



750 Naples Street • San Francisco, CA 94112 • (415) 584-6360 • <http://www.pumpkininc.com>

## ***INDI CLI & TX2 Update***

---

The following delivery package contains updates for the INDI CLI control software and TX2 camera control software. The following issues were addressed with these software versions:

- **CLI changes**
  - Allow user to specify exposure times up to 120 seconds.
  - Verified 14-bit TIF files show image data now on Windows 11.
  - Synchronize time with the TX2 at start of services.
    - We found using client time for saving files would cause potential copy errors when doing single captures. Synchronizing time on the TX2 was found to be a more reliable solution.
- TX2 Camera Control changes:
  - Allow the `date` command to run as `sudo` without a password
  - Increase the timeout on the XIMEA `get\_image` call to allow 120 second exposures

The delivery package `**20230831-indi-tx2-cli-update.zip**` contains the following items:

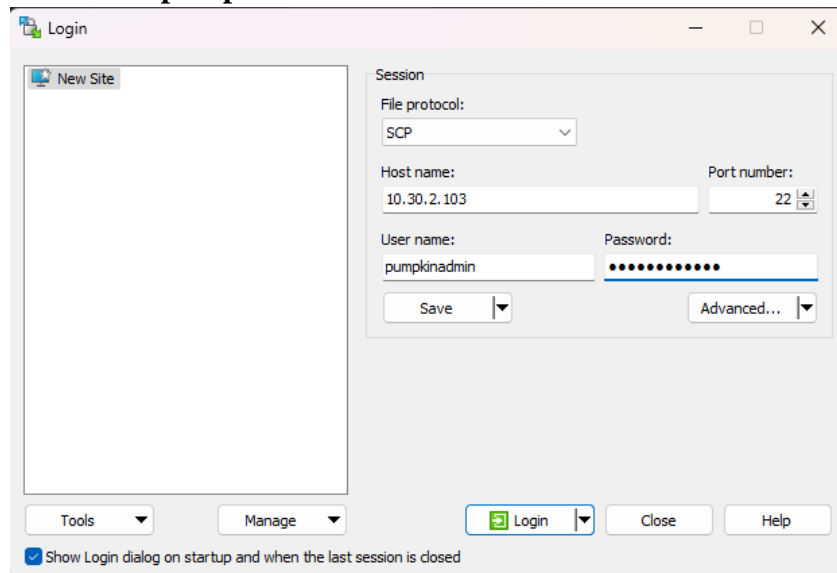
- This document under the root folder (**20230831-update-notes.pdf**)
- `**tx2**` folder, which contains the following:
  - `**enable-sudo-date.sh**` - A script to allow running `date` as sudo to set time remotely via CLI application
  - `**INDI/src/habsat/acquisition/image\_acquisition.py**` - The updated image acquisition code to increase the timeout delay for the XIMEA image and allow 120 second exposures.
- `**cli**` folder, which contains the following:
  - `**indi-cli.exe**` - The updated CLI to address 14-bit captures, synchronize TX2 time on start, and increased exposure time range to 120 seconds.



## INSTALLATION OF TX2 CHANGES

The following steps are required to install the updated camera control software, and verify operation.

1. Get the IP Address of the TX2 via `nmap -sP <subnet-of-tx2>/24` or contacting the local administrator to see currently connected network devices.
2. Extract the deliverable to a known location on the host desktop
3. Open WinSCP and login to the TX2 with the following information:
  - a. Host Name: <use IP Address of TX2 assigned on Network>
  - b. User Name: **`pumpkinadmin`**
  - c. Password: **`pumpkinadmin`**



