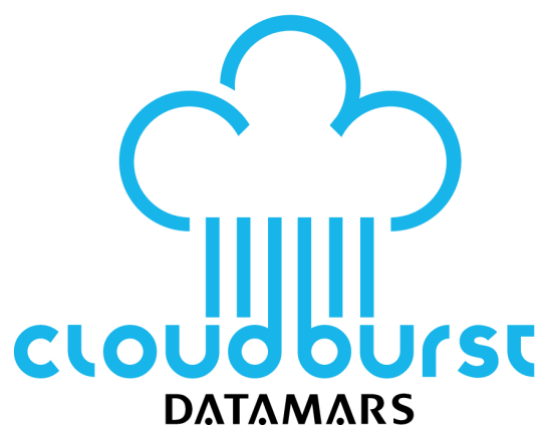


Cloudburst

SW Cloudburst

# USER MANUAL

Software Version 3.1.3



## Table of contents

1	Introduction .....	4
2	Getting started with Cloudburst .....	5
2.1	Connection through the Ethernet interface.....	5
2.2	Install or update Cloudburst on the Speedway Revolution Readers (R420/R220/R120) .....	7
2.3	Installation of Cloudburst on the R700 reader.....	10
2.4	Access Cloudburst Web GUI and first reading .....	14
2.5	Cloudburst license .....	17
3	Network configuration .....	18
4	Web GUI description .....	19
5	Time zone management .....	20
6	Operating modes.....	21
7	Interfacing Cloudburst .....	22
7.1	Cloudburst messages and data .....	22
7.2	Keepalive and Keepalive acknowledge .....	23
7.3	Physical interfaces .....	23
7.4	Protocols and data formats available over the physical interfaces .....	23
7.5	JSON data format .....	24
7.6	XML data format in HTTP POST .....	25
7.7	RAW string data format.....	26
7.8	Form encoded RAW string in HTTP POST .....	26
7.9	FTP file transfer .....	27
8	Communication error.....	28
9	Command Line Interface .....	29
10	Cloudburst logs .....	30
11	Hardware accessories and combo installation .....	31
11.1	P-UHF-CBO for SR420/SR220 (Art. N.: 800 3075-967) .....	31
11.2	P-UHF-CBO for R700/R510 (Art. N.: 800 3075-949) .....	32
11.3	P-UHF-RS232 for SR420/SR220 (Art. N.: 800 3075-969) .....	33
11.4	P-UHF-RS232 for R700/R510 (Art. N.: 800 3075-948).....	33
11.5	P-UHF-SRMIX for SR420/SR220 (Art. N.: 400 5009-358).....	34
	Appendix A - Impinj Speedway Revolution readers ports and LEDs .....	35
	Appendix B - Impinj Speedway Revolution readers GPIO pinout configuration .....	36
	Appendix C - Impinj Speedway Revolution readers LEDs status .....	38
	Appendix D - Impinj Speedway Revolution readers Troubleshooting.....	39

Appendix E - Impinj R700 reader ports and LEDs .....41

Appendix F - Impinj R700 reader GPIO pinout configuration .....42

Appendix G - Impinj R700 readers LEDs status.....44

Appendix H - Impinj R700 readers Troubleshooting .....45

## 1 Introduction

Datamars Cloudburst is a licensed software that runs on the Impinj Speedway® Revolution readers and the Impinj R700 reader. Cloudburst reduces the overall complexity related to RFID implementation while maximizing the reader performance in a laundry environment.

Cloudburst enables laundry managers to quickly deploy the RFID system. Web oriented, it simplifies integration with cloud-based ERP software and allows to easily integrate UHF readers with no need for software development and deep RFID knowledge.

The reader's activity and parameters setting are managed through a simple, yet powerful Web based GUI.

It comes with pre-configured reading modes that optimize RFID reading performance depending on the reading station. Cloudburst also provides autonomous start-reading and a set of parameters to control its functionality that are automatically restored at power up.

Cloudburst supports Ethernet, RS-232 and USB keyboard wedge hardware interfaces. It handles WebSocket, HTTP POST, RAW TCP/IP socket and FTP protocols and provides flexible and customizable data formats.

The Cloudburst software is also aimed to control the UHF hardware in combination with existing LF and HF installations, allowing a smooth transition between the three RFID technologies.

## 2 Getting started with Cloudburst

### 2.1 Connection through the Ethernet interface


By default, the Impinj Speedway Revolution and the R700 readers have DHCP client enabled. The IP address given by the DHCP server, or the host name of the reader is needed to reach it via Ethernet interface.

The default hostname of your Speedway Revolution reader is speedwayr-XX-XX-XX where XX-XX-XX shall be replaced with the last 6 digits of the reader' MAC address (e.g., speedwayr-11-4b-73).

The default hostname of the R700 reader is impinj-XX-XX-XX where XX-XX-XX shall be replaced with the last 6 digits of the reader' MAC address (e.g., impinj-13-9c-b0).

Alternatively, if the reader is connected directly to a PC set to automatically obtain an IP address, the reader can usually be reached at the 169.254.1.1 IP address. Follow the next steps to properly set the configuration of the Ethernet adapter of your Windows based PC for a direct connection before connecting the reader.

Any other operating system can be configured to properly connect to the reader, please refer to the documentation of your operating system to know how to change the network settings.

Press the +R keys on the keyboard to show the Run window. Type ncpa.cpl and click "OK" to open the Network Connections window.

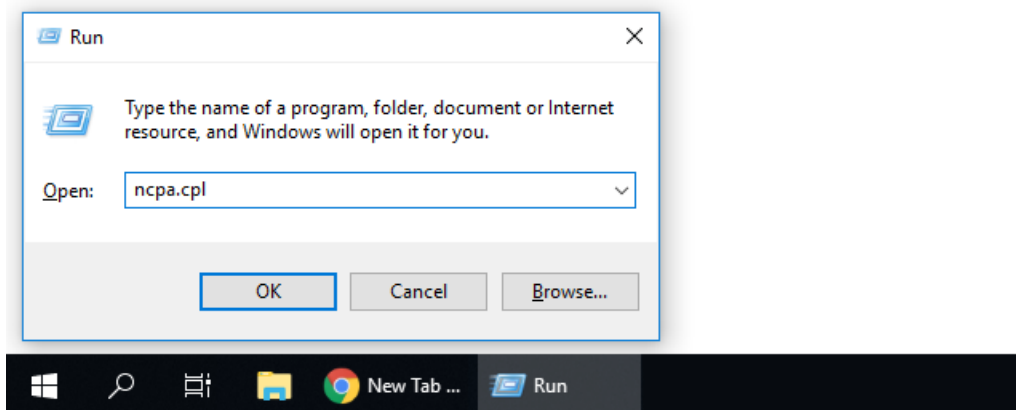


Figure 1 - Open Network Connections

Right click on the Local Area Connection icon and then click on Properties.

