Canon
N10-W02 provider

Version 1.0.3

User's guide

July 22, 2020

[Remarks]

[Revision history]

Version	Date	Content
1.0.0	2017-12-26	First edition.
1.0.1	2018-07-24	@USER was abolished @PASSWORD was abolished
1.0.2	2019-02-12	Modified explanation of @ORIGIN
1.0.2	2019-08-22	Added a remedy for camera connection failure
1.0.3	2020-07-22	Modified a bug in bitmap conversion

[Compatible models]

Model	Version	Note

Contents

1. Introduction

This is a user's guide of a CAO provider for Canon N10-W02 series. Hereafter, this CAP provider (CaoProvCanonN10-W02.dll) is called N10-W02 provider.

The following chapter describes the overview of N10-W02 and Chapter 3 lists the command reference.

2. Overview of provider

2.1. Overview

N10-W02 provider absorbs Canon N10-W02 dependent part and provides CAO provider interface-supported functions. The file format is DLL (Dynamic Link Library) and it will be loaded from CAO engine automatically when it is used. To use N10-W02 provider, you need to install ORiN2SDK or manually perform the registration based on the following information.

Table 1 N10-W02 provider

File name	CaoProvCanonN10-W02.dll
ProgID	CaoProv.Canon.N10-W02
Registration[1]	regsvr32 CaoProvCanonN10-W02.dll
Remove registry registration	regsvr32 /u CaoProvCanonN10-W02.dll

[1] If it is installed with ORiN SDK, no need to register/delete manually.

2.2. Method and Property

2.2.1. CaoWorkspace::AddController method

N10-W02 provider establishes communication by referring to the connection parameters for communication when AddController is executed.

When AddControlle execution, specify the connection destination address with option strings.

Depending on the computer setting, a server name unresolved error (error code: 0x80072EE7) may occur. For the remedy of this error, refer to Appendix (5.1.Remedy for connection failure at AddController due to an error).

Syntax AddController(<bstrCtrlName:BSTR>,<bstrProvName:BSTR>,
<bstrPCName:BSTR>,<bstrOption:BSTR>))

bstrCtrlName	:	[In] Controller name (any)
bstrProvName	:	[in] Provider name Fixed to =" CaoProv.Canon.N10-W02"
bstrPcName	:	[in] Computer name where the provider runs (any)
bstrOption	:	[in] Option character string

The following table shows a list of option character strings.

Table 2 Option character string of CaoWorkspace::AddController

Option	Description
Conn=<Connection parameter>	Either Conn option or Server option is required. Specify the communication format and connection parameter. For details, refer to “Conn option”. If both the Conn option and Server option are entered, a multiple definition error is returned.
Server=<IP address>	Either Conn option or Server option is required. Specify an IP address of N10-W02 camera to connect Example: ”Server=192.168.0.90” If both the Conn option and Server option are entered, a multiple definition error is returned.
[Timeout=<timeout>]	Specify the communication timeout at the data sending/receiving. (millisecond) If this option is not entered, “500msec” will be set automatically.

[User=<user name>]	Specify a user name of a camera to connect. If this option is not entered, "admin" will be set automatically.
[Password=<password>]	Specify a password of a camera to connect. If this option is not entered, "password" will be set automatically.

2.2.1.1. Conn option

The following shows connection parameter strings of Conn option.

- **Ethernet device**

  "eth:<IP Address>"

  <IP Address> : IP address of N10-W02 camera to connect (Port number must be 80 always for the HTTP communication.)
  Example: "192.168.0.90", "192.168.100.50"

Example

```
Dim caoEng as CaoEngine
Dim caoCtrl as CaoController

Set caoEng  = New caoEngine
Set caoCtrl = caoEng.Workspaces(0).AddController("N10-W02", "CaoProv.Canon.N10-W02", "",
"Conn=eth:192.168.0.90")
```

2.2.2. CaoController::Execute method

Execute method of CaoController class sends and receives a command. Specify a command name for the first argument and command parameter for the second argument.

For details of commands implemented in N10-W02 provider, refer to Chapter 3.

Synatax Execute(<bstrCommandName:VT_BSTR>[,<vntParam:VT_VARIANT>])

<bstrCommandName > : [in] Command Name

<vntParam> : [in] Parameter

2.2.3. CaoController::AddVariable method

AddVariable method of CaoController class is a method to access variables. In N10-W02 provider, enter a user variable or a system variable for a variable name.

For information about variables implemented in N10-W02 provider, refer to Table 3 and Table 4.

