App. Note Code: 3T-Z



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# CC5MPX Digital Camera and IPn3Gb Cellular Modem

# 1. Introduction

This application note is intended to provide guidance for setting up the IPn3Gb modem and CC5MPX camera for the purpose of transmitting images and video via Ethernet. Transfer options discussed include Email (SMTP) and FTP. There is also discussion of power management, where the CC5MPX can be used to control power to the modem.

For general CC5MPX and IPn3Gb configuration details, refer to their respective manuals. If you have general questions or encounter any issues during the procedure, please contact a Campbell Scientific Measurement Consultant by phone (780-454-2505) or by email (dataloggers@campbellsci.ca).

## 1.1 Modem Account – Public versus Private IP Address

When setting up an account with your mobile data service provider, it is important to obtain an account that has a public IP address. The account can make use of either dynamic or static IP configuration.

If the modem account does not have a public IP address, then only outgoing communications will be possible. This means that the camera will only be able to send pictures or videos out via FTP or email, and it will not be possible to initiate communications from the Internet to the camera.

In contrast, if a public IP address is provided, then full two-way communications will be possible. This means that you will also have access to the CC5MPX web interface and FTP server from the Internet. This is required for access to camera settings and diagnostics information, and also for remote file access.

For further details, please see the IPn3Gb manual.

# 2. Initial Modem Setup

The following procedures assume that:

- You have obtained an appropriate account from your mobile data provider
- The appropriate SIM card has been inserted properly into the modem
- You have the required account information and setting details from your mobile data provider, and the modem is active on the network.

The easiest way to configure the IPn3Gb modem is to connect the modem directly to your computer using the Ethernet port. Be sure that the unit is powered on and has been allowed to warm up for about 2 minutes.

A modem that is set to factory defaults will act as a DHCP server. Once connected to a computer, the modem can be accessed by typing the following address into your web browser: 192.168.0.1

Please note that your computer's Local Area Connection adapter must be set to use DHCP for this connection to work. If you find that the connection is unsuccessful, please see article below for instructions on how to set up a DHCP Ethernet connection in Windows:

#### http://www/computing.vt.edu/kb/entry/3345

Once you have connected to the modem, a login page will appear. The default login is:

Username = admin Password = admin

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205.206.34.6 ×			and the second	
← → C ♠ 🗋 205.206.34.6				☆ =
System Network Car		conton to the security Firewall 1/0 Advar	10101 01010 0100 0100 0100 0100 000000	
Summary Config Loc	ation History			
Carrier:				
Current APN:	connect.telus.com	Core Temperature(°C):	50	
Activity Status:	Call in progress	Supply Voltage(V):	12.27	
Network:	TELUS	IMEI:	354626031369758	
Home/Roaming:	Home	IMSI:	302220009808941	
Cell ID:	0x4B94432	SIM Card:	READY	
Data Service Type:	3G-HSDPA/HSUPA	SIM Number (ICCID):	8912230000132818220	
Channel Number:	512	Phone Number:	15878736667	
Frequency Band:	1900MHz	WAN IP Address:	205.206.34.6	
Ec/No (dB):	-13	DNS1:	209.91.107.11	
RSSI (dBm):	-57	DNS2:	209.121.225.11	
RSCP (dBm):	-61			
Ethernet Port:				
IP Address:	192.168.0.1			
IP Subnet Mask:	255.255.255.0			
IP Gateway:	192.168.0.1			
Ethernet MAC:	00:0F:92:00:92:C0			
USB Port:	NDIS Mode Standalone			
Local IP Address:	192.168.111.1			
Subnet Mask:	255.255.255.0			
Host IP:	192.168.111.2			
USB MAC:	00:0F:92:01:92:C0			
System:				
NMS Status:	UDP Disabled/WS Disabled Se	tting		
System time:	Tue Jul 29 2014 08:31:26			
Hardware Version:	v2.0.0			
Software Version:	v2.0.28-r2070			

#### Figure 2-1 - IPn3Gb Main Page

Navigate to Network | Config. Once on the Config tab, change the IP Subnet Mask to 255.255.254.0. This change allows the system to work with both the CC5MPX and the IPn3Gb to remain at their default IP address settings. The default IP address setting for the CC5MPX is 192.168.1.90 and the default IP address setting for the IPn3Gb is 192.168.0.1.