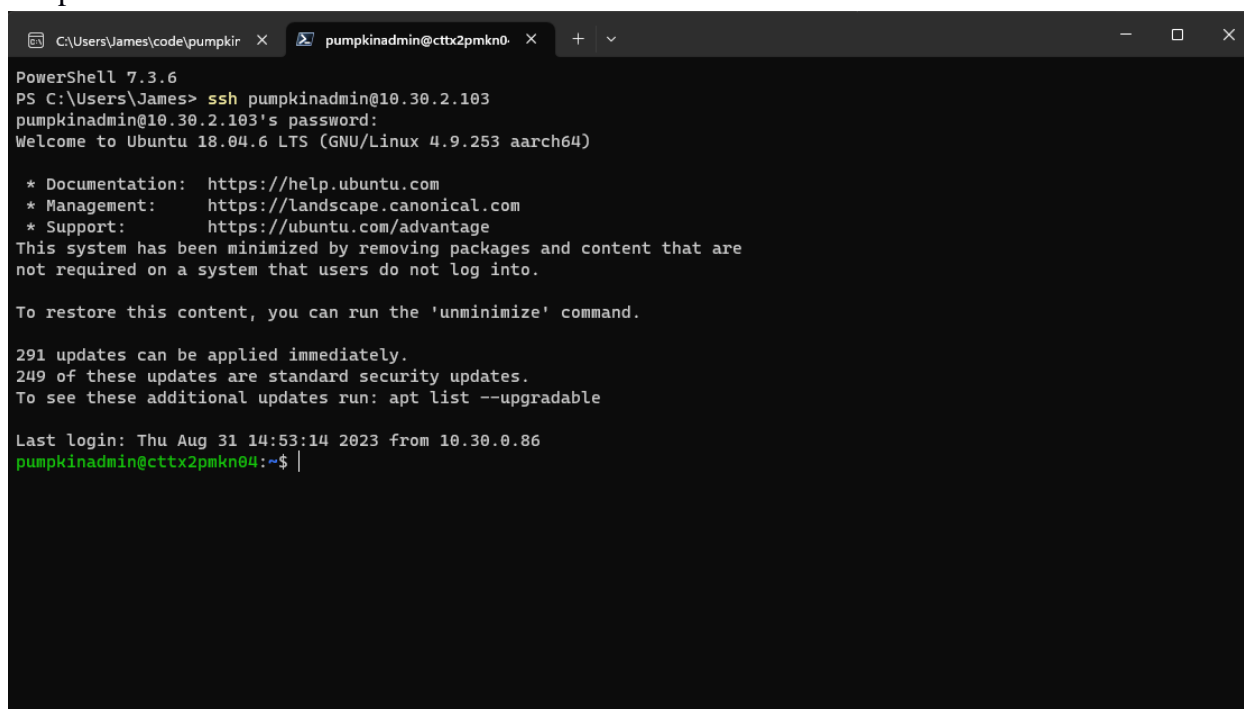
**Figure 1 - WinSCP Login**

4. Navigate to the location of the **`tx2`** folder and drag/drop the **`tx2`** folder onto the right panel to copy over to the TX2.

5. Once copied over, SSH into the TX2 via opening Windows Terminal and running:

``ssh pumpkinadmin@<tx2-ip-address>``. Use password ``pumpkinadmin``, and note the password characters do NOT appear while typing in the password.

Output should be similar to below:



```
PowerShell 7.3.6
PS C:\Users\James\code\pumpkir > ssh pumpkinadmin@10.30.2.103
pumpkinadmin@10.30.2.103's password:
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.9.253 aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage
This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

291 updates can be applied immediately.
249 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Thu Aug 31 14:53:14 2023 from 10.30.0.86
pumpkinadmin@cttx2pmkn04:~$
```

Figure 2 - TX2 Login via SSH

- Navigate to the `~/tx2` folder via `cd ~/tx2`. Run the `ls` command and see a listing below similar to:

```
PowerShell 7.3.6
PS C:\Users\James> ssh pumpkinadmin@10.30.2.103
pumpkinadmin@10.30.2.103's password:
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.9.253 aarch64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage
This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

291 updates can be applied immediately.
249 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Last login: Thu Aug 31 14:53:14 2023 from 10.30.0.86
pumpkinadmin@cttx2pmkn04:~$ ls
Desktop  enable-sudo-date.sh  INDI  Music  Templates  zoom.txt
Documents  examples.desktop  launch_services.sh  Pictures  test-images
Downloads  HABSat-env        mcu-service-0.4.5  Public  Videos
pumpkinadmin@cttx2pmkn04:~$ cd tx2/
pumpkinadmin@cttx2pmkn04:~/tx2$ ls
enable-sudo-date.sh  INDI
pumpkinadmin@cttx2pmkn04:~/tx2$ |
```

