

# CameraPro NET Module for Windows Phone 8

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*Manual*  
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*Harald Meyer*  
[office@tequnique.com](mailto:office@tequnique.com)

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## Introduction

CameraPro supports remote control of camera features over WiFi and Bluetooth turning your smartphone into a powerful camera controlled from web browsers, microelectronic boards (such as Arduino), and other Bluetooth and WiFi enabled devices.

Example use cases are:

- Entry control systems triggered by external sensors, like movement, temperature, or light sensors attached to an Arduino board.
- Trigger multiple CameraPro instances on different smartphones at almost the same time.
- Trigger image capture from a remote distance (for instance a group photo where the smartphone is 10 meters away).
- ...

## Bluetooth Mode

The following steps are necessary to control CameraPro over Bluetooth:

1. Each Bluetooth device has to be paired with the smartphone in the smartphone Bluetooth settings. This is only required once for each Bluetooth device.  
This setting can be found in Windows Phone 8 “Settings” – “Bluetooth”.
2. In the CameraPro Settings turn on “Bluetooth” and select the device from which commands will be received.

## WiFi Mode

The following steps are necessary to control CameraPro over WiFi:

1. Connect the smartphone to a WiFi network. If the smartphone can act as a WiFi access point then this works as well.
2. Enable “WiFi” mode in the CameraPro Settings. Optionally the port number can be changed.
3. Note down the IP address displayed in the CameraPro Settings. This address is used to send commands.

## Sending Commands

CameraPro can be controlled by sending integer style command/value pairs over Bluetooth or WiFi. The following table shows the supported commands. The corresponding values are described later in this document.

Command name	Command integer value
<b>CAMERAPRO_COMMAND_OK</b>	20
<b>CAMERAPRO_COMMAND_FAILED</b>	21
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## Bluetooth Mode

In Bluetooth mode each command sent to CameraPro consists of 7 bytes:

Byte	Value	Description
0	0x06	Header
1	0x85	Header
2	0-255	Payload size
3	0-255	Command
4+5	-32767 to 32767	Value of type int16
6	0-255	CRC value by XOR over the payload bytes 3-5.

CameraPro can send back status messages with the following format:

Byte	Value	Description
0	0x06	Header
1	0x85	Header
2	0-255	Payload size
3	0-255	Status / command
4	0-255	CRC value by XOR over the payload byte 3.

## WiFi Mode

CameraPro is controlled by sending GET requests to the smartphone IP address:

*http://<IP>:30000?k=command\_value&v=value*

“command\_value” is an integer from the commands table and “value” is an integer representing a parameter.

For instance the following command triggers the image capturing button:

*http://<IP>:30000?k=23&v=0*

**Hint:** Some smartphones disconnect the WiFi connection after some idle time. To prevent this, regular “CAMERAPRO\_COMMAND\_OK” commands with an arbitrary value can be send to CameraPro.

## Parameters

This Section describes supported command/value pairs.

### Camera Control

Command: CAMERAPRO\_CAMERA\_CONTROL

Possible values (device dependent):

Value	Description
0	Trigger capture button
1	Focus
2	Pause (video), <b>NOT SUPPORTED</b>

### Camera Mode

Command: CAMERAPRO\_CAMERA\_MODE

Possible values (device dependent):

Value	Description
300	Still images
301	Video, <b>NOT SUPPORTED</b>
302	Anti-shake
303	Burst
304	Time-lapse
305	Self-timer
306	Bracketing

### Captured preview image (WiFi only)

Command: CAMERAPRO\_GET\_CAPTURED\_IMAGE

This command requests the captured image (only in WiFi mode) in jpeg format. If no preview image is available then an empty message is returned.

### Exposure Lock

Command: CAMERAPRO\_EXPOSURE\_LOCK

Possible values (device dependent):

Value	Description
0	Off (unlock)
1	On (lock)

## Exposure Compensation

Command: CAMERAPRO\_EXPOSURE\_COMPENSATION

Possible values (device dependent):

Value	Description
<b>0 to x</b>	The <b>index</b> of the exposure compensation value starting with 0.

