



INTERNATIONAL
YEAR OF LIGHT
2015

**COSMIC
LIGHT** IAU

Globe at Night - Sky
Brightness Monitoring
Network

User Workshop Tokyo, Japan - Jan 7-9, 2015

Configuration and installation of SQM-LE unit

Dr SO Chu-wing

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国立天文台
NAOJ
National Astronomical
Observatory of Japan



1.

- Unboxing a package of Sky Quality Meter-LE+H+POE

2.

- Establish connection for configuration

3.

- SQM-LE configuration: **Lantronix Device Installer (LDI)**

4.

- SQM-LE configuration: **XPort**

5.

- SQM-LE configuration: **Unihedron Device Manager (UDM)**

6.

- Communication test of SQM-LE

7.

- Selection of a mounting location for SQM-LE

8.

- Installation of SQM-LE

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- SQM-LE cabling

10.

- SQM-LE testing

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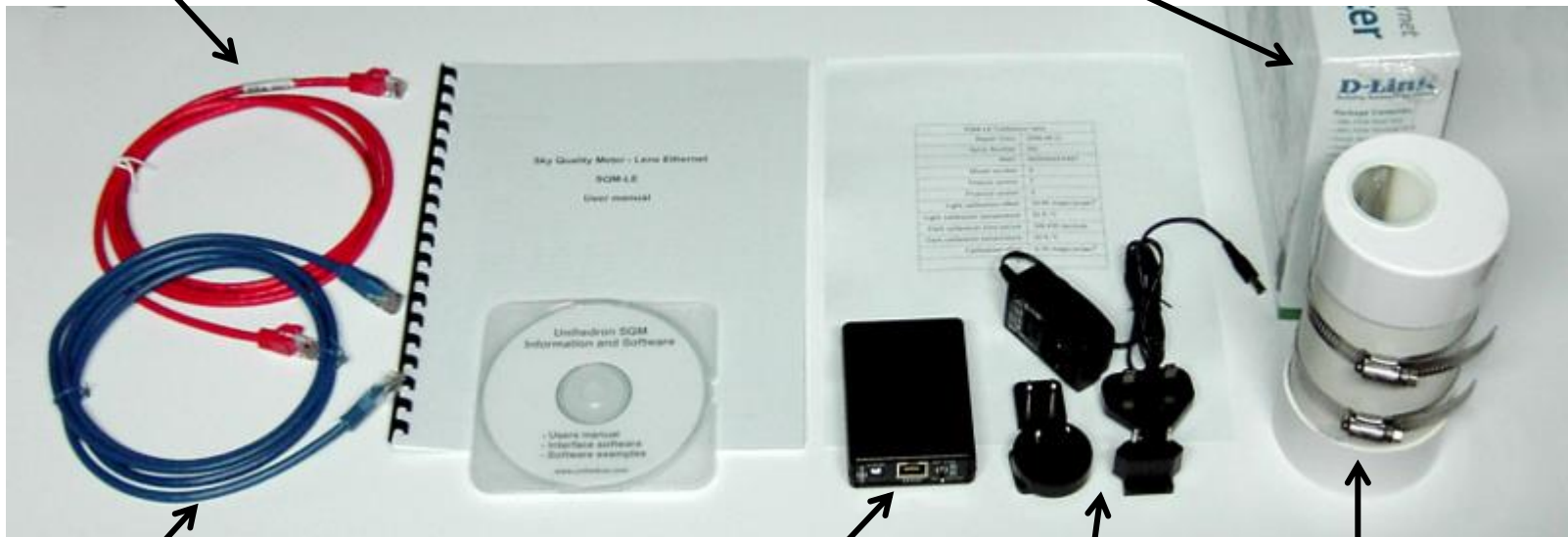
- SQM-LE testing

1. Unboxing a package of Sky Quality Meter-LE+H+POE



cross-over cable (for direct connection only)

Power-over-Ethernet (PoE): TP-LINK TL-POE200



ethernet cable

Sky Quality Meter(SQM)-LE

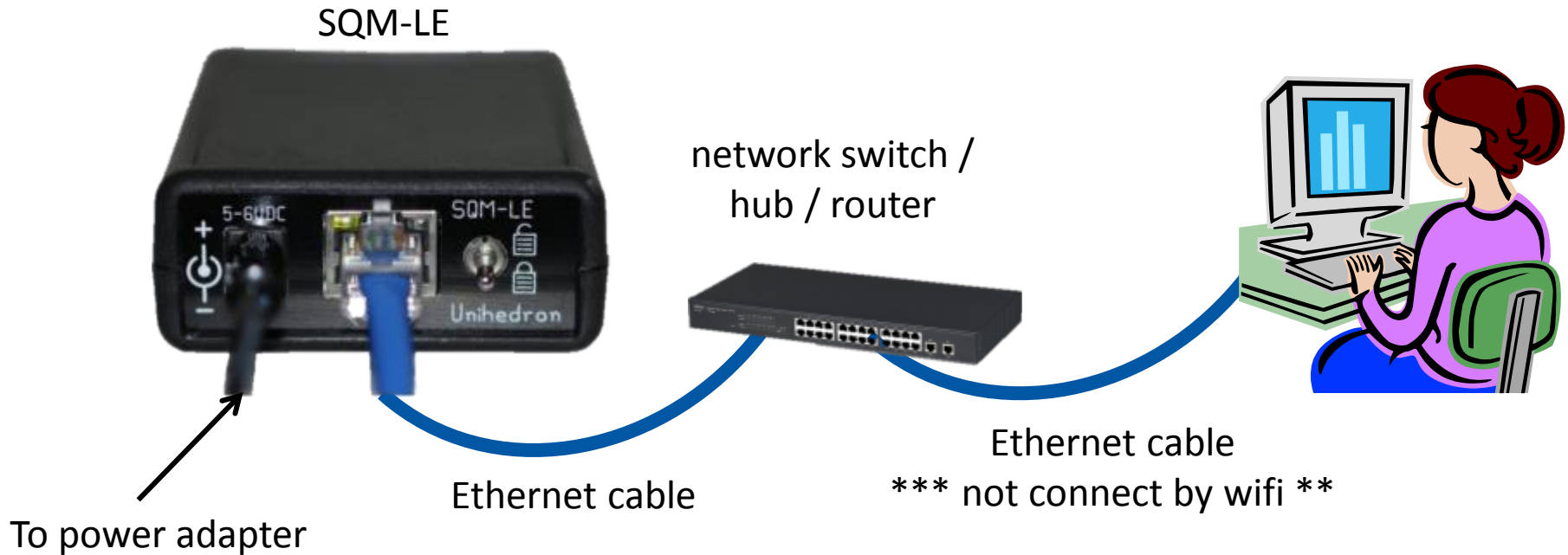
Power adapter SQM-LE

Housing (H)

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10. • SQM-LE testing

2. Establish connection for configuration

2.1 Follow the example of cabling below :



Caution :

Please use wired connection for the desktop/laptop but not wifi.