Figure 3 - Listing of TX2 folder

- Run: `chmod +x enable-sudo-date.sh` to make the script executable to allow date to run as admin/sudo. Run an `ls` command and the `enable-sudo-date.sh` should show up in **green text** now, signifying it is executable.
- Run `sudo ./enable-sudo-date.sh` to install the system changes necessary. Use `pumpkinadmin` for the password when prompted.
- Run `cp -r INDI ~` to install the code changes necessary for allowing long exposure times.
- To verify the `date` can be run as **sudo**, run `sudo date` in the terminal. **No password should be prompted and the current date set on the TX2 should be output.**

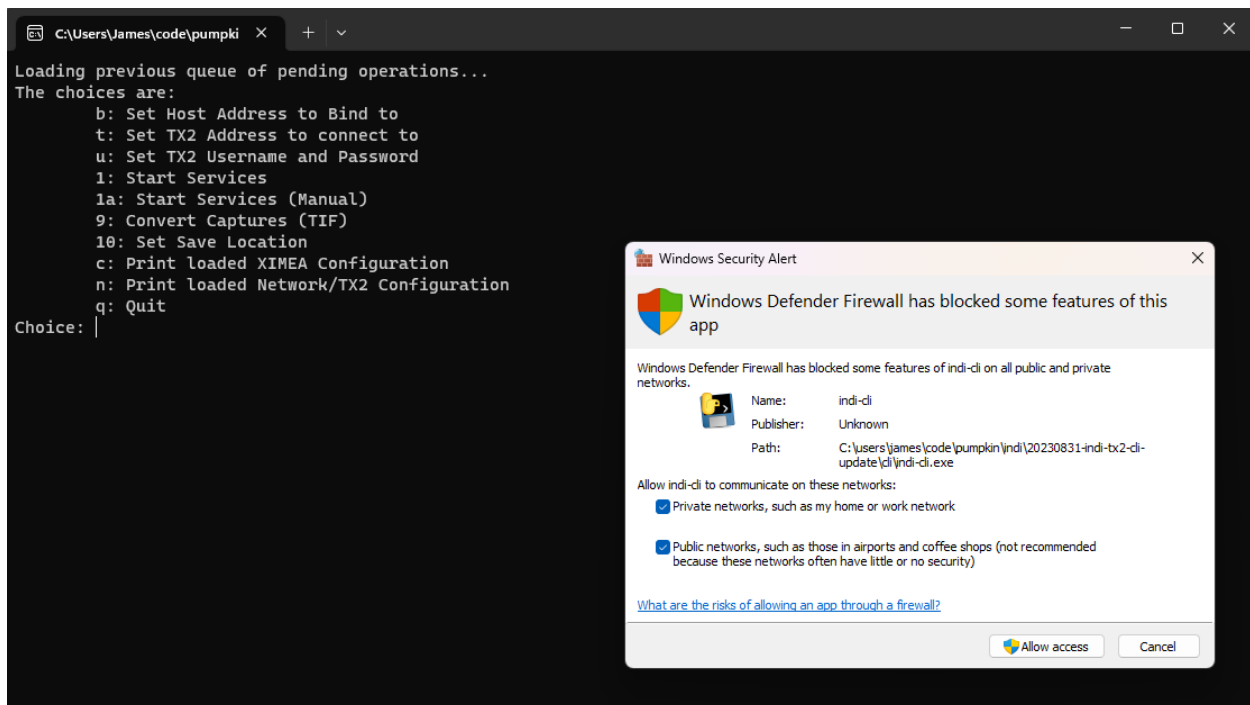
```
pumpkinadmin@cttx2pmkn04:~/tx2$ sudo date
Thu Aug 31 16:00:23 PDT 2023
pumpkinadmin@cttx2pmkn04:~/tx2$ |
```

Figure 4 - No Password prompt for Date command

## INSTALLATION OF CLI

The application is now a single executable so it can be placed anywhere desired on the users system.