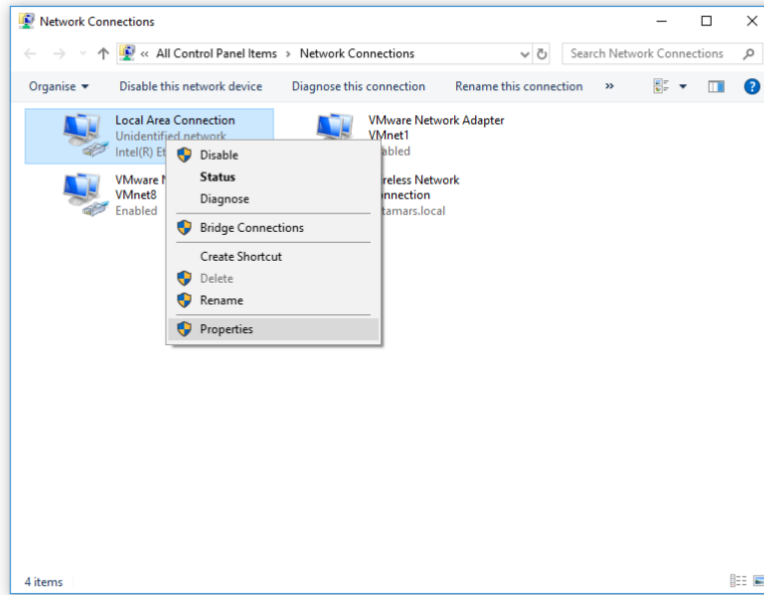


Figure 2 - Local Area Connection

Select the Internet Protocol Version 4 (TCP/IPv4) item and click on the Properties button.

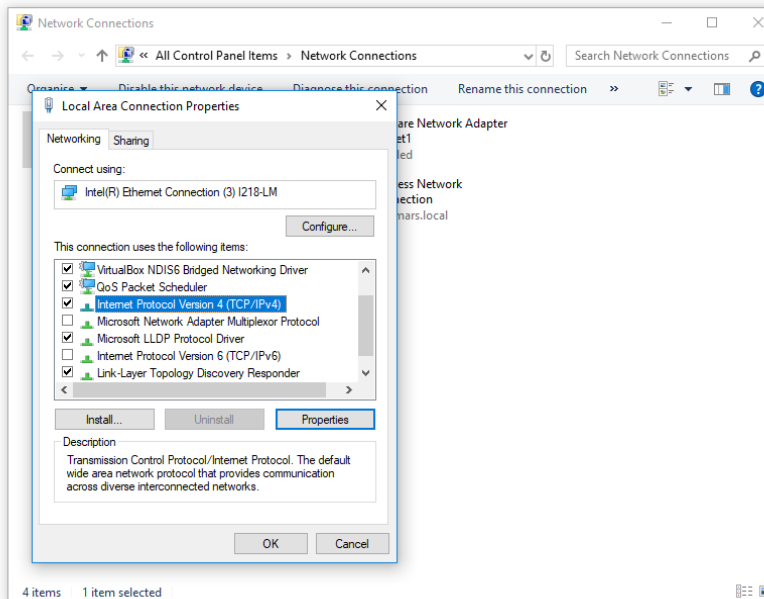


Figure 3 - Local Area Connection Properties

Make sure that “Obtain an IP address automatically” is selected in the Internet Protocol Version 4 (TCP/IPv4) Properties window.

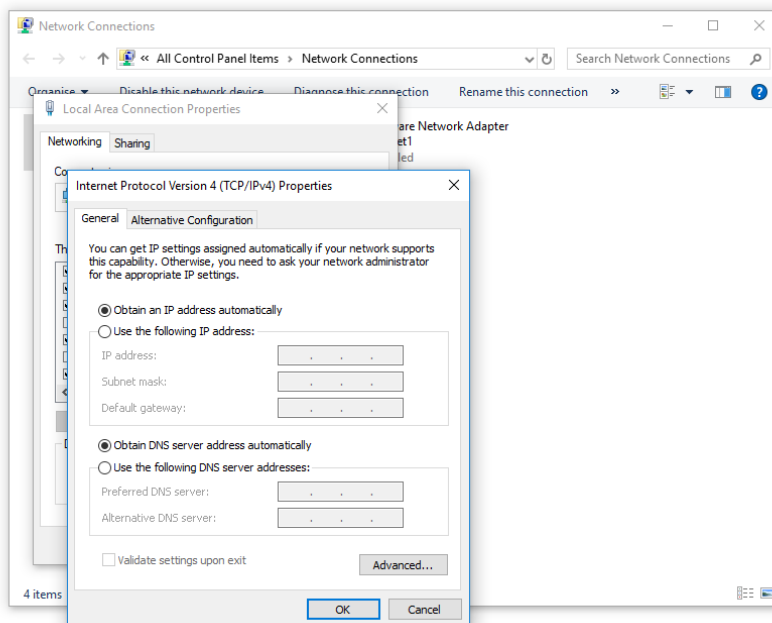


Figure 4 - Internet Protocol Version 4 (TCP/IPv4) Properties

Connect the RFID reader directly to the PC with an Ethernet cable and power it up plugging in the power supply plug.

## 2.2 Install or update Cloudburst on the Speedway Revolution Readers (R420/R220/R120)

Please note that the following instructions are needed only if Cloudburst is not installed already or in case of a Cloudburst software update is required. When updating an RFID reader with Cloudburst already installed, the Cloudburst configuration and license will be restored automatically.

If Cloudburst is already installed on the RFID reader and there is no need to update, proceed to chapter 2.4.

Download Cloudburst from the Datamars Textile ID website clicking the “Download” button at the following address <https://www.textile-id.com/cloudburst> and unzip the downloaded file.