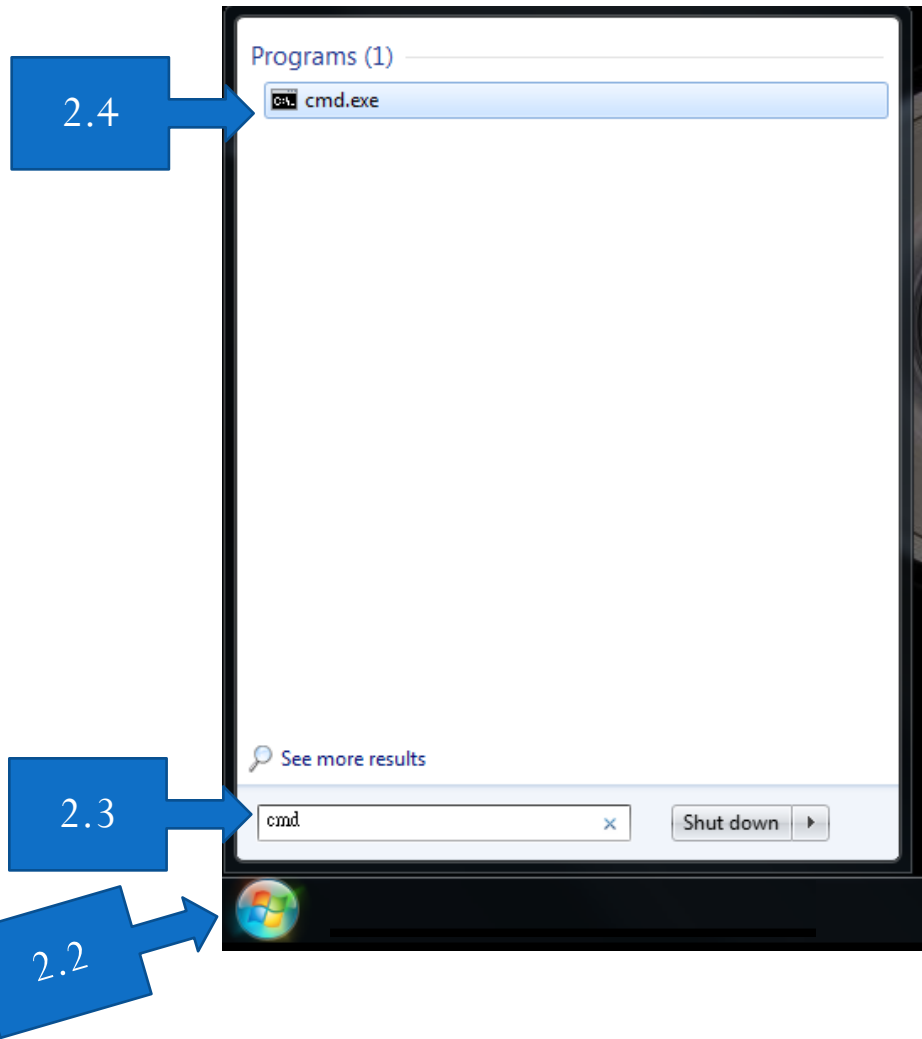
2. Establish connection for configuration

2.2 click



2.3 type in "cmd"

2.4 run "cmd.exe"