To install the new CLI version, the user simply has to extract the delivery zip folder and run the ``indi-cli.exe`` application in the ``cli`` folder. The following dialog should pop in in a terminal, with a Windows Defender Firewall exception being shown. Allow Access for Private and Public networks:

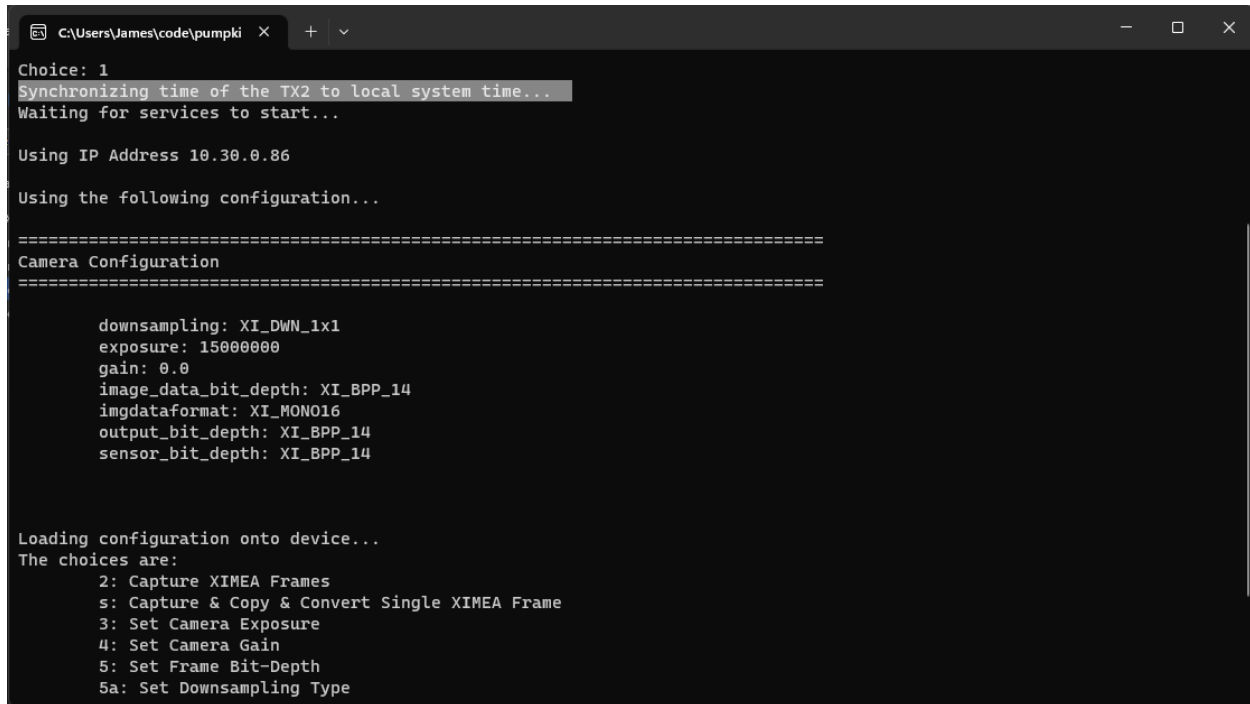


**Figure 5 - Initial startup of INDI CLI**

The same directions as in the ``20230314-INDI Camera Control Usage Guide.pdf`` all still applies. See below for minor changes to CLI