Syntax AddVariable(<bstrVariableName:VT_BSTR>[,<bstrOption:VT_BSTR>])

<bstrVariableName> : [in] Variable name

<bstrOption> : [in] Option character string

Example

```
Dim oFirmware As Object
Dim FirmWare as String
Set oFirmware = caoCtrl.AddVariable("@FIRMWARE")
FirmWare = Firmware.Value
```

2.3. Variable list

2.3.1. Controller class

Table 3 Controller class user variable list

Variable name	Data type	Description	Attribute	
			get	put
IMAGE	VT_UI1 | VT_ARRAY	Static image (bitmap)	✓	-
FOCUS_MODE	VT_BSTR	Focus mode “manual”: Manual “infinity”: Fix to “Infinity” “one_shot”: One shot auto-focus “stop”: Stop “near”: Move to Near focus “far”: Move to Far focus	✓	✓
FOCUS_LIST	VT_BSTR	Focus mode list “infinity, manual”	✓	-

FOCUS_VALUE	VT_I4	Focus value When this parameter is obtained, if FOCUS_MODE (focus mode) is other than “manual”, E_OPERATION_MODE (refer to Table 5 Original error) will be returned.	✓	✓
FOCUS_RAW	VT_I4	Position of focus lens.	✓	-
EXPOSURE	VT_BSTR	Exposure mode “auto”: Automatic “manual”: Manual	✓	✓
EXPOSURE_LIST	VT_BSTR	Exposure mode list “auto, manual”	✓	-
SHUTTER	VT_I4	Shutter speed When this parameter is obtained, if EXPOSURE (exposure mode) is other than “manual”, E_OPERATION_MODE (refer to Table 5 Original error) will be returned.	✓	✓
SHUTTER_LIST	VT_BSTR	Shutter speed list “30,34,40,48,60,75, 90,100,120,150,180, 210,250,300,360, 420,500,600,720 840,1000,1200,1400, 1700,2000”	✓	-
GAIN	VT_I4	Gain value When this parameter is obtained, if EXPOSURE (exposure mode) is other than “manual”, E_OPERATION_MODE (refer to Table 5 Original error) will be returned.	✓	✓
GAIN_MAX	VT_I4	Maximum value of gain	✓	-
GAIN_MIN	VT_I4	Minimum value of gain	✓	-
WHITEBALANCE	VT_BSTR	White balance mode “manual”: Manual “one_shot”: One-shot white balance	✓	✓

WHITEBALANCE_LIST	VT_BSTR	White balance mode list “manual, one_shot”	✓	-
CAMERA_ID	VT_I4	Camera number currently selected	✓	-
TYPE	VT_BSTR	Camera type	✓	-
STATUS	VT_BSTR	Camera control availability “enabled”: Camera control available “disabled”: Camera control not available	✓	-
TIMESTAMP	VT_BSTR	Elapsed time from the camera start	✓	-

Table 4 Controller class system variable list

Variable name	Data type	Description	Attribute	
			get	put
@ORIGIN	VT_BSTR	Address of a camera server	✓	−
@HARDWARE	VT_BSTR	Model name	✓	−
@FIRMWARE	VT_BSTR	Firmware version	✓	−
@COUNT	VT_I4	The number of cameras	✓	−
@TIMEOUT	VT_I4	Communication timeout	✓	✓

2.4. Error code

Command execution status is returned as HRESULT. For about ORiN2 common errors, refer to the error code section of ORiN2 programming guide. Errors not defined in ORiN2 are returned with the following format.

Original error code : 0x80100xxx
HTTP error code : 0x80101xxx
N10-W02 error code : 0x80102xxx

2.4.1. Original error code

At the command execution, a provider original error code will be returned.

Table 5 Original error

Error code	Error name	Description
0x80100001	E_OPERATION_MODE	Tried to obtain a variable when relevant variable is not available. Example: Change the FOCUS_VALUE when FOCUS_MODE is “infinity”.

2.4.2. HTTP error code

An error code is returned according to the HTTP status that is returned as a process result of HTTP protocol level.

Table 6 HTTP error

Error code	Applicable HTTP status	Description
0x80101130	304 Not Modified	Data is not updated
0x80101190	400 Bad Request	Request is incorrect
0x80101191	401 Unauthorized	User authorization failed
0x80101194	404 Not Found	A resource corresponding to the requested URL is not exist.
0x8010119B	411 Length Required	Content-Length is not specified
0x801011F4	500 Internal Server Error	Request denied due to internal processing error
0x801011F7	503 Service Unavailable	Request denied due to temporary overload

2.4.3. N10-W02 error code

An error code is returned according to the Livescope-Status value that is a HTTP message transferred from N10-W02 at the command execution timing.