2. Establish connection for configuration

2.5 Type “ipconfig” then pass enter

2.6 Look for the values of “Subnet Mark” and “Default Gateway” under “Ethernet adaptor Local Area Connection”. These information will be used for configuring SQM-LE.

```
C:\Windows\system32\cmd.exe - cmd
Windows IP Configuration

Wireless LAN adapter Wireless Network Connection 3:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Wireless LAN adapter Wireless Network Connection 2:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Wireless LAN adapter Wireless Network Connection:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::3597:e6c:78b:c1a4%11
IPv4 Address. . . . . : 192.168.2.105
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.2.1

Tunnel adapter isatap.<BF841D70-534D-4D3C-BA27-FB740AAB4DB1>:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Tunnel adapter isatap.<528B7935-6721-4F82-921A-CB327E99E95F>:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Tunnel adapter Local Area Connection* 14:

Connection-specific DNS Suffix . :
IPv6 Address. . . . . : 2001:0:9d38:6abd:342f:26fe:fedb:bbf5
Link-local IPv6 Address . . . . . : fe80::342f:26fe:fedb:bbf5%24
Default Gateway . . . . . :

Tunnel adapter isatap.<FCF7777B-9BC7-4D64-B74E-0717DBE420AE>:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Tunnel adapter isatap.<12851856-3911-4E90-9295-ADC6473ED1FB>:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
```

```
Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::3597:e6c:78b:c1a4%11
IPv4 Address. . . . . : 192.168.2.105
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.2.1
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3. SQM-LE configuration: Lantronix Device Installer (LDI)

3.1 download and install then run **Lantronix Device Installer (LDI)**:

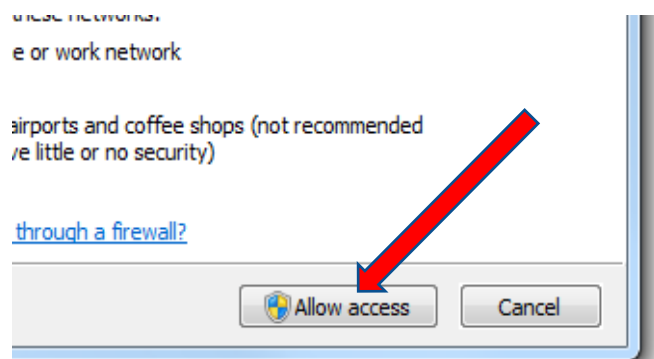
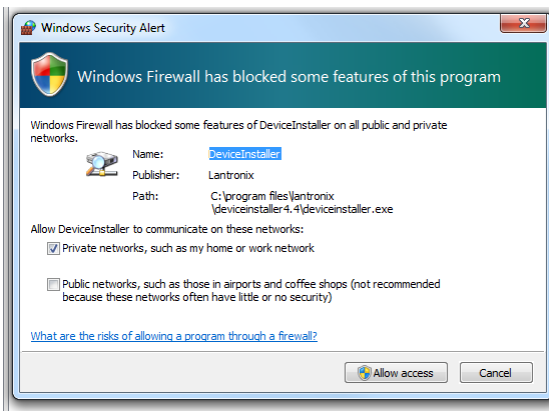
Web setup (1.3 MB, requires internet access):

<http://unihedron.com/projects/darksky/cd/SQM-LE/windows/LDI/setup.exe>

Stand-alone setup (70 MB, no internet access required to install):

http://unihedron.com/projects/darksky/cd/SQM-LE/windows/LDI/setup_di_x86x64cd_4.4.0.2RC3.exe

Select “Allow access” when asked for firewall permission:



3. SQM-LE configuration: Lantronix Device Installer (LDI)