G CC5MPX Camera ×	206.33.57:9191/cgi-bir ×	- 🗆 🗙
← → C ⋒ 🗋 205.206.33.57:	:9191/cgi-bin/network_ip_config.cgi	☆ =
microhard	d systems inc.	
System Network Carrier	COM1 COM2 USB Security Firewall I/O Advanced Tools Logout	
Summary Statistics Graph	Config Static Routing SNMP DHCP Lease	
IP Address:	192.168.0.1	
IP Subnet Mask:	255.255.254.0	
IP Gateway:	192.168.0.1	
Ethernet Port Mode:	• Auto Negotiation	
ARP Cache Timeout(s):	60	
DHCP Server Status:	O Disable 🖲 Enable	
DHCP Starting Address:	192.168.0.100	
DHCP Ending Address:	192.168.0.200	
DHCP Lease Time:	120 seconds T	
DNS Mode:	Static  Automatic	
Preferred DNS Server:	209.91.107.11	
Alternate DNS Server:	209.121.225.11	
Binding MAC:	00:00:00:00:00	
Binding IP:	0.0.0.0 Add	
-		
Submit	Cancel	
	Copyright © 2010-2013 Microhard Sy	ystems Inc.

Submit the change to save new value.

#### Figure 2-2 - Network | Config Page

Navigate to Security | Access. Change the HTTP: port from 80 to 9191. The reason for this change is that we want to be able to remotely access the CC5MPX via HTTP on default port 80.

Submit the change to save new value.

**NOTE** After submitting this change, you will be booted from the modem's webpage. You will now need to add :9191 to the IP address or DDNS name being used to connect to the modem (e.g. 192.168.0.1:9191).

CC5MPX Camera	× 205.206.33.57:	9191/cgi-bir ×				
← → C 🕯 🗋 205	5.206.33.57:9191/c	gi-bin/security_ui_acc	:ess_config.cgi			යි <b>=</b>
micr	cohard sys	TEMS INC.	rototo1	010101	01	Killing status at an
System Network	Carrier COM1	COM2 USB S	ecurity Firewall	I/O Advanced	Tools Logout	
Password Discove	any Access Aut		cate Management			
Telnet:	23	🔍 Disable 💿 Er	nable			
HTTP:	9191	🔍 Disable 💿 Er	ıable			
SSH:	22	O Disable 🖲 Er	iable			
HTTPS:	443	O Disable O Er	nable			
FTP Server:		🔍 Disable 🖲 Er	nable			
Local DNS Server:		🔍 Disable 🖲 Er	able			
Submit	Can	cel				
					Copyright © 2010-2	013 Microhard Systems Inc.

Figure 2-3 - Security | Access Page

Navigate to Firewall | Port Forwarding. In order to provide access to the camera's webpage and FTP server, the modem needs to be configured to forwarding the required ports. Port 80 is used to access the camera's webpage and the remaining ports (85, 1024 to 1029) will allow access to the camera's FTP server. If you do not require access to the camera's FTP functionality, then you will only need to forward port 80.

Enter the rules required for your application, as shown in Figure 4.

- Give each rule a name
- Enter the IP address of the camera in the Internal Server IP field
- Enter the port number in both the Internal and External Port fields

Once the fields are completed, click the Add button. Once the rule appears in the Port Forwarding Summary, click the Apply button. If you are adding multiple rules, you can click the Apply button after all the rules have been added. Refer to Figure 5 for an example of the completed rules.

205.206.47.46:9191/cgi-bir × 5 CC5MPX Camera		
← → C ♠ 205.206.47.46:9191/cgi-bin/se	curity_firewall_portforwarding.cgi	ය <b>=</b>
microhard system	IS INC. 10101010101010101010101010101010101010	Alfred States of Care
System Network Carrier COM1 CO	M2 USB Security Firewall I/O Advanced Tools Logout	
General Rules Port Forwarding MAC		
DMZ mode :	Disable      Enable	
DMZ Server IP:	192.168.100.100	
Exception Port:		
More exception Ports:		
Rule Name: Internal Server IP: Internal Port: Protocol:	Forward80 192.168.1.90 80 TCP T	
External Port:	80	
Add Apply		
	Copyright ©	2010 Microhard Systems Inc.