Make sure the UHF reader is ready. It takes about 45 seconds to boot up after power up, it is ready when both Power LED Status LED are solid green.

Open a web browser (e.g., Google Chrome), type `http://` followed by the IP address (e.g., <http://169.254.1.1>) or the host name (e.g., <http://speedwayr-11-4b-73.local>) in the address bar and press Enter.

Once the connection is established the reader prompts for username and password. Default Username is: **root**. Default password is: **impinj**. Click on the Sign in button.

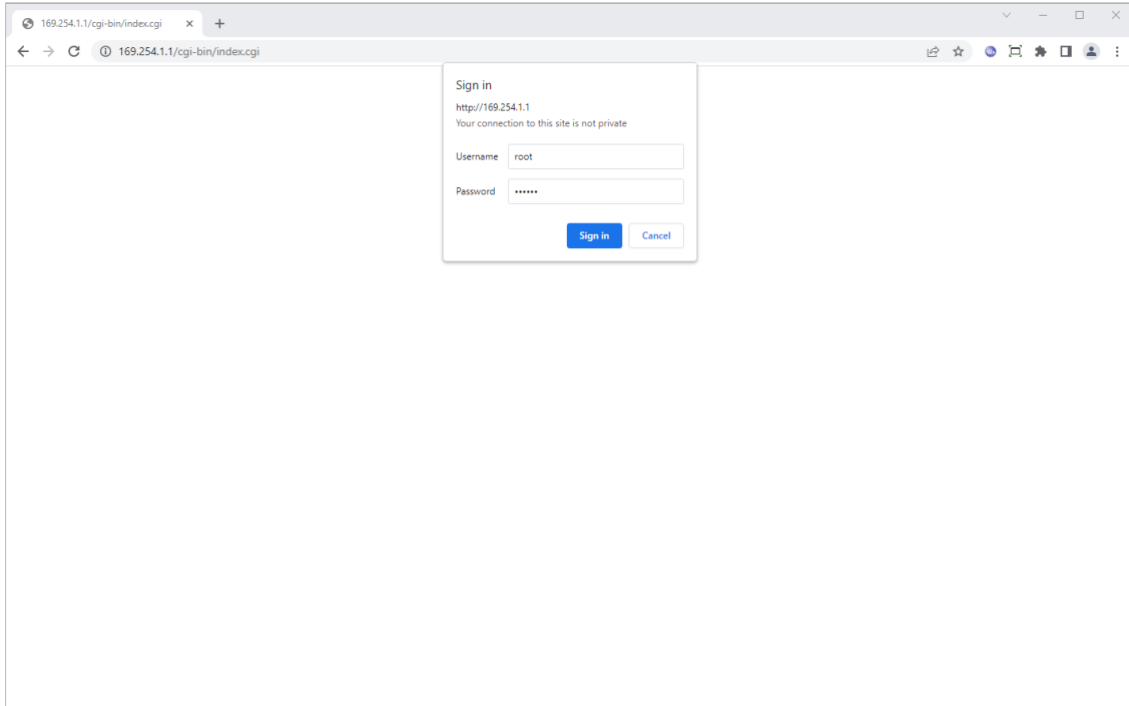


Figure 5 - Speedway Revolution reader Web management interface login

Cloudburst is tested and validated on Speedway revolution readers running a Software version 7.6.1.240. Please check it on the “Software Version” in the “Details” section. Running Cloudburst on a reader with a different software version is still possible although it is not officially validated. In case of doubts, please contact Datamars support.

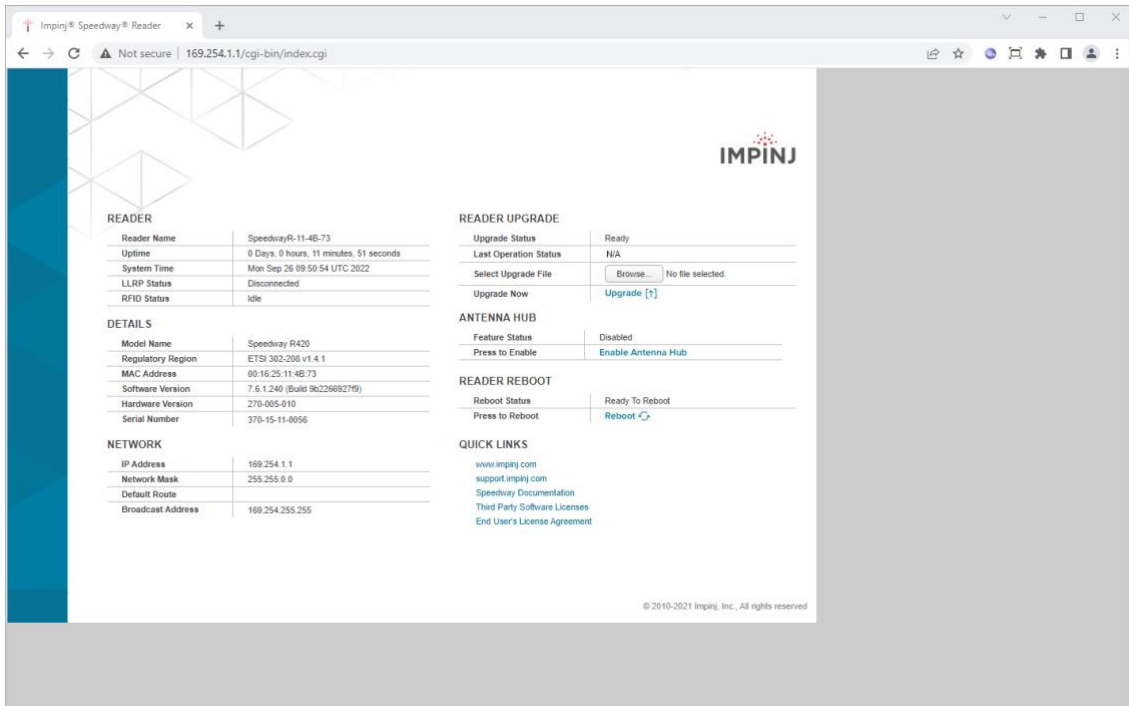


Figure 6 - Speedway Revolution reader Web management interface



Click the “Browse...” button in the “Reader Upgrade” section. Make sure to select the .upg file (e.g., Cloudburst\_3\_1\_2\_0.upg) in the unzipped folder of the previously downloaded file and click “Open”.