## Exposure Time

Command: CAMERAPRO\_EXPOSURE\_TIME

Possible values (device dependent):

Value	Description
<b>0</b>	Auto
<b>x</b>	The exposure time in <b>1/x</b> seconds. For instance "x=1" equals 1 second, "x=2" equals 0.5 seconds, etc. If the exposure time is longer than 1 second, then the following format applies: Time = - 1/(x/1000). For example an exposure time of <b>2</b> seconds equals "x=-500", 4 seconds equal "x=-250", <b>8</b> seconds equal "x=-125", etc.

## Flash Mode

Command: CAMERAPRO\_FLASH\_MODE

The same values as defined in the Windows Phone 8 API are used:

<http://msdn.microsoft.com/en-us/library/windowsphone/develop/windows.phone.media.capture.flashstate%28v=vs.105%29.aspx>

Possible values (device dependent):

Value	Description
<b>0</b>	Off
<b>1</b>	Auto
<b>3</b>	On

## Focus Mode

Command: CAMERAPRO\_FOCUS\_MODE

The same values as defined in the Windows Phone 8 API are used:

<http://msdn.microsoft.com/en-us/library/windowsphone/develop/windows.phone.media.capture.autofocusrange%28v=vs.105%29.aspx>

Possible values (device dependent):

Value	Description
-2	Manual
1	Macro
2	Normal
3	Full
4	Hyperfocal
5	Infinity

## Manual Focus

Command: CAMERAPRO\_FOCUS\_MANUAL

If the CAMERAPRO\_FOCUS\_MODE is set to "manual" then the focus distance can be controlled manually.

Possible values (device dependent):

Value	Description
x	The focus distance value. On Nokia devices the value usually ranged between 0-1000, on HTC 0-50.

## Change focus rectangle position

Command: CAMERAPRO\_FOCUS\_POSITION\_X

Command: CAMERAPRO\_FOCUS\_POSITION\_Y

The focus rectangle position can be changed by sending two separate x/y commands where x and y hold the center position coordinates of the target focus rectangle position.

After setting the position, re-focusing has to be manually triggered using the Camera Control command.

## ISO Value

Command: CAMERAPRO\_ISO\_VALUE

Possible values (device dependent):

Value	Description
-1	Auto
x	The ISO value "x". For instance "x=100" sets the ISO to 100. Supported values (device dependent) are usually in the range between ISO 100-800. The Nokia Lumia 1020 supports values up to ISO 3200.

## Scene Mode

Command: CAMERAPRO\_SCENE\_MODE

The same values as defined in the Windows Phone 8 API are used:

<http://msdn.microsoft.com/en-us/library/windowsphone/develop/windows.phone.media.capture.camerascenemode%28v=vs.105%29.aspx>

Possible values (device dependent):

Value	Description
1	Auto
2	Macro
6	Night
4	Sport
...	

## Resolution

Command: CAMERAPRO\_RESOLUTION

Possible values (device dependent):

Value	Description
0-x	The index of the resolution, starting with 0 and ending with x = number of resolutions – 1.

## Switch between front and back camera

Command: CAMERAPRO\_SWITCH\_CAMERA

Possible values (device dependent):

Value	Description
0	Back camera
1	Front camera

## White balance Mode

Command: CAMERAPRO\_WHITEBALANCE\_MODE

The same values as defined in the Windows Phone 8 API are used:

<http://msdn.microsoft.com/en-us/library/windowsphone/develop/windows.phone.media.capture.whitebalancepreset%28v=vs.105%29.aspx>

Possible values (device dependent):

Value	Description
-2	Manual
-1	Auto
1	Cloudy
2	Daylight
3	Flash
4	Fluorescent

5	Tungsten
6	Candlelight

## Manual White Balance

Command: CAMERAPRO\_WHITEBALANCE\_MANUAL

If the CAMERAPRO\_WHITEBALANCE\_MODE is set to “manual” then the white balance temperature in Kelvin can be controlled manually.

Possible values (device dependent):

Value	Description
x	The temperature in Kelvin. The valid range is usually between 1000 and 1000K. Manual white balance does not work properly on Nokia devices at the moment.