Table 7 N10-W02 error

Error code	Applicable Livescope status	Description

0x8010212E	302 Camera is not available	Specified camera ID is not exist.
0x8010212F	303 Camera is not controllable	Control is not available due to camera error
0x80102191	401 Unknown Operator	Undefined command was specified
0x80102193	403 Invalid Parameter Value	Specified parameter value is not correct.
0x80102194	404 Operation Timeout	Command execution failed to finish within predetermined timeout period.
0x80102196	406 Parameter Missing	A necessary parameter is not specified
0x80102197	407 Invalid Request	Invalid session function was requested.
0x80102198	408 Conflict	Exclusive operation was requested.
0x801021F5	501 Unknown Connection ID	Requested session is not exist.
0x801021F7	503 Too many clients	Maximum connection counts exceeded.
0x801021FB	507 Insufficient Privilege	Access failed due to access restriction
0x801021FC	508 Request Refused	Request denied due to temporary connection restriction of a camera.

3. Command reference

Table 8 Command list

Category	Command	Function	
Operation			
	OneShotFocus	One shot auto-focus	P13
	OneShotWhiteBalance	One-shot white balance	P13
	SaveWhiteBalance	Saves the white balance status	P14
	SetParameter	Sets several parameters all together.	P14

3.1. Operation

3.1.1. CaoController::Execute("OneShotFocus") command

Bring a camera into focus at the current position. After the command execution, wait until the value of variable [FOCUS_MODE] is changed from “one_shot” or the timeout period specified by argument elapses.

Syntax OneShotFocus([<lTimeout>])

Argument : [in]<lTimeout> : timeout(VT_I4)(msec) (any)
Default value : 5000
Return value : none

Example

```
caoCtrl.Execute("OneShotFocus") 'Bring a camera into focus at the current position
```

3.1.2. CaoController::Execute("OneShotWhiteBalance") command

Forcibly adjust the white balance to the light source.. Wait until the value of variable [WHITEBALANCE] is changed from “one_shot” or the timeout period specified by argument elapses.

Note that this command itself cannot save the white balance adjustment result. To save the white balance setting, execute a white balance save command (refer to 3.1.3.CaoController::Execute("SaveWhiteBalance") command).

Syntax OneShotWhiteBalance([<lTimeout>])

Argument : [in]<lTimeout> : Timeout(VT_I4)(msec) (any)
Default value: 5000

Return value : none

Example

```
caoCtrl.Execute("OneShotWhiteBalance") 'Adjust the white balance to the current light source.
```

3.1.3. CaoController::Execute("SaveWhiteBalance") command

Save the current white balance execution result to the nonvolatile memory.

Note that this command itself cannot adjust the white balance. To change the white balance setting, execute a one-shot white balance command (refer to 3.1.2CaoController::Execute("OneShotWhiteBalance") command).

Syntax SaveWhiteBalance( )

Argument : none

Return value : none

Example

```
caoCtrl.Execute("SaveWhiteBalance") 'Save the white balance
```

3.1.4. CaoController::Execute("SetParameter") command

Set a specified parameter.

To set several parameters, enter several parameters at the same time.

For about parameter name to be set as argument, refer to variable names written in 2.3.Variable list.

Syntax SetParameter(<vntParamArray>[,<vntParamArray>…])

Argument : [in]<vntParamArray> :Array of setting parameters (VT_VARIANT | VT_ARRAY)

The following shows the setting parameter formats.

<bstrName> : parameter name(VT_BSTR)

<vntVal> : setting value(VT_VARIANT)

Return value : none

Example

```
Dim strFocusModeName As String
Dim strFocusModeVal As String
strFocusModeName = "FOCUS_MODE"
```

```
strFocusModeVal = "manual"

Dim strFocusValueName As String
Dim lFocusValueVal As long
strFocusValueName = "FOCUS_VALUE"
lFocusValueVal = 1500

caoCtrl.Execute("SetParameter", Array( Array( strFocusModeName, strFocusModeVal ),
Array( strFocusValueName, lFocusValueVal ) ) ) 'Set the FOCUS_MODE to "manual" and FOCUS_VALUE
to "1500".
```

4. Sample program

The following program brings a camera into focus at the current camera position, and displays the image to the picture box.