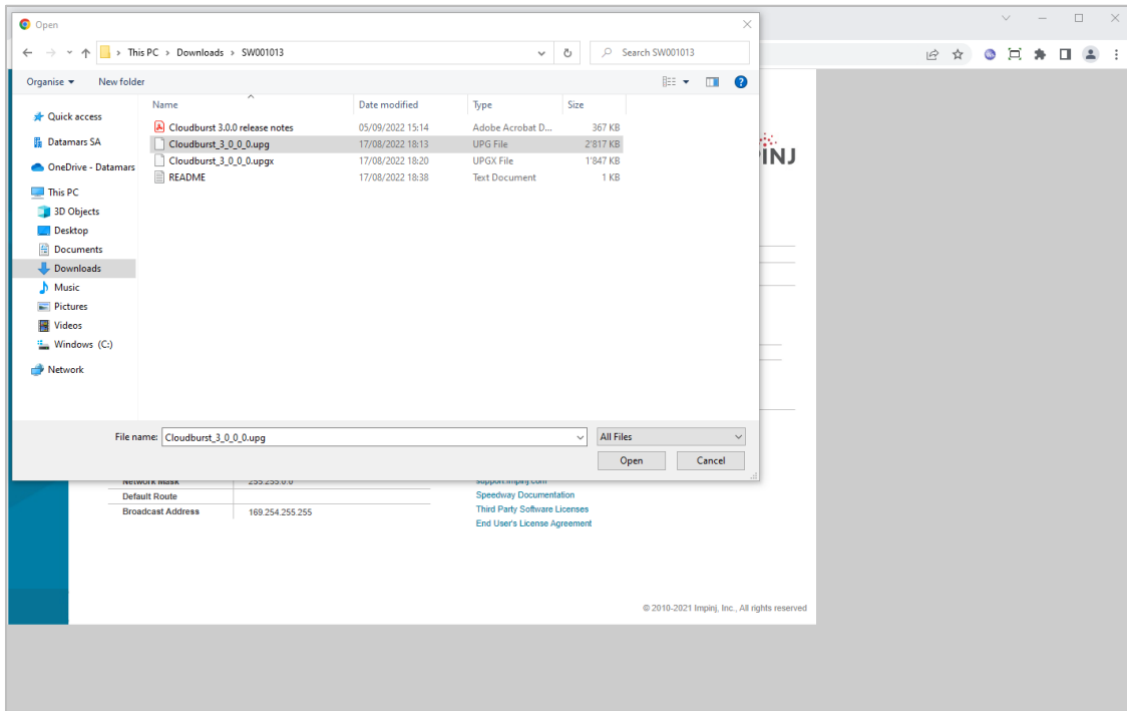


Figure 7 - Select the .upg file

Click on the “Upgrade [#]” button. The reader uploads Cloudburst and then commits the SW image. The process is shown in the “Last Operation Status” in the “Reader Upgrade” section, and it lasts about 30 seconds.

When the “Last Operation Status” turns to “Waiting for manual reboot” click on the “Reboot Q” button in the “Reader Reboot” section and then click “OK” in the pop-up window.

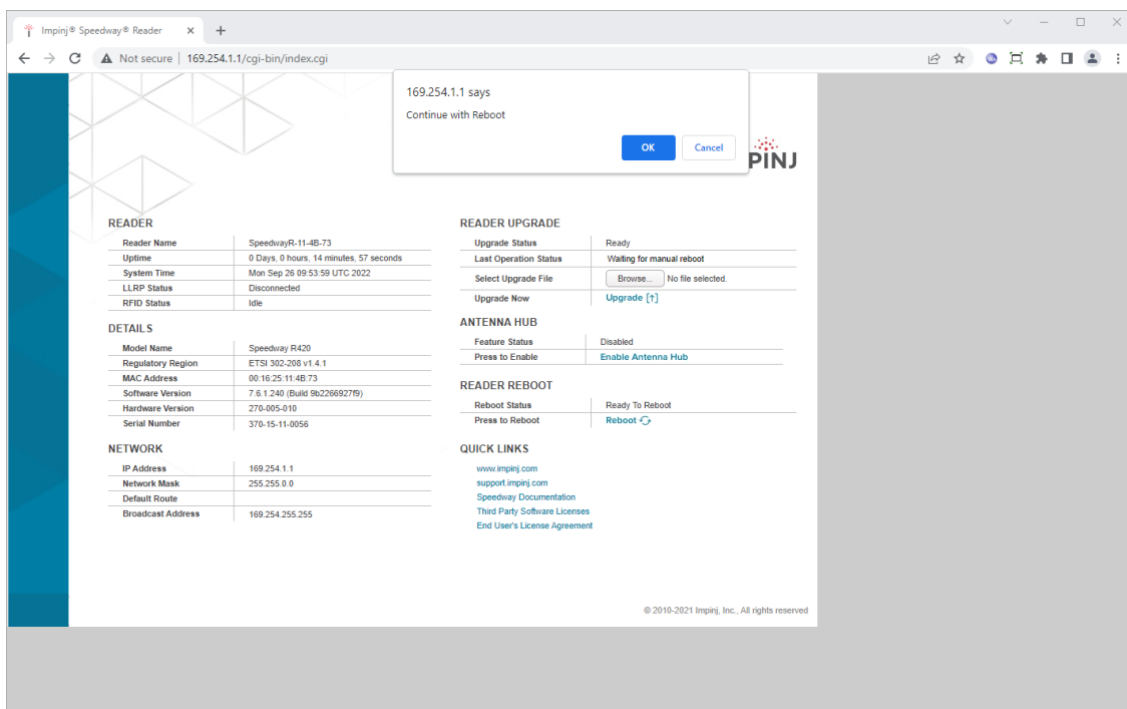


Figure 8 - Reboot

The reboot process takes about 1 minute. Wait until the reader is rebooted and the web management interface is reloaded. If the web page is not automatically refreshed, try refreshing it manually.

When the Web management interface is reloaded you can verify if the installation was successful by checking the “Application SW Version” shown in the “Details” section of the Web page. The version number must match the Cloudburst version just installed.

