication privileges.
- While using the device to authenticate, parameter key must be identical to the device Authentication Key.
- Multi-thread supported.

Set_key()

Reset remote update key.

```
HRESULT Set_key (  
    IN    BSTR    key  
);
```

Parameters

key [IN] Key (80 bytes)

Return Value

Successful LC_SUCCESS
Failed Go to [error code](#)

Remarks

It requires admin privileges.
Multi-thread supported.

Error Code

It is required to have returned value AND operated with 0xff.

Decimal Number Returned	Macro	Definition
0	LC_SUCCESS	Successful
1	LC_OPEN_DEVICE_FAILED	Open device failed
2	LC_FIND_DEVICE_FAILED	No matching device was found
3	LC_INVALID_PARAMETER	Parameter Error
4	LC_INVALID_BLOCK_NUMBER	Block Error
5	LC_HARDWARE_COMMUNICATE_ERROR	Communication error with hardware
6	LC_INVALID_PASSWORD	Invalid Password
7	LC_ACCESS_DENIED	No privileges
8	LC_ALREADY_OPENED	Device is open
9	LC_ALLOCATE_MEMORY_FAILED	Allocate memory failed
10	LC_INVALID_UPDATE_PACKAGE	Invalid update package
11	LC_SYN_ERROR	Synchronization error
12	LC_OTHER_ERROR	Unknown error
13	LC_OPERATION_NOT_SUPPORTED	Other unknown exceptions
14	LC_DEVICE_BLOCKED	device locked
15	LC_WRITE_FAILED	FLASH write failed

Brief Description

The Middleware ActiveX Control is the second encapsulation based on Generic API. This control can be applied on any development environment using COM or OLE technology. The supported development platforms are as follows:

- Microsoft Visual C++
- Microsoft Visual Basic
- Inprise C++ Builder
- Inprise Delphi

Sample codes are provided in the SDK.

The Middleware ActiveX Control covers most of Generic API. Its API definition is as follows:

CLSID: {EEFB0056-0E92-44A4-8B10-0C0BD75C56A8}

IID: {EEFB0056-0E92-44A4-8B10-0C0BD75C56A8}

ProgID: LC_FULL.LCFULL.1

Open()

Open a matching device according to its index.

```
HRESULT Open(  
    IN LONG index  
);
```

Parameters

Index	[IN] Index of devices (0=first, and so on)
-------	--

Return Value

Device not found	LC_FIND_DEVICE_FAILED
Device found but failed to open	LC_OPEN_DEVICE_FAILED
Device open	LC_SUCCESS

Remarks

Open in exclusive mode.

Multi-thread not supported.

Close()

Close an open device.

```
HRESULT Close(  
    );
```

Parameters

Return Value

Device closed successfully

LC_SUCCESS

Device failed to close

Go to [error code](#)

Remarks

Device cannot be closed repeatedly.

Closing device will also clear out the password validation status.

Multi-thread not supported.

Passwd()

Validate a password.

```
HRESULT Passwd(  
    IN    LONG    type,  
    IN    BYTE*   passwd  
);
```

Parameters

type	[IN] Password type (0=Admin, 2=Authentication)
password	[IN] Password(8 bytes)

Return Value

Invalid password	LC_INVALID_PASSWORD
Valid password	LC_SUCCESS

Remarks

Valid password grants corresponding privileges to owner.

Multi-thread supported.

Set_passwd()

Set up a new password.

```
HRESULT Set_passwd (
    IN    LONG    type,
    IN    BYTE*    passwd,
    IN    LONG    retries
);
```

Parameters

type	[IN] Password type (0=Admin, 2=Authentication)
passwd	[IN] New password (8 bytes)
retries	[IN] Retry counter (1~15), setting -1 disables the function of retries. Retries is not applicable on Admin Password.

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

- It requires admin privileges.
- Multi-thread supported.

Change_passwd()

Change authentication password.

```
HRESULT Change_passwd (  
    IN    BYTE*    oldpasswd,  
    IN    BYTE*    newpasswd  
);
```

Parameters

oldpasswd	[IN] Old password (8 bytes)
newpasswd	[IN] New password (8 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Only authentication privileges can change Authentication password. Other users can only use **Set_passwd()** to reset.

Multi-thread supported.

Get_hardware_info()

Gain device information.

```
HRESULT Get_hardware_info (
    IN     LONG    type,
    OUT    BYTE*   info
);
```

Parameters

type	[IN] Type of hardware information (0=Device SN, 1=Production Date)
info	[OUT] hardware information (8 bytes)

Return Value

Successful	LC_SUCCESS
Failed	Go to error code

Remarks

Multi-thread supported.

Hmac()

Calculate HMAC value by hardware.

```
HRESULT Hmac (
    IN      BYTE*  text,
    IN      LONG   textlen,
    OUT     BYTE*  digest
);
```

Parameters

text	[IN] The data that needs the HMAC value
textlen	[IN] Length of text (by byte, >=0)
digest	[OUT, RETVAL] HMAC value (20 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

It requires authentication privileges.

Multi-thread supported.

Hmac_software()

Calculate HMAC value by software.

```
HRESULT Hmac_software (
    IN      BYTE*    text,
    IN      LONG     textlen,
    IN      BYTE*    key,
    OUT     BYTE*    *digest
);
```

Parameters

text	[IN] The data that needs the HMAC value
textlen	[IN] Length of text (by byte, >=0)
key	[IN]key of HMAC algorithm (20 bytes Hex string)
digest	[OUT, RETVAL] HMAC value (20 bytes)

Return Value

Successful	LC_SUCCESS digest returns the calculated HMAC value
Failed	Go to error code

Remarks

It requires authentication privileges.

While using the device to authenticate, key must be identical to the device Authentication Key.

Multi-thread supported.

Set_key()

Reset remote update key.

```
HRESULT Set_key (  
    IN    BYTE*    key  
);
```

Parameters

key [IN] Key (20 bytes)

Return Value

Successful LC_SUCCESS
Failed Go to [error code](#)

Remarks

It requires admin privileges.
Multi-thread supported.

Error Code

It is required to have returned value AND operated with 0xff.

Decimal Number Returned	Macro	Definition
0	LC_SUCCESS	Successful
1	LC_OPEN_DEVICE_FAILED	Open device failed
2	LC_FIND_DEVICE_FAILED	No matching device was found
3	LC_INVALID_PARAMETER	Parameter Error
4	LC_INVALID_BLOCK_NUMBER	Block Error
5	LC_HARDWARE_COMMUNICATE_ERROR	Communication error with hardware
6	LC_INVALID_PASSWORD	Invalid Password
7	LC_ACCESS_DENIED	No privileges
8	LC_ALREADY_OPENED	Device is open
9	LC_ALLOCATE_MEMORY_FAILED	Allocate memory failed
10	LC_INVALID_UPDATE_PACKAGE	Invalid update package
11	LC_SYN_ERROR	Synchronization error
12	LC_OTHER_ERROR	Unknown error
13	LC_OPERATION_NOT_SUPPORTED	Other unknown exceptions
14	LC_DEVICE_BLOCKED	device locked
15	LC_WRITE_FAILED	FLASH write failed