3.2 run **LDI** > click “Search” near upper right to search for SQM-LE connected (the name is “Xport-XX”, where XX is a number)

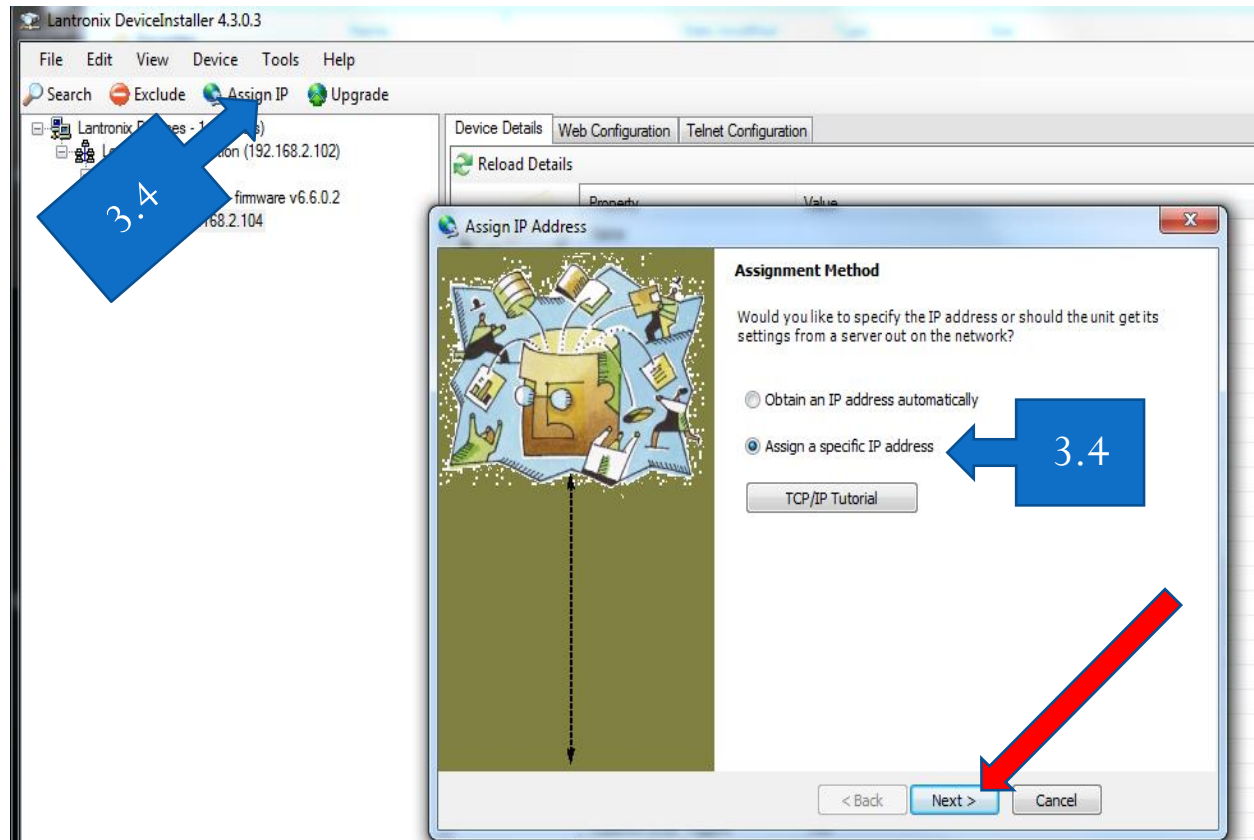
3.3 expand the directory and click the IP address of the searched SQM-LE device

The screenshot shows the Lantronix DeviceInstaller 4.3.0.3 interface. A blue arrow labeled '3.2' points to the 'Search' button in the top menu. Another blue arrow labeled '3.3' points to the IP address '192.168.2.104' of the selected device 'XPort-03/04 - firmware v6.6.0.2' in the search results. The right pane shows the 'Device Details' tab with a table of properties.

Property	Value
Name	
DHCP Device Name	
Group	
Comments	
Device Family	XPort
Type	XPort-03/04
ID	X5
Hardware Address	00-20-4A-BA-DB-73
Firmware Version	6.6
Extended Firmware Version	6.6.0.2
Online Status	Online
IP Address	192.168.2.104
IP Address was Obtained	Statically
Subnet Mask	255.255.255.0
Gateway	192.168.2.1
Number of COB partitions supported	6
Number of Ports	1
TCP Keepalive	45
Telnet Supported	True
Telnet Port	9999
Web Port	80
Maximum Baud Rate Supported	921600
Firmware Upgradable	True
Supports Configurable Pins	True

3. SQM-LE configuration: Lantronix Device Installer (LDI)

3.4 click “Assign IP” > “Assign a specific IP address” > “Next” to configure the IP address of SQM-LE



3. SQM-LE configuration: Lanttronix Device Installer (LDI)

3.5 Configure the IP address according to the values of subnet mask and gateway of the network in the installation location:

Example	A (used as an example in the rest of the document)	B	C
network in the installation location:			
Subnet Mask [#]	255.255.255.0	255.255.255.0	255.255.0.0
Default Gateway [^]	192.168.2.1	192.168.0.1	192.168.0.1
configuring SQM-LE via LDI (“IP Settings”) :			
IP address [*]	192.168.2.104	192.168.0.100	192.168.0.200
Subnet mark [#]	255.255.255.0	255.255.255.0	255.255.0.0
Default gateway [^]	192.168.2.1	192.168.0.1	192.168.0.1

* do not use the IP address which is occupied by other network devices (e.g. network printer) for SQM-LE

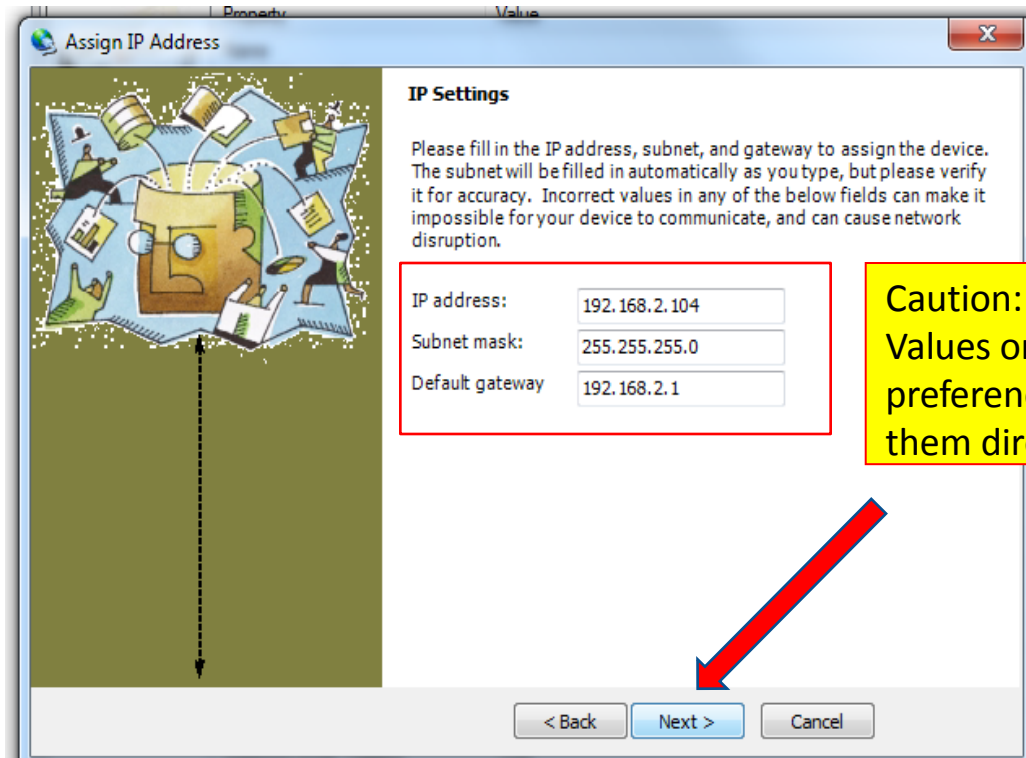
subnet mask of SQM-LE should be the same as that of the network adopted

^ default gateway of SQM-LE should be the same as that of the network adopted (i.e., router’s IP)

3. SQM-LE configuration: Lantronix Device Installer (LDI)