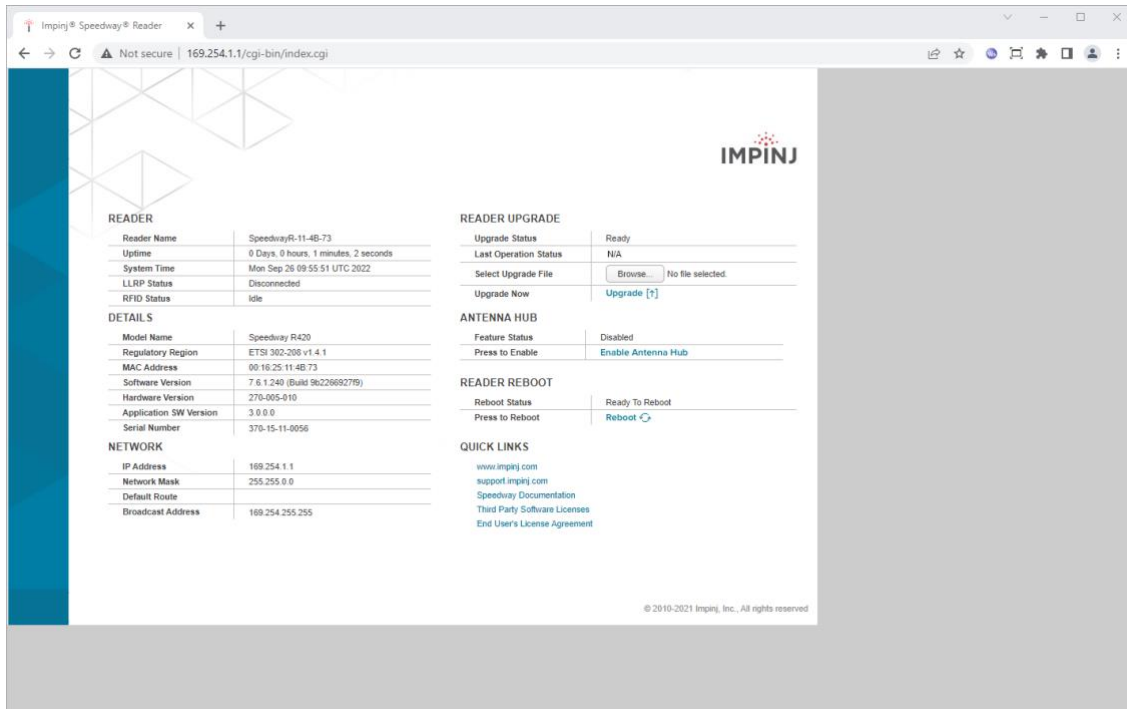


Figure 9 - Verify Cloudburst installed version

If Cloudburst is correctly running the Status LED of the Speedway Revolution reader blinks green.

## 2.3 Installation of Cloudburst on the R700 reader

Please note that the following instructions are needed only if Cloudburst is not installed already or in case of a Cloudburst software update is required. When updating an RFID reader with Cloudburst already installed, the Cloudburst configuration and license will be restored automatically.

If Cloudburst is already installed on the RFID reader and there is no need to update, proceed to chapter 2.4.

Download Cloudburst from the Datamars Textile ID website clicking the “Download” button at the following address <https://www.textile-id.com/cloudburst> and unzip the downloaded file.

Make sure the UHF reader is ready. It takes about 45 seconds to boot up after power up, it is ready when the System LED is solid blue.

If the R700 reader’s Firmware Version is 8.0.1.240 or above, it uses https as default for its web configuration page. Open a web browser (e.g., Google Chrome), type https:// followed by the IP address (e.g., <https://169.254.1.1/>) or the host name (e.g., <https://impini-13-9c-b0.local/>) in the address bar and press Enter. If the reader is running an older version or the default has been reverted, use http instead of https.

Depending on the browser privacy settings a security warning may show up. It is totally safe to proceed and accept the security exception.

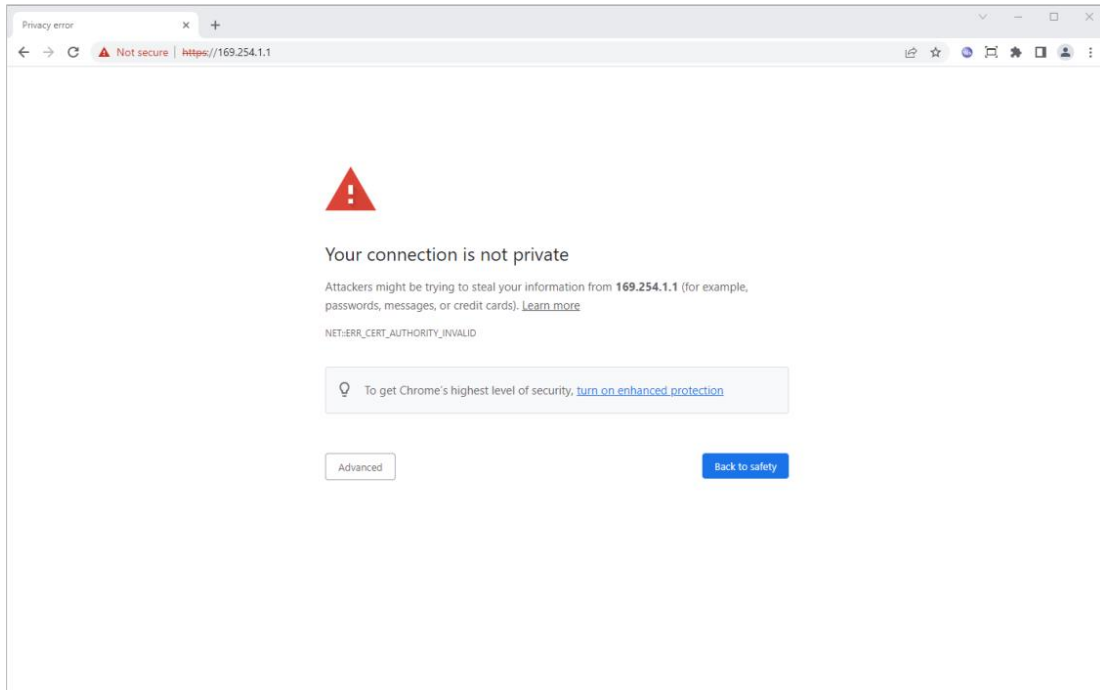


Figure 10 - Security warning

Click on the advanced button (depending on the browser the security warning may be different from the one shown here) and then click on the “Proceed to 169.254.1.1”. The security exception can also be permanently stored to avoid the message showing up every time. Additional information can be found in the browser help section.