List 4-1 Sample.frm

```
'CAO engine
    Private caoEng As CaoEngine
    'CAO workspace
    Private caoWS As CaoWorkspace
    'CAO controller of N10-W02 camera
    Private caoCtrl As CaoController
    'Image data of N10-W02 camera
    Private vntPicture As CaoVariable

    Private Sub Form_Load()
        'Create CAO engine and CAO workspace
        caoEng = New CaoEngine
        caoWS = caoEng.Workspaces.Item(0)

        'CAO controller of N10-W02 camera
        caoCtrl = caoWS.AddController("N10-W02", "CaoProv.Canon.N10-W02", "",
"Conn=eth:192.168.0.90")

        'Obtain an variable object
        vntPicture = caoCtrl.AddVariable("IMAGE")

        'Execute a command that focuses on at the current position
        caoCtrl.Execute("OneShotFocus")

        Dim bArray() As Byte
        'Obtain image data
        bArray = vntPicture.Value
        'Create a MemoryStream object from binary data
        Dim mstreamCur As New MemoryStream(bArray)
        'Create an Image object from a stream, and then display it in the picture box.
        PictureBox1.Image = Image.FromStream(mstreamCur)

    End Sub
```

5. Appendix

5.1. Remedy for connection failure at AddController due to an error

If an error code (such as 0x800722EE7 or other errors) appears at AddController, do the following process.

Step.1 Start “cmd.exe”.

Step.2 Execute “netsh winhttp show proxy”, and then check the “Current WinHTTP proxy setting”.

Step.3 Execute “netsh winhttp reset proxy”, and then change the “Current WinHTTP proxy setting” to “Direct access”.

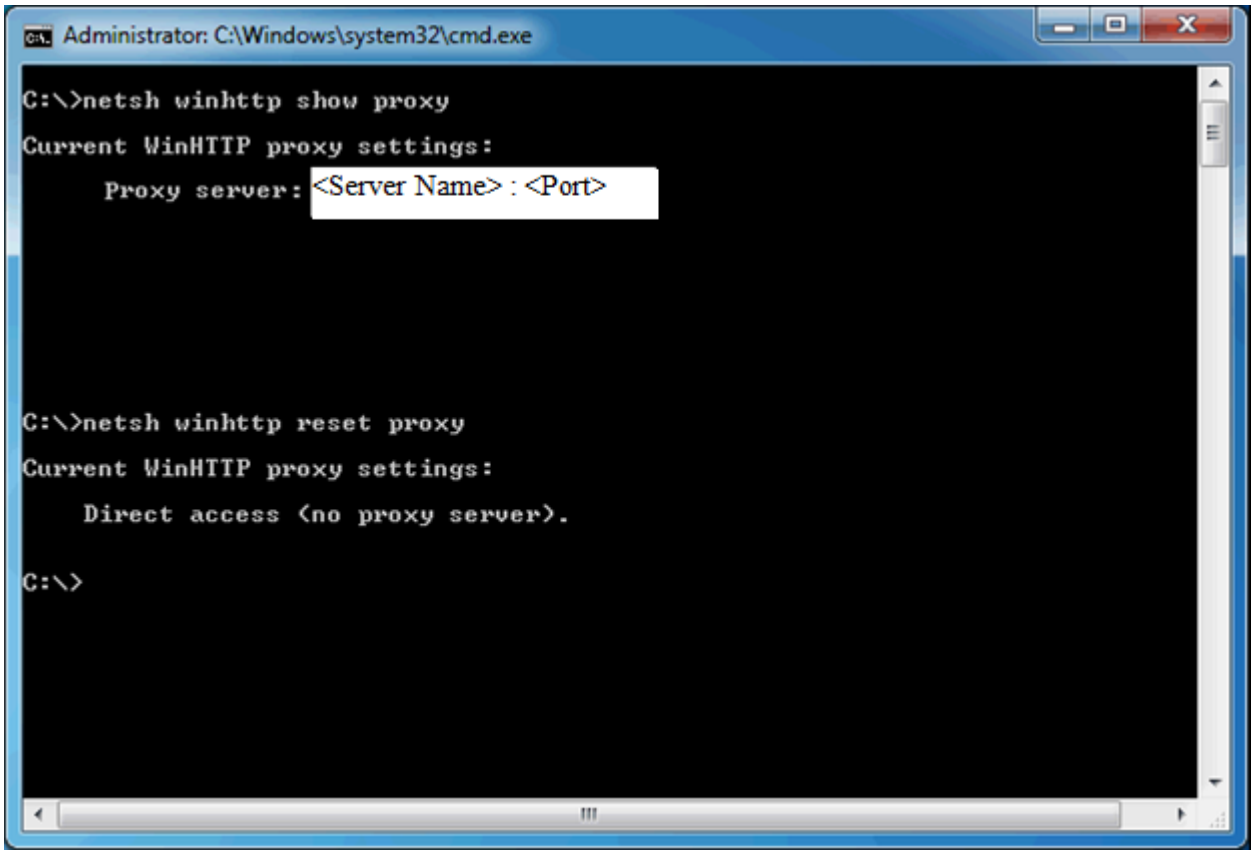

Figure 1 Command input window