3.6 Input the IP address, Subnet mark, and Default gateway then click “Next” > “Assign”

3.7 wait for the processing (a couple of minute)



Caution:
Values on this image are for preference only. Do not use them directly.

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5. • SQM-LE configuration: **Unihedron Device Manager (UDM)**

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7. • Selection of a mounting location for SQM-LE

8. • Installation of SQM-LE

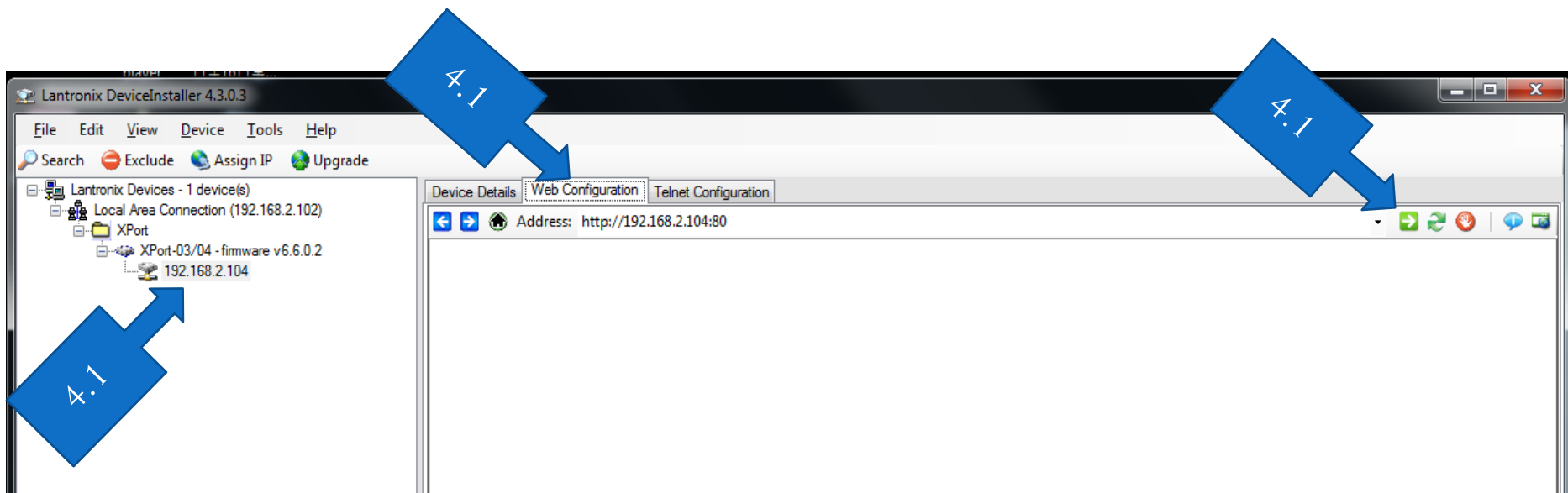
9. • SQM-LE cabling

10. • SQM-LE testing

4. SQM-LE configuration: XPort

4.1 click again the IP address of SQM-LE > click “Web Configuration” tab > click 

4.2 leave the login username and password blank. Click “OK” to enter the XPort page.



4. SQM-LE configuration: XPort

4.3 click “Connection” under “Channel 1” on the right manual. Select “With Any Character” for the “Active Connection”

4.4 set the “Local Port” as **10001**

4.5 set the “Remote Port” as **80**

4.6 set “Remote Host” as (to be announced later)

4.7 set “Inactivity Timeout” under “Disconnect Mode” as **0:2**

4.8 click “OK”

4.9 click “Apply Settings” then wait for the process to complete

XPort LANTRONIX®

Connection Settings

Channel 1

Connect Protocol: Protocol: TCP

Connect Mode

Passive Connection: Accept Incoming: Yes Password Required: No Password: Modem Escape Sequence Through: Yes

Active Connection: Active Connect: With Any Character Start Character: 0x0D (in Hex) Modem Mode: None Show IP Address After RING: Yes

Endpoint Configuration: Local Port: 10001 Remote Port: 80 Remote Host: Auto increment for active connect

Common Options: Telnet Com Port Cntrl: Disable Connect Response: None Terminal Name: Use Hostlist: No LED: Blink

Disconnect Mode: On Mdm_Ctrl_In Drop: No Check EOT(Ctrl-D): No Hard Disconnect: Yes Inactivity Timeout: 0:2 (mins : s)

OK

For additional details, please refer to pages 43 to 44 of the manual:

http://unihedron.com/projects/darksky/cd/SQM-LE/SQM-LE_Users_manual.pdf

4. SQM-LE configuration: XPort

Other settings of XPort (for information only)

XPort LANTRONIX®

Serial Settings

Channel 1

Disable Serial Port

Port Settings

Protocol: RS232

Flow Control: CTS/RTS (Hardware)

Baud Rate: 115200

Data Bits: 8

Parity: None

Stop Bits: 1