Figure 2-4 - Firewall | Port Forwarding Page (entering a rule)

→ C ☆ 205.206.47.46:9191	/cgi-bin/security_firewall_portforwarding.cgi	☆
microhard System Network Carrier CC General Rules Port Forwardin	SYSTEMS INC. MICOM2 USB Security Firewall V/O Advanced Tools Logout g MAC List IP List Default	A
DMZ mode :	Disable Enable	
DMZ Server IP:	192.168.100.100	
Exception Port:		
More exception Ports:		
Internal Server IP: Internal Port:	192.168.2.1 3000	
Internal Port:	3000	
Protocol:	TCP T	
External Port:	2000	
Port Forwarding Summary: Forward80 : Forward connection from WAI Forward1024 : Forward connection from W Forward1025 : Forward connection from W Forward1026 : Forward connection from W Forward1027 : Forward connection from W Forward1028 : Forward connection from W Forward1028 : Forward connection from W Forward1029 : Forward connection from W Add Edit Delete Apply	N port 80 to LAN 192.168.1.90 port 80 over TCP         -           N port 85 to LAN 192.168.1.90 port 85 over TCP         -           /AN port 1024 to LAN 192.168.1.90 port 1025 over TCP         -           /AN port 1025 to LAN 192.168.1.90 port 1025 over TCP         -           /AN port 1025 to LAN 192.168.1.90 port 1025 over TCP         -           /AN port 1025 to LAN 192.168.1.90 port 1027 over TCP         -           /AN port 1027 to LAN 192.168.1.90 port 1027 over TCP         -           /AN port 1028 to LAN 192.168.1.90 port 1028 over TCP         -           /AN port 1028 to LAN 192.168.1.90 port 1028 over TCP         -           /AN port 1028 to LAN 192.168.1.90 port 1029 over TCP         -           /AN port 1029 to LAN 192.168.1.90 port 1029 over TCP         -	r
	Conviriant © 2010 Miarr	shard Sustame Inc

**Figure 2-5 - Port Forwarding Summary** 

## 3. Setting up the CC5MPX Camera

NOTE

Access to the camera's FTP server requires firmware version 1.23 or greater. The latest camera firmware can be downloaded from our website:

(http://www.campbellsci.ca/downloads?sb=cc5&c=9999).

Please see the CC5MPX manual for details on establishing a connection between the camera and your computer. Once the connection has been established, open the camera webpage and select the Network settings tab. We recommend keeping the default IP address and changing the Netmask and the Default Gateway as shown. The example shows the Public Domain Name System (i.e. Primary Nameserver) offered by Google. However, you may also use the name server recommended by your service provider if you choose.

← → 5 http://169.254.99.99/#	A DECK	の - c G CCSMPX Came	ra ×			• • <b>•</b> ★ ¤
<u>File Edit View Favorites Tools H</u> elp						
Itere/1462/254.395.99/#       Ele     Edit     Yew     Favorites     Tools     Help       Live Video     Network     System     Memory Card       Image: State of the state of		Campbell Scientific CC5MPX Camera			Firmware Serial Nu	e Version : 1.23 umber : 1302
Live Video Netwo	k System Memory Card	Video Settings Ima	ge Capture Communic	ation Settings	Still Image Settings	
		Network				
Network     Ethernet Power     Hode     FTP Server     SMTP Server     SNTP	DHCP IP Address Netmask Default Gateway Primary Nameserver HTTP Port	© Enable ® Disa 192 . 168 . 255 . 255 . 2 192 . 168 . 8 . 8 . 80 Submit	ble 1 . 90 54 . 0 0 . 1 8 . 8			
						,



Once the above network settings are changed on the CC5MPX the camera can be connected to the IPn3Gb and you should be able to connect to the camera with a web browser once the modem is powered and on the network. The connection between the CC5MPX and IPn3Gb requires the use of an RJ45 cable or the RJ45ENVCBL-L.

If the modem is using a public static IP account from your service provider, enter the IP address into the navigation bar of a web browser and hit Enter. This will take you to the CC5MPX home page. If the modem has been configured to make use of a public dynamic IP address then enter the related DDNS name into the web browser navigation bar.

### 3.1 EMAIL Setup

It is possible to have the CC5MPX send images or video via email to one or more destination email addresses. In the setup in Figure 7 we make use of the Telus SMTP Outgoing Mail Server (smtp.telus.net), as the modem is configured for use on the Telus network. Mail servers for other service providers are listed below:

Bell – mail.1xbell.ca Rogers – smtp.rogerswirelessdata.com

You will need to enter a "Sender" email address based on the mail server being used. In the example below the 10-digit number of the modem is being used with the service provider domain name.