Once the connection is established the reader prompts for username and password. Default Username is: **root**. Default password is: **impinj**. Click on the Sign in button.

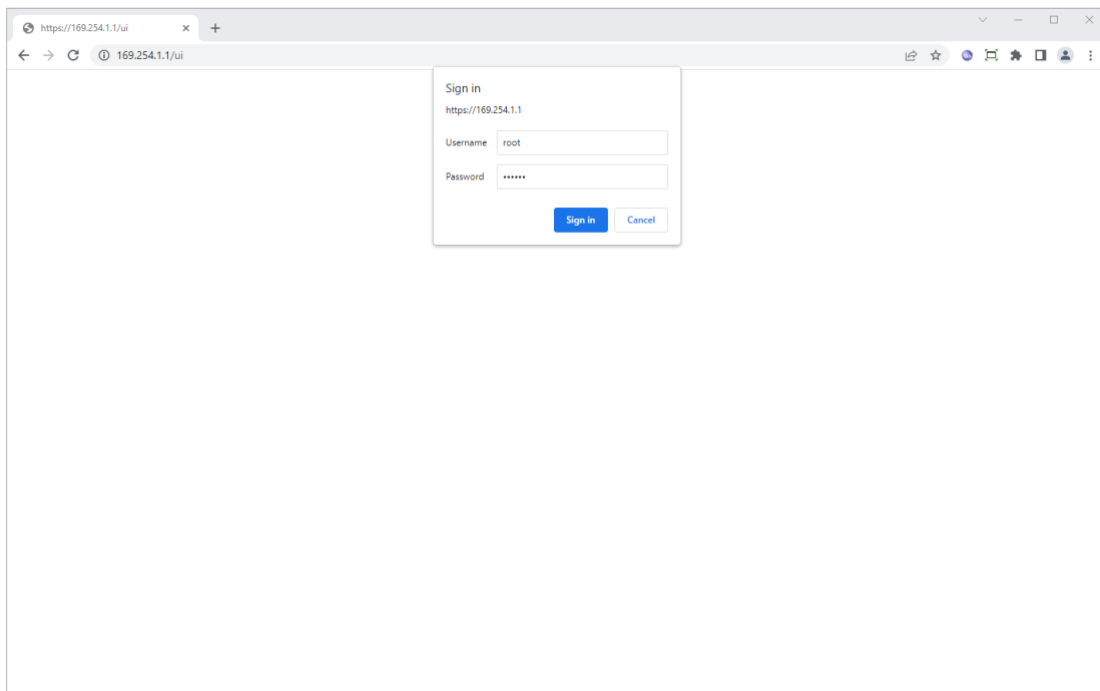


Figure 11 - R700 reader Web management interface login

Cloudburst is tested and validated on the R700 reader running Firmware Version 8.2.2. Please check it on the “Firmware Version” in the “Firmware and CAP” section. Running Cloudburst on a reader with a different software version is still possible although not officially validated, in case of doubts, please contact Datamars support.

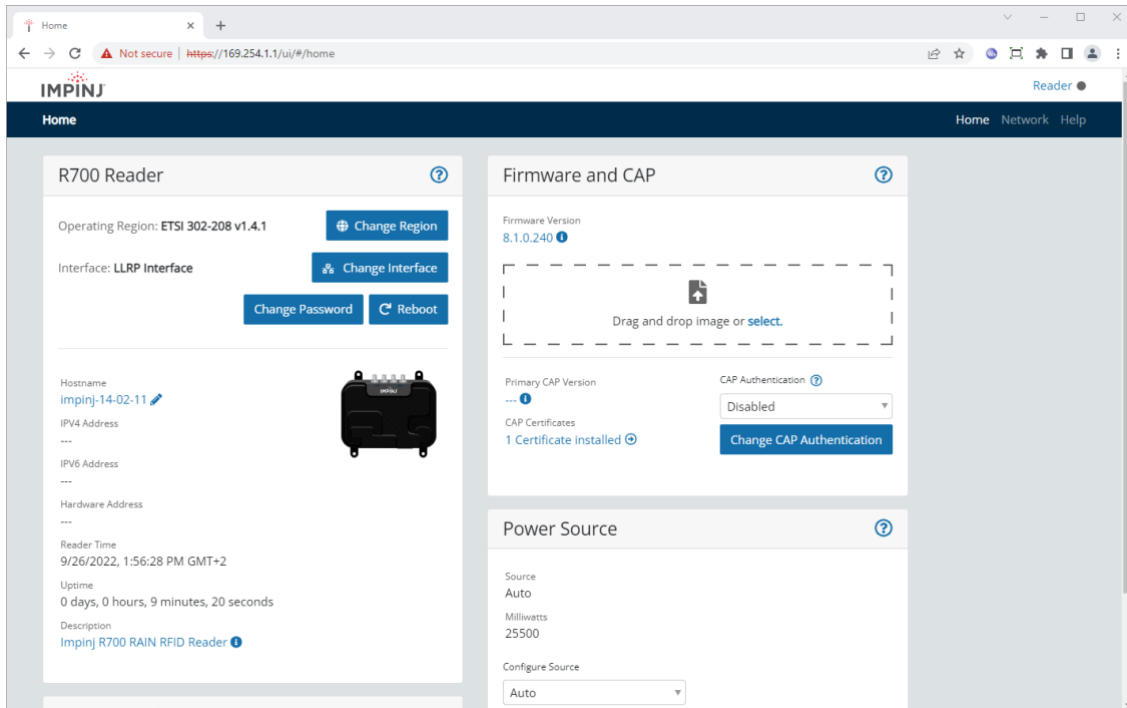


Figure 12 - R700 reader Web management interface

Before installing Cloudburst, the CAP Authentication shall be set to Open. “In the Firmware and CAP” section click on the drop-down menu below the “CAP Authentication” label and select Open, then click on the “Change CAP Authentication” button to make the change effective.

Click the “select” link in the “Firmware and CAP” section or drag and drop the Cloudburst installation file. Make sure to select the .upgx file (e.g., Cloudburst\_3\_1\_2\_0.upgx) in the unzipped folder of the previously downloaded file and click “Open”.