Pack Control

Enable Packing

Idle Gap Time: 12 msec

Match 2 Byte Sequence: Yes No

Send Frame Immediate: Yes No

Match Bytes: 0x00 0x00 (Hex)

Send Trailing Bytes: None One Two

Flush Mode

Flush Input Buffer

With Active Connect: Yes No

With Passive Connect: Yes No

At Time of Disconnect: Yes No

Flush Output Buffer

With Active Connect: Yes No

With Passive Connect: Yes No

At Time of Disconnect: Yes No

OK

4. SQM-LE configuration: XPort

Other settings of XPort (for information only)

XPort LANTRONIX®

Configurable Pin Settings

CP	Function	Direction	Active Level
1	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input checked="" type="radio"/> Low <input type="radio"/> High
2	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input checked="" type="radio"/> Low <input type="radio"/> High
3	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input checked="" type="radio"/> Low <input type="radio"/> High

OK

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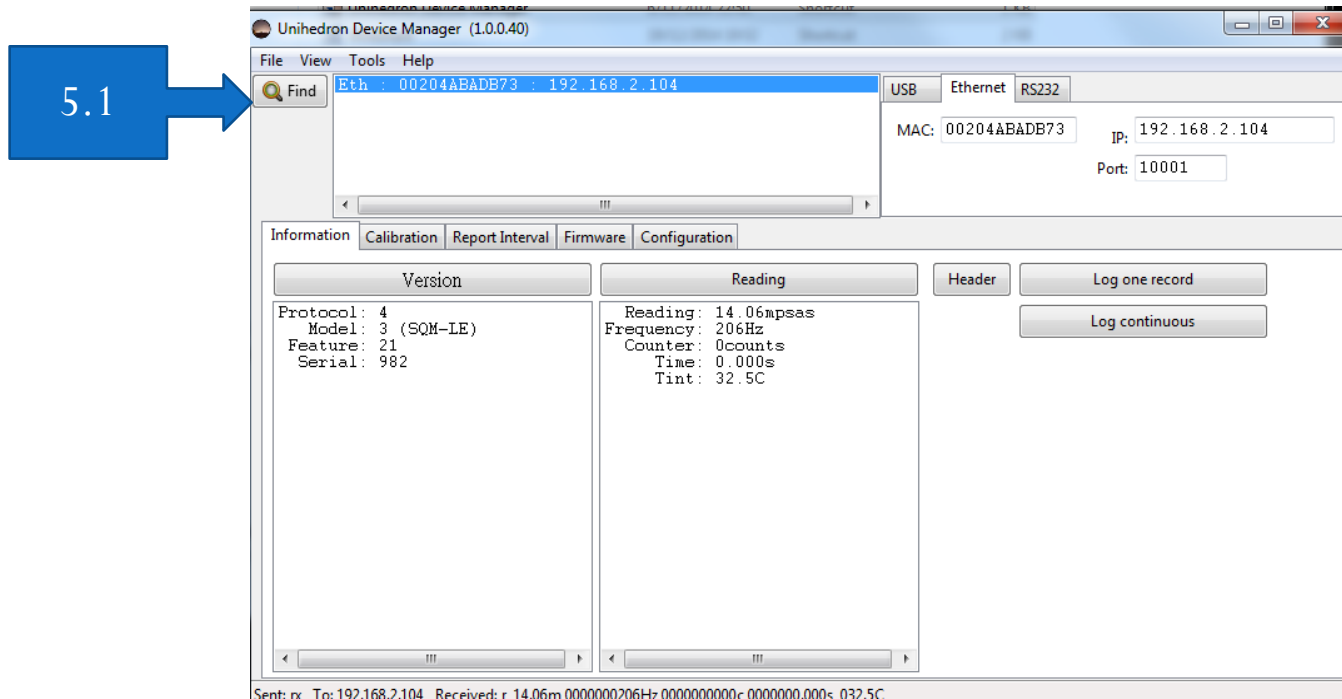
5. SQM-LE configuration:

Unihedron Device Manager (UDM)

5.1 download and install **Unihedron Device Manager (UDM)**:

<http://unihedron.com/projects/darksky/cd/SQM-LE.html>

> run > click "Find" near upper right

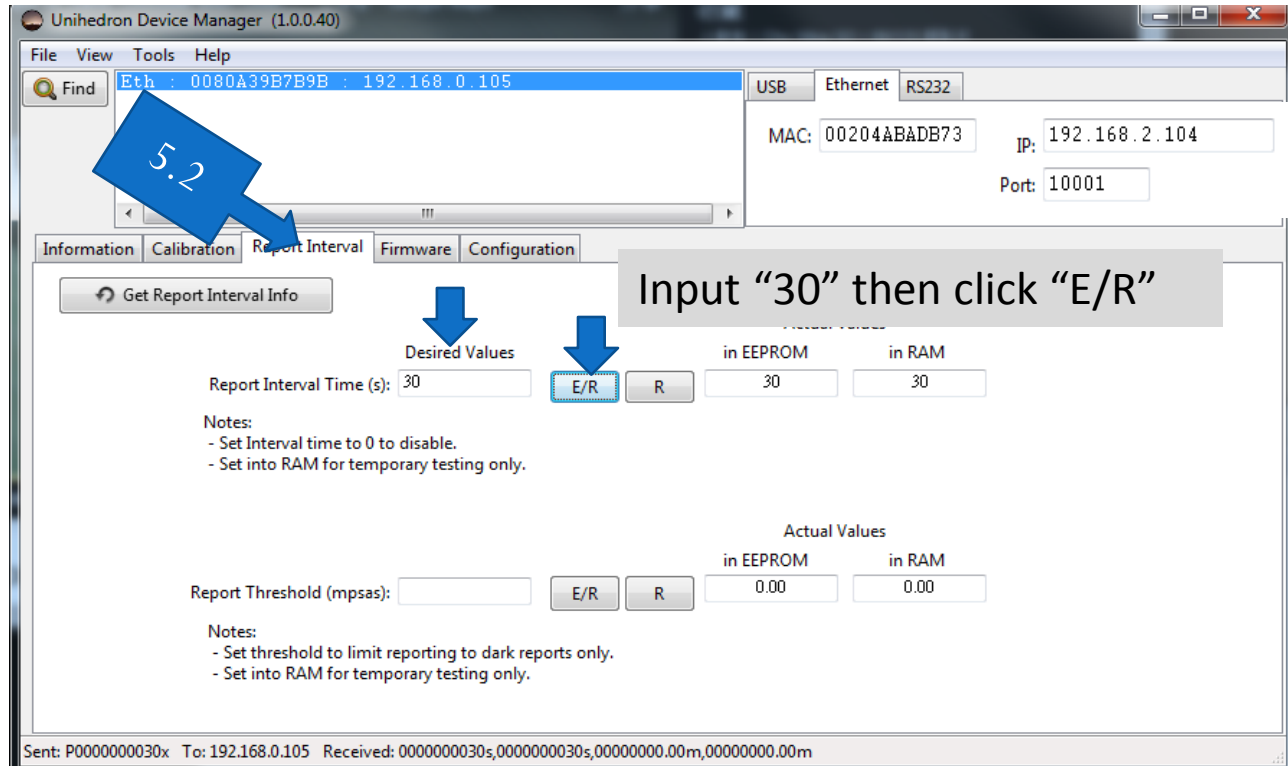


For additional details, please refer to pages 20 to 34 of the manual:

http://unihedron.com/projects/darksky/cd/SQM-LE/SQM-LE_Users_manual.pdf

5. SQM-LE configuration: Unihedron Device Manager (UDM)

5.2 click “Report interval” tab, input “30” as below



For additional details, please refer to pages 20 to 34 of the manual:

http://unihedron.com/projects/darksky/cd/SQM-LE/SQM-LE_Users_manual.pdf

5. SQM-LE configuration: Unihedron Device Manager (UDM)

5.3 click “Get Report Interval Info”

Unihedron Device Manager (1.0.0.40)

File View Tools Help

Find Eth : 0080A39B7B9B : 192.168.0.105

USB Ethernet RS232

MAC: 00204ABADB73 IP: 192.168.2.104

Port: 10001

Information Calibration Report Interval Firmware Configuration

Get Report Interval Info

Desired Values

Report Interval Time (s): 30 E/R R

Actual Values

in EEPROM 30 in RAM 30

Notes:

- Set Interval time to 0 to disable.
- Set into RAM for temporary testing only.

Report Threshold (mpsas): E/R R in EEPROM 0.00 in RAM 0.00

Notes:

- Set threshold to limit reporting to dark reports only.
- Set into RAM for temporary testing only.

Sent: P0000000030x To: 192.168.0.105 Received: 0000000030s,0000000030s,00000000.00m,00000000.00m

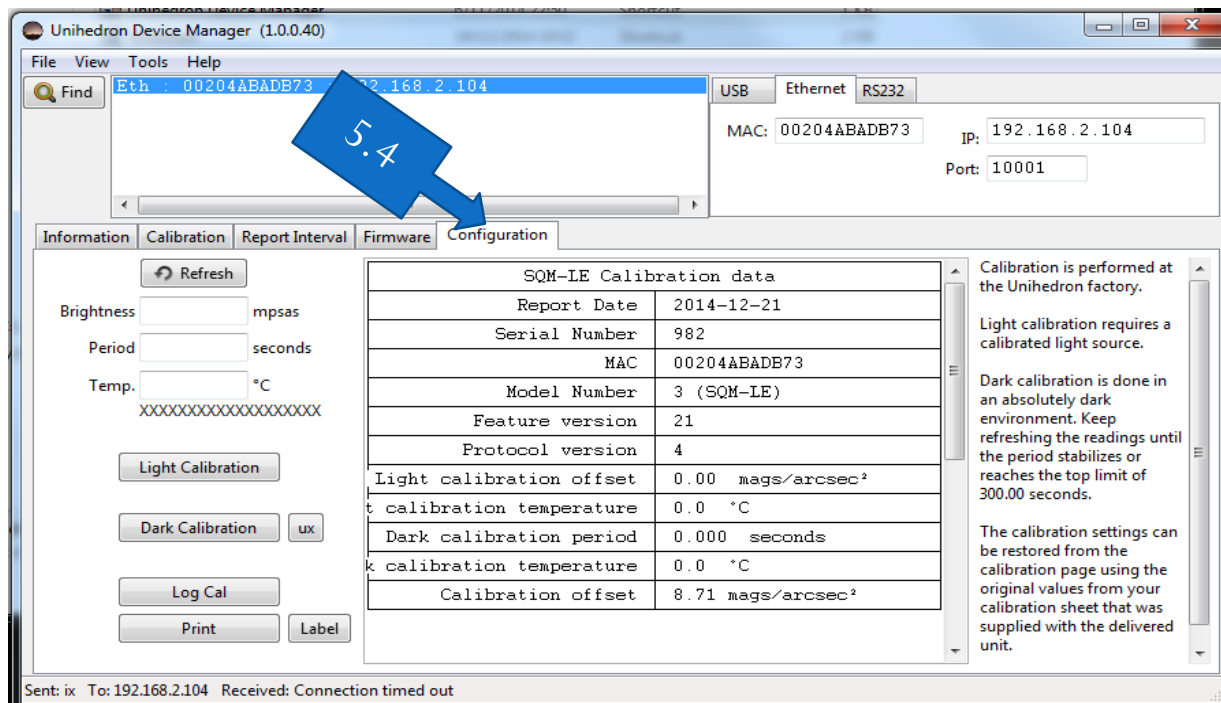
Make sure that the values of “in EEPROM” and in RAM” are both 30

For additional details, please refer to pages 20 to 34 of the manual:

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5. SQM-LE configuration: Unihedron Device Manager (UDM)

5.4 click “Configuration” tab, then capture and send the screen to us for information.



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6. • **Communication test of SQM-LE**
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9. • SQM-LE cabling
10. • SQM-LE testing

6. Communication test of SQM-LE

Conduct a communication test before installing the SQM-LE to outdoor:

Please contact Dr So:
Tel: 852 9447 2120 or
email: socw@connect.hku.hk or
skype: sochuwing

Install the SQM-LE to outdoor only when the communication is well established.

Once the “Interval Report” is running, avoid to get data from the device from software such as SQM reader or Unihedron Device Manager.

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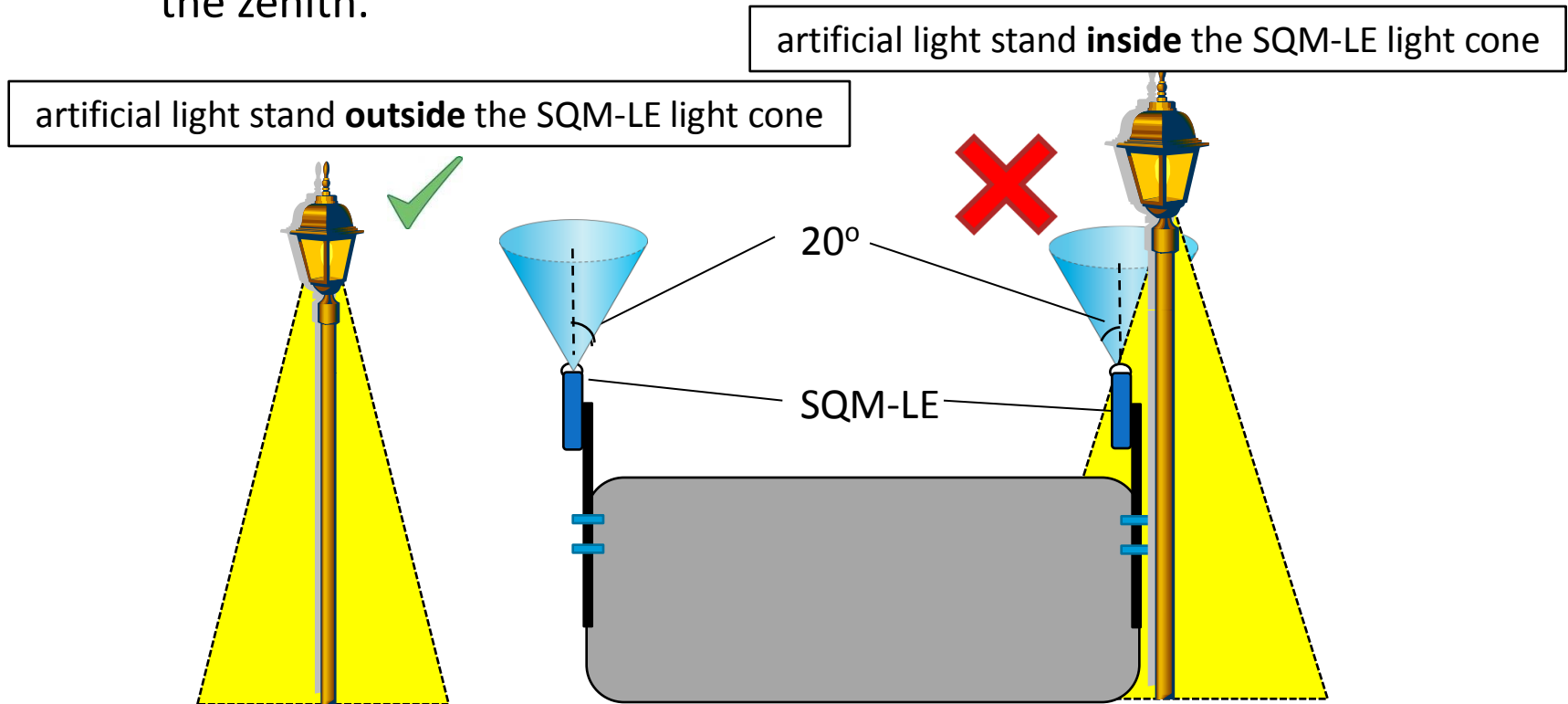
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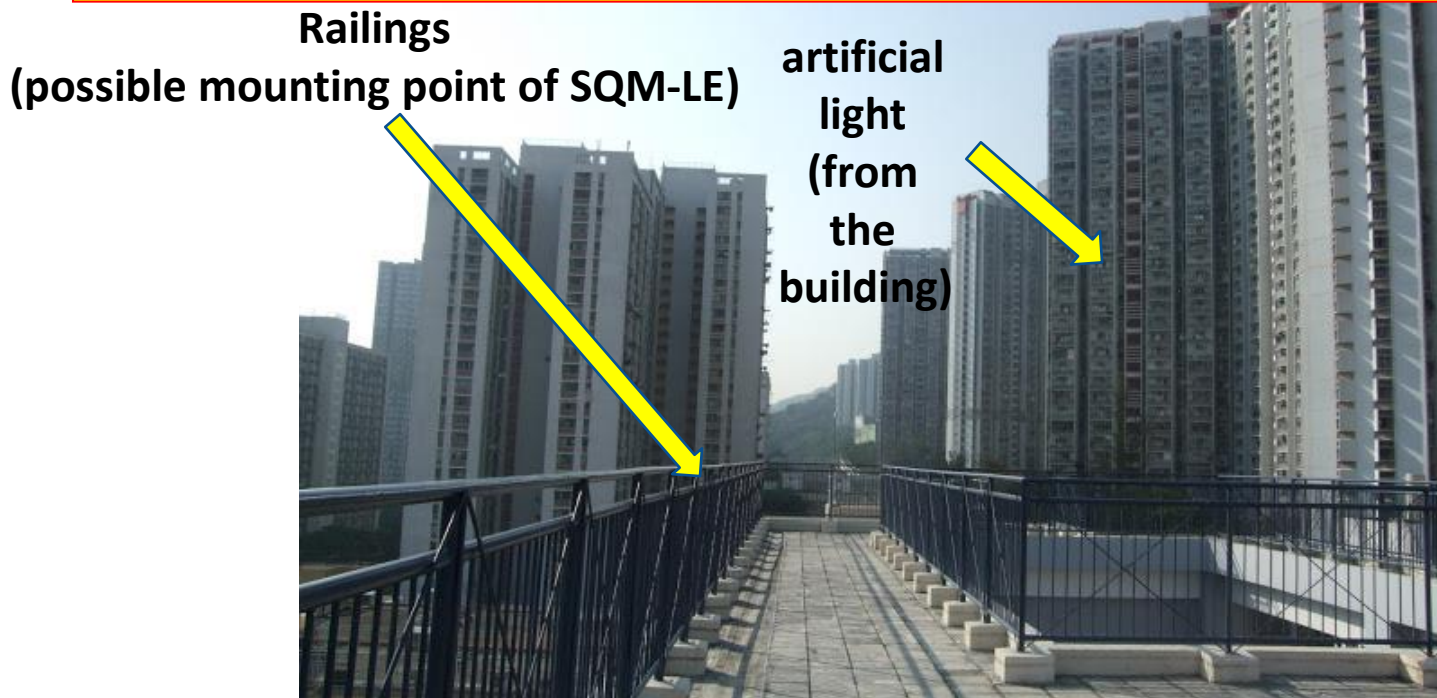
7. Selection of a mounting location for SQM-LE

- Open outdoor space, such as rooftop
- Avoid artificial light nearby shining directly on SQM-LE
 - The light collective cone of SQM-LE of about 20 degrees away from the zenith.



7. Selection of a mounting location for SQM-LE

Make sure that there is no artificial light, including those be turned on automatically or manually in the evening, within the region of SQM-LE light collective cone

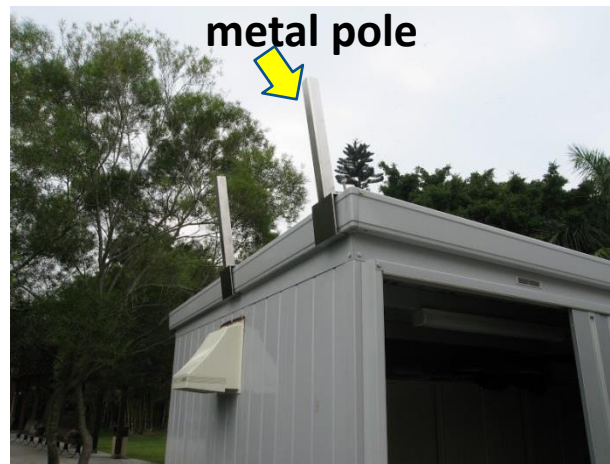
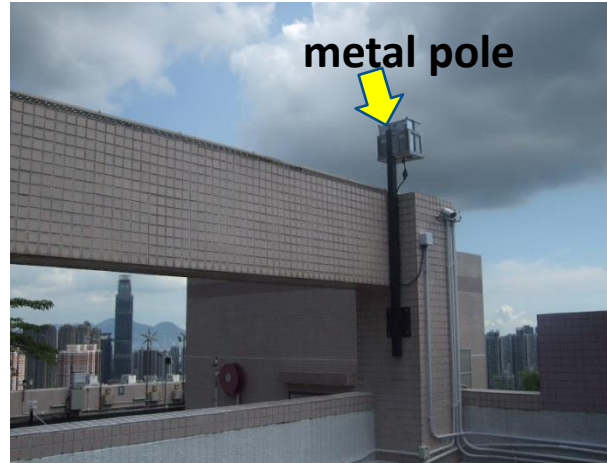


7. Selection of a mounting location for SQM-LE

- Safely first: make sure that the device is safe under severe weather conditions.
- Mount the device to a metal pole or railing.
 - **The sensor of SQM-LE should point directly to the zenith (directly "above" the location)**
- The ethernet cable can be routed from indoor to outdoor for power and internet connections.