Enter the destination email address(es) in the "Email Address" field. For multiple email addresses, use a space, comma or semi-colon as a separator between addresses.

G CC5MPX Camera × 205.206.4 ← → C ☆ 205.206.43.166/#	43.166:9191 ×		·
	Ľ C	Campbell Scientific CC5MPX Camera	Firmware Version:1.22 Serial Number :1260
Live Video Net	work System Memory Card	Video Settings Image Capture Communication Settings	Still Image Settings
		SMTP Server Setting	
Network Ethermet Power Mode FTP Server MTIP Server SITTP	Server #1 My Server Requires A Account Name Password Sender SMTP Server Email Address Server #2 My Server Requires A Account Name Password Sender SMTP Server Email Address	uthentication	
		Submit	

Figure 3-2 - SMTP Configuration Example

Once the SMTP server settings are submitted, the email functionality of the camera can be used as part of the Image Capture configurations in the CC5MPX.

C 🖌 🗋 173.182.77.17	1/#		G
	25 <b>₹</b> σ		
CAMPBELL		Campbell Scientific	irmware Version :
SCIENTIFIC		CC5MPX Camera	Serial Number :
Live Video Network	System Memory Card Video	Settings Image Capture Communication Settings Still Image Set	tings
		Self Timed Capture1	
Power Modes	Self Timed Capture	® Enable ⊙ Disable	3
Self Timed Capture1	Start Minutes	Minutes from Midnight ( From 0 ~ 1439 )	
Self Timed Capture2	Stop Minutes	Minutes from Midnight ( From 0 ~ 1439 )	
External Trigger	Capture Interval	30 Minutes ( From 0 ~ 1439 )	
Motion Detection Save/Read Camera	Still Image Capture	● YES ◎ NO	
Settings	Number of Images	1 (From 1 ~ 60)	
	Image Interval	1 (Seconds 1 ~ 60)	
	Capture To Memory Card	NO V	
	Memory Card Management		
	Maximum Memory Size	0 (From 0 ~ 65535 ) MegaBytes	
	Management Type Options	● Fill and Stop ○ Ring Memory	
	Still Image	Settings #1 Settings #2	
	Main Folder Name	SelfTimed1Still	
	Sub Felder Options	Year_Month Laken	
	Send via email	EMAIL Settings #1 V Still Dhage Settings #1 V	
	Send Via FTP	Disabled Still Image Settings #1 ¥	
	Send via PakBus	Disabled ▼ Still Image Settings #1 ▼	
	Video Capture		
	Video Settings	Settings #1 V	
	Duration In Seconds	1 (Seconds 1 ~ 60)	
	Capture To Memory Card	NO T	
	Memory Card Management		
	Maximum Memory Size	0 (From 0 ~ 65535 ) MegaBytes	
	Management Type Options	Fill and Stop ORing Memory	
	Main Folder Name	SelfTimed1Video	
	Sub Folder Options	Year_Month Taken	
	Send via email	EMAIL Settings #1 V	
	Send via ETP	Disabled	
	Send via Pakbus	Disabled <b>V</b>	
		Submit	
		Cart Directory	

Figure 3-3 - Self Timed Capture Example

### 3.2 FTP Setup

The CC5MPX can be configured to automatically send captured images to up to two separate FTP servers. In order to configure the destination server settings in the camera, navigate to the FTP Server settings under the Network tab.

In the FTP Server address field, enter the IP address or domain name of the destination FTP server.

In the User Name and Password fields, enter the required credentials for the destination FTP server.

The file upload path contains the path to the desired storage folder on the destination FTP server. To store images in the default login directory, this can be left blank.

The requirement to use "Passive Transfer Mode" will depend on the FTP server. Most modern servers support passive mode.

If you encounter any issues with FTP transfers from the camera, please confirm the required settings with the FTP server provider.