## Synchronize time on start

The following message should appear upon startup of the services via the **`1. Start Services`** option in the CLI.



```

C:\Users\James\code\pumpki x + v
Choice: 1
Synchronizing time of the TX2 to local system time...
Waiting for services to start...

Using IP Address 10.30.0.86

Using the following configuration...

=====
Camera Configuration
=====

    downsampling: XI_DWN_1x1
    exposure: 15000000
    gain: 0.0
    image_data_bit_depth: XI_BPP_14
    imgdataformat: XI_MONO16
    output_bit_depth: XI_BPP_14
    sensor_bit_depth: XI_BPP_14

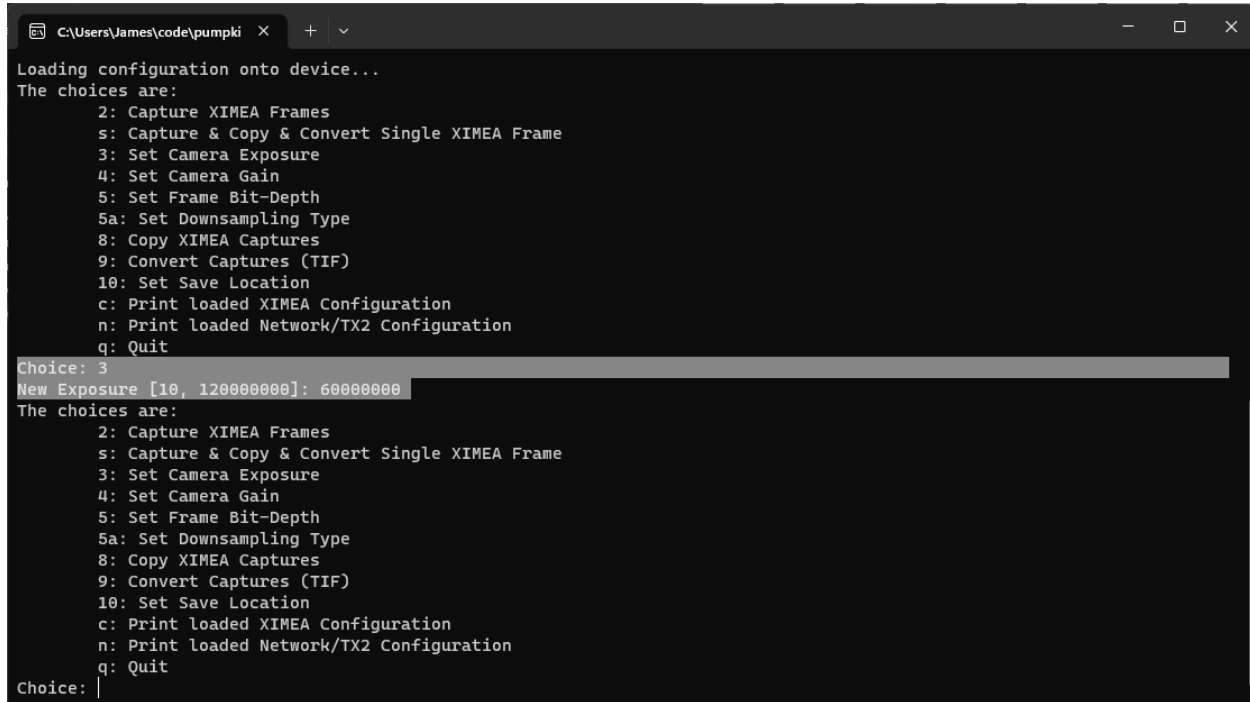
Loading configuration onto device...
The choices are:
    2: Capture XIMEA Frames
    s: Capture & Copy & Convert Single XIMEA Frame
    3: Set Camera Exposure
    4: Set Camera Gain
    5: Set Frame Bit-Depth
    5a: Set Downsampling Type
  
```

**Figure 6 - Synchronize time on start of services**

Once this message appears, the time should be synchronized to the clock on the host Windows 11 computer.

## Exposure Time increase

The Exposure time now can go up to 120 seconds, see below for changed option as well:



```
C:\Users\James\code\pumpki x + -
Loading configuration onto device...
The choices are:
  2: Capture XIMEA Frames
  s: Capture & Copy & Convert Single XIMEA Frame
  3: Set Camera Exposure
  4: Set Camera Gain
  5: Set Frame Bit-Depth
  5a: Set Downsampling Type
  8: Copy XIMEA Captures
  9: Convert Captures (TIF)
  10: Set Save Location
  c: Print loaded XIMEA Configuration
  n: Print loaded Network/TX2 Configuration
  q: Quit
Choice: 3
New Exposure [10, 120000000]: 60000000
The choices are:
  2: Capture XIMEA Frames
  s: Capture & Copy & Convert Single XIMEA Frame
  3: Set Camera Exposure
  4: Set Camera Gain
  5: Set Frame Bit-Depth
  5a: Set Downsampling Type
  8: Copy XIMEA Captures
  9: Convert Captures (TIF)
  10: Set Save Location
  c: Print loaded XIMEA Configuration
  n: Print loaded Network/TX2 Configuration
  q: Quit
Choice: |
```

Figure 7 - Increased Exposure time range

**Note:** When using long exposure times (>5 seconds) the captures will take much longer to complete. This is expected behavior due to waiting for the longer image to complete.