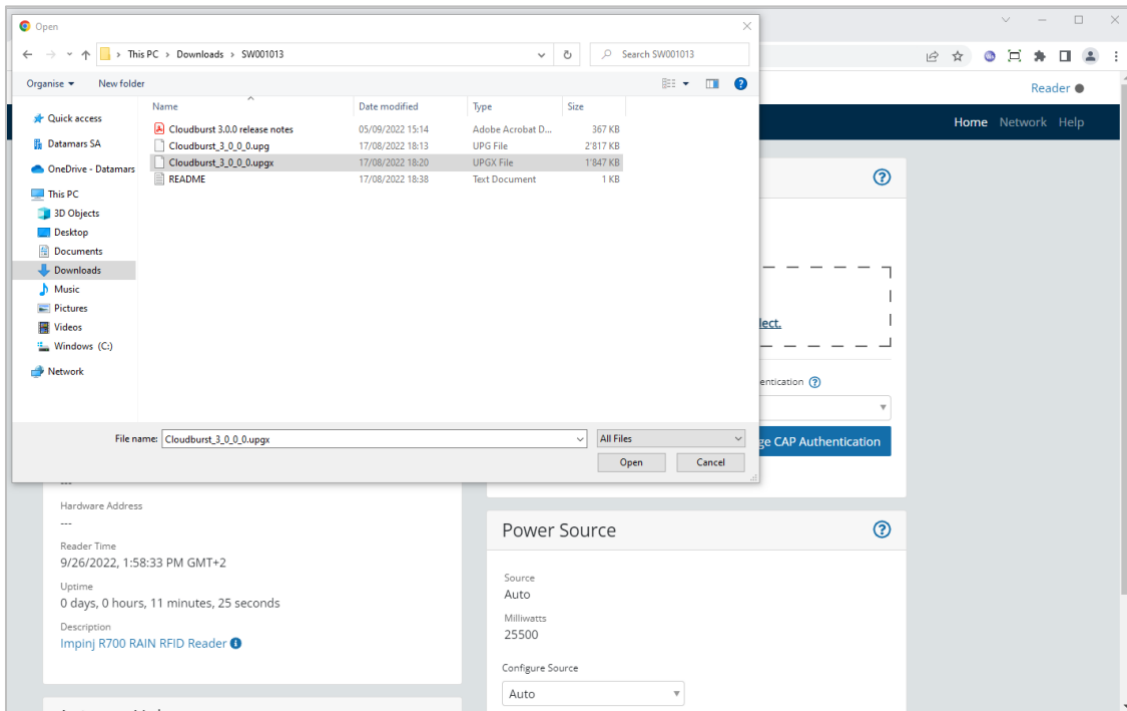


Figure 13 - Select the .upgx file

The reader uploads Cloudburst and then install the software image. The process is shown in the “Firmware and CAP” section, and it lasts about 20 seconds.

When the “Upgrade has been installed. Reboot to enable it or select another upgrade file.” message is shown, click on the “P Reboot” button in the “R700 Reader” section and then click “Reboot” in the pop-up window.

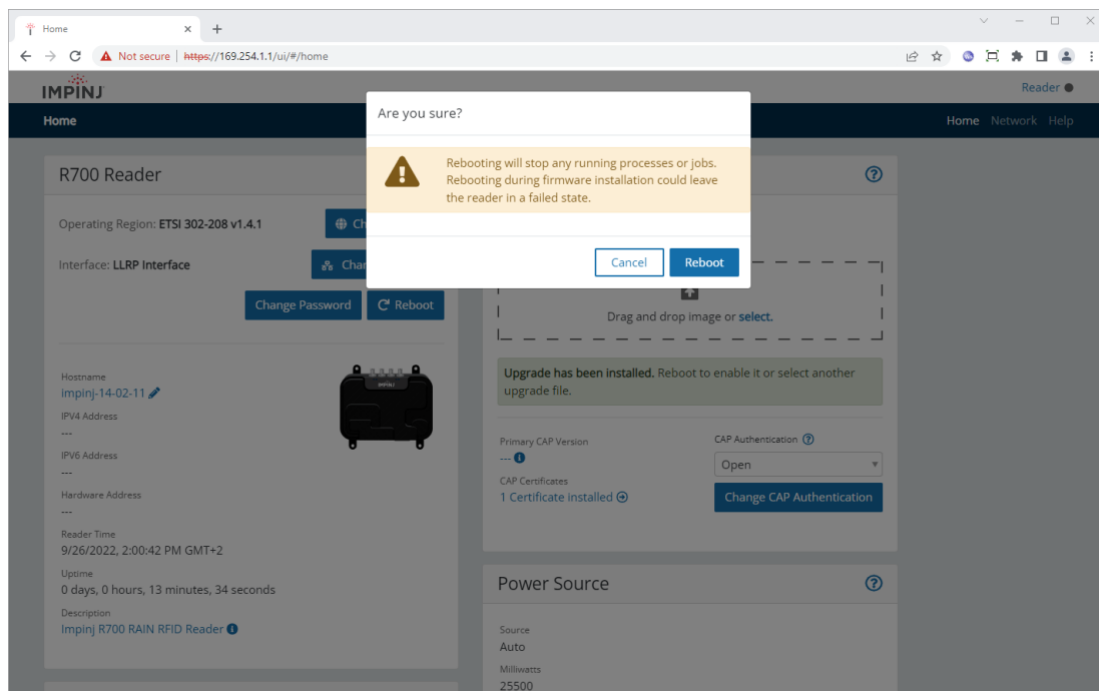


Figure 14 - Reboot

The reboot process takes about 1 minute. Wait until the reader is rebooted and the web management interface is reloaded. If the web page is not automatically refreshed, try refreshing it manually.

When the Web management interface is reloaded you can verify if the installation was successful by checking the “Primary CAP Version” shown in the “Firmware and CAP” section of the Web page. The version number must match the Cloudburst version just installed.