			Campbell So CC5MPX C	cientific camera	Firmware Version:1 Serial Number :1
Live Video Netw	ork System Memory Card	Video Settings	Image Capture	Communication Settings	Still Image Settings
		FTP Se	erver Setting		
Network Ethernet Power Mode FTP Server SMTP Server SMTP	Server #1 FTP Server Address User Name Password File Upload Path Passive Transfer Mode	ftp.driv CSC_En /driveho	ehq.com igineering  qshare/CSC_DataSer	Port 21	
	Server #2 FTP Server Address User Name Password File Upload Path Passive Transfer Mode			Port 21	
		Submit			

Figure 3-4 - FTP Configuration Example

### 3.3 Power Management

If your system is power constrained as can be the case with solar powered systems, then the CC5MPX can be setup to manage the power consumption. The highest power savings can be achieved by having the camera control the power supplied to the IPn3Gb modem in conjunction with using the camera in one of its low powered modes. Please see the CC5MPX manual for information on the available power modes.

The following example shows how to set up a camera that will email images every 15 minutes while minimizing power consumption for solar powered sites.

Navigate to the CC5MPX Digital I/O settings menu, which is located in the System tab.

G CC5MPX Camera ×	No. of Lot of Lot of		(10) (1)			×
← → C ↑ □ 173.182.77.171/#					Q 🕸	∃≡
		Campbell S CC5MPX (	cientific Camera	Firmware Versi Serial Number	on : 1.23rc1 : 1260	1
Live Video Network	System Memory Card Vid	leo Settings Image Capture	Communication Settings	Still Image Settings		
		Digital I/O Setting			_	
Date and Time Automatic Date and Time Update Site Name Users/Security Digital 1/0 Update Events Save/Read Camera Settings	External Trigger Input Select Active High or Low Light Power Control Communication Power Control Communication Warm up Time Heater Power control Heat when temperature is below On Duration	High   High   Not Used   Enable  Disable  Disable  Disable  Disable  Always On  Minutes prior  Submit	0 ) to schedule 0 ( From 0 ~ 59	)	_	

Figure 3-5 - CC5MPX Power Control Example

Enable the communication power control and set the Communication Warm up Time to 120 Seconds. A warm up time is required for the modem to register onto the data network. In-house testing has indicated that 120 seconds provides sufficient time for the IPn3Gb modem. However, a longer period maybe required depending on location and cellular coverage.

The CC5MPX camera switches the power on the Communication Power Control line when an email or an FTP file transfer is required. When a capture event is triggered to send out an email or FTP transfer, the camera will switch on power on the modem (yellow wire), wait for the duration of the Communication Warm up Time and then attempt to send out the image or video. Once the image has been sent, the camera will switch off power.

The yellow wire from the CC5MPX must be connected to Vin+ on the modem. The modem's GND terminal must be wired to the ground of the CC5MPX power supply (using a user-supplied wire).

The following shows a CC5MPX setup for Self-timed Capture 1 to send out a still image using email every 15 minutes.

G CC5MPX Camera ×					<b>- - X</b>
← → C ☆ 173.182.77.171/inde	ex.htm#				요☆ 〓
	Campbell Scientific CC5MPX Camera			Firmware Version : 1.23rc1 Serial Number : 1260	
Live video	System Memory Card Video S	ettings Image Capture Commun	ication Settings	Still Image Settings	_
Self Timed Capture1					
Self Timed Capture1 Self Timed Capture2 External Trigger Hotion Detection Save/Read Camera Settings	r Hodes     Self Timed Capture        ● Enable © Disable        timed usel     Start Minutes        ● Minutes from Midnight (From 0 ~ 1439 )        imed Capture2     Stop Minutes        ● Minutes from Midnight (From 0 ~ 1439 )        and Trigger     Capture Interval        Is Minutes (From 0 ~ 1439 )        m Detection     Capture Interval        Is Minutes (From 0 ~ 1439 ) <i>Read Camera</i> Still Image Capture        • YES • NO <i>Read Camera</i> Still Image Interval        I (From 1 ~ 60 )        Image Interval        I (Seconds 1 ~ 60 )        Capture To Memory Card        No        Memory Card Management        Maximum Memory Size        Management Type Options        Fill and Stop        Ring Memory       Still Image        Still Image        Settings #1       Settings #2       Main Folder Name       Sub Folder Ontions				
	Send via email Send via FTP Send via PAkBus	EMAIL Settings #1 ▼     Still Image       Disabled ▼     Still Image       Disabled ▼     Still Image	Settings #1 Settings #1 Settings #1	• •	
	Video Capture	○ YES ● NO			-

Figure 3-6 - Image Capture Configuration Example