 - Plug the injector unit of the PoE to the AC power supply and internet connection appropriately in indoor. Make sure that both power and internet connections are already on throughout the night.

After selecting a mounting location, take pictures showing the environment of the location and email pictures to Dr So for him to check whether the location is acceptable.

7. Selection of a mounting location for SQM-LE



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8. Installation of SQM-LE



SQM-LE



the light sensor of SQM-LE is here

Housing's cover:
Point the sensor of SQM-LE
directly to the glass
window

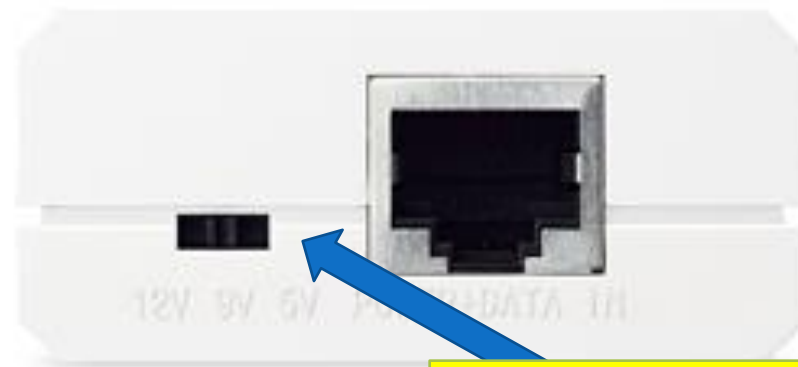
housing



Mount the housing to the pole

8. Installation of SQM-LE

The output voltage of the splitter of PoE should be set as 5V
but NOT 9V or 12V



set as 5V but NOT 9 V or 12V

8. Installation of SQM-LE

Insert the SQM-LE and PoE's splitter unit to the housing



Make sure that there is no gap between the sensor and the glass window!

(this picture shows an old model of PoE)

8. Installation of SQM-LE

Point the sensor of SQM-LE directly to the glass window



Make sure that there is no gap between the sensor and the glass window!

8. Installation of SQM-LE

Device supporting (optional)



(these pictures show an old model of PoE)

8. Installation of SQM-LE

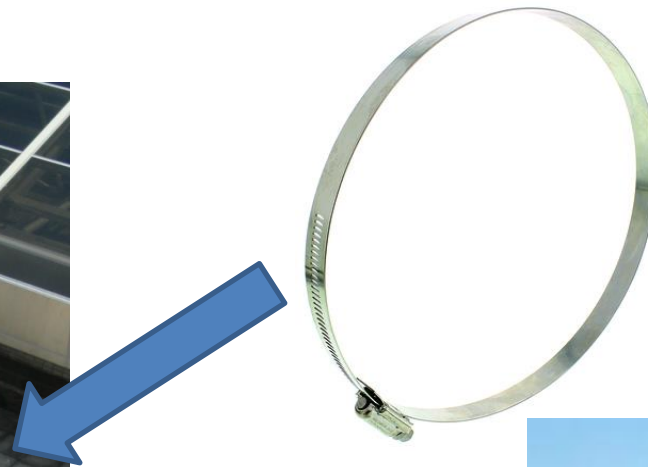
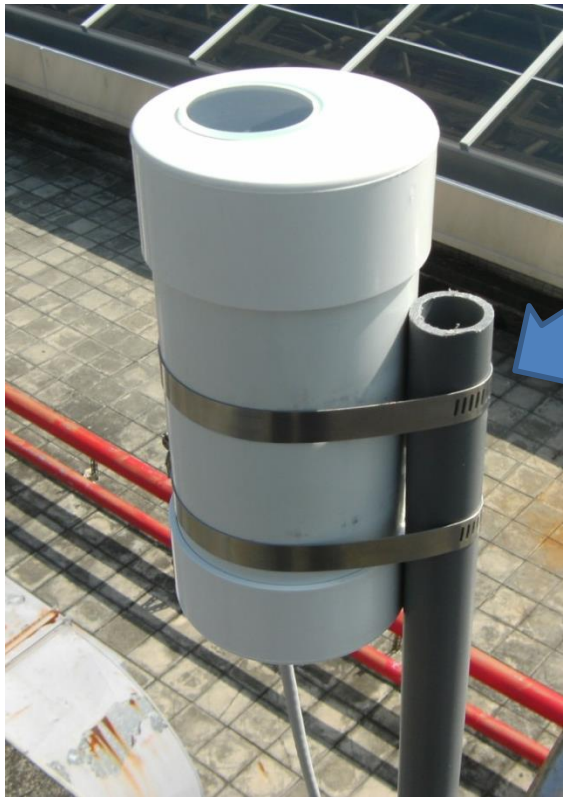
Mount the housing to the pole



cable gland
to seal the opening for ethernet cable

8. Installation of SQM-LE

Mount the housing to the pole



stainless steel
hose / Jubilee clip



8. Installation of SQM-LE

Mount the housing to the pole



electrical tape (prefer outdoor quality)
to seal the cover

cable ties (prefer outdoor quality)

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9. SQM-LE cabling

Inside the housing SQM-LE



power cord ethernet cable

PoE splitter

POWER+DATA in

set the output voltage as 5V

Cat 5 ethernet cable running from indoor to outdoor

PoE injector

POWER+DATA out

ethernet cable

power supply of PoE injector

timer switch

network switch / hub / router

indoor



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10. SQM-LE testing

After completing the above steps:

Please contact Dr So

Tel: 852 9447 2120 or
email: socw@connect.hku.hk or
skype: sochuwing