## 14-Bit capture fix

The build has been confirmed to be able to copy over 14-bit captures from the TX2, when downsampling is set to 1x1. See below for example of copying over a 14-bit capture and having data in the TIF file:

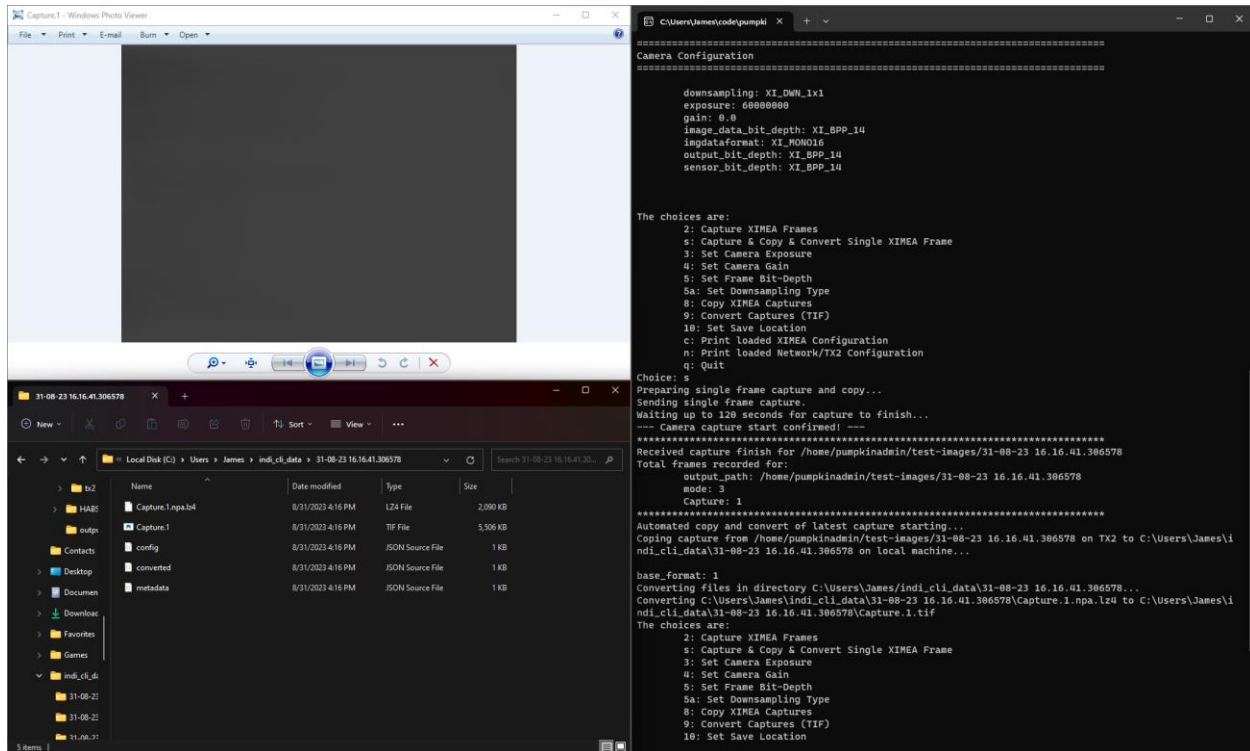


Figure 8 - 14-bit capture, copy and conversion successful

**Note:** The TIF file may show as 0KB/no data for **several seconds** after the copy has finished in the CLI. This is most likely to the CLI closing the file handle and flushing contents to disk.