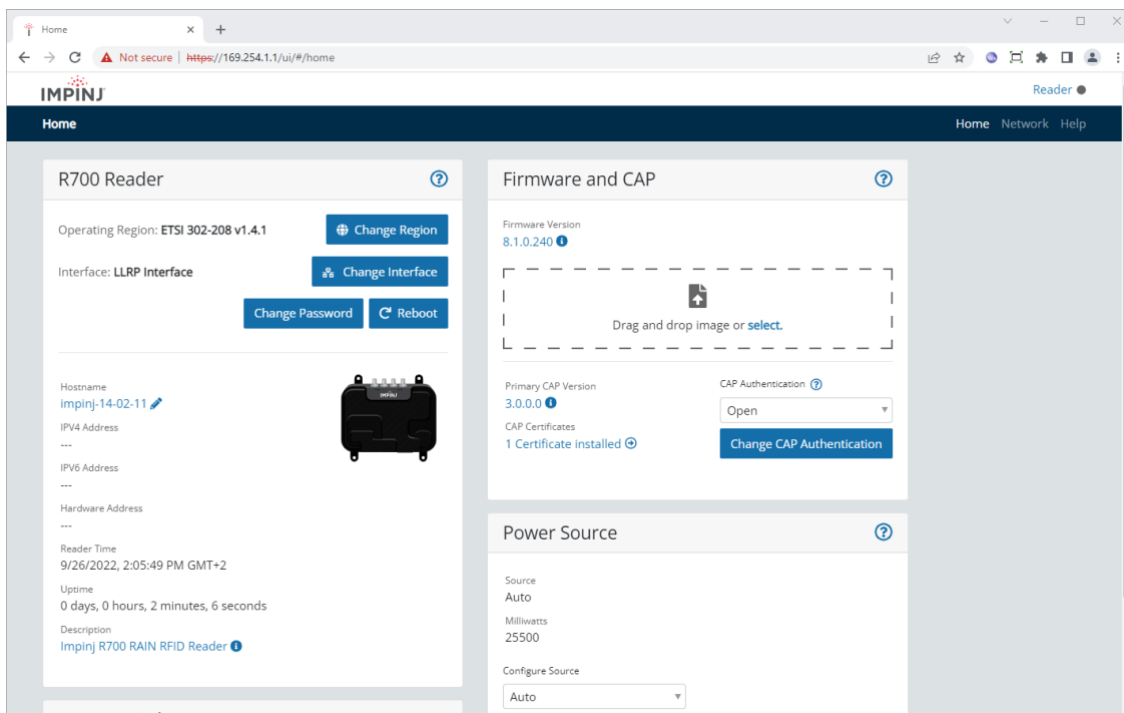


Figure 15 - Verify Cloudburst installed version

If Cloudburst is correctly running, the Inventory LED of the R700 reader blinks blue.

## 2.4 Access Cloudburst Web GUI and first reading

The Web GUI (Graphical User Interface) allows to configure Cloudburst, manually start, and stop the reading and check the tag codes read by the reader.

Make sure the UHF reader is ready. It takes about 45 seconds to boot up after power up. The Speedway Revolution reader is ready when the Power LED is solid green, and the Status LED blinks green while the R700 reader is ready when the System LED is solid blue.

To access the Cloudburst Web GUI on a Speedway Revolution reader, open a web browser (e.g. Google Chrome), type <https://> followed by the IP address (e.g. <https://169.254.1.1>) or the host name (e.g. <https://speedwayr-11-4b-73.local>) in the address bar and press Enter.

On a R700 reader, open a web browser (e.g. Google Chrome), type <https://> followed by the IP address and then the :8443 port number (e.g. <https://169.254.1.1:8443/>) or the host name (e.g. <https://impinj-13-9c-b0.local:8443/>) in the address bar and press Enter.

Depending on the browser privacy settings a security warning may show up. It is totally safe to proceed and accept the security exception.

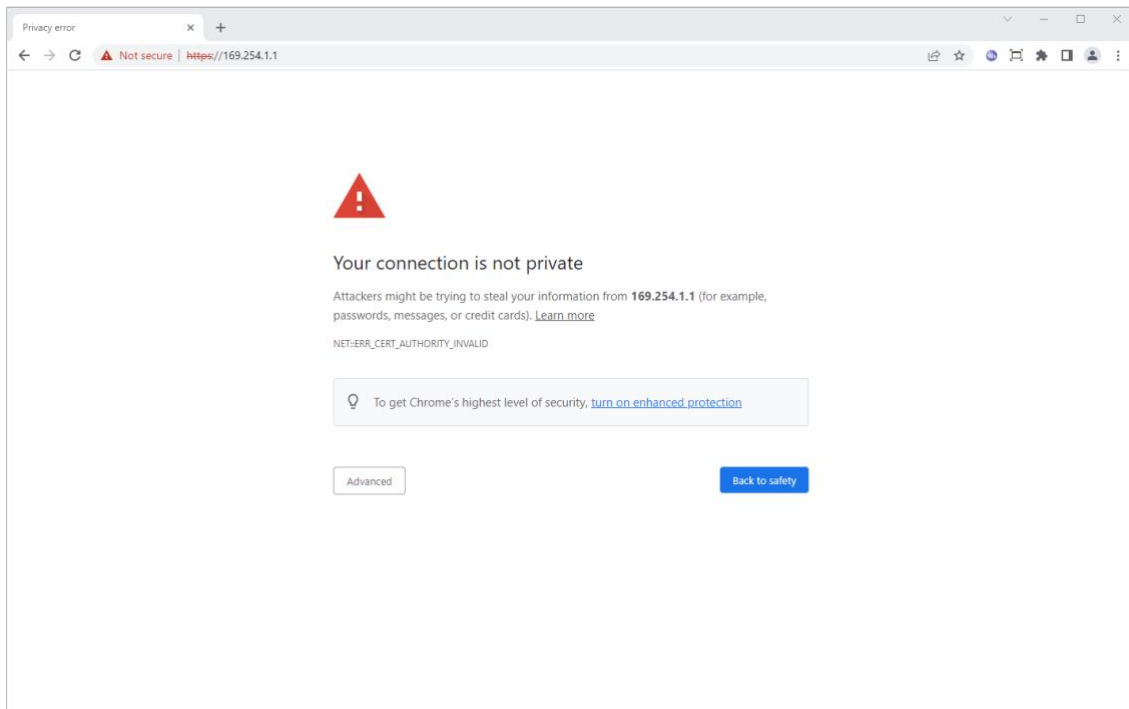


Figure 16 - Security warning

Click on the advanced button (depending on the browser the security warning may be different from the one shown here) and then click on the “Proceed to 169.254.1.1”. The security exception can also be permanently stored to avoid the message showing up every time. Additional information can be found in the browser help section.

Now the Cloudburst login page is shown. The default password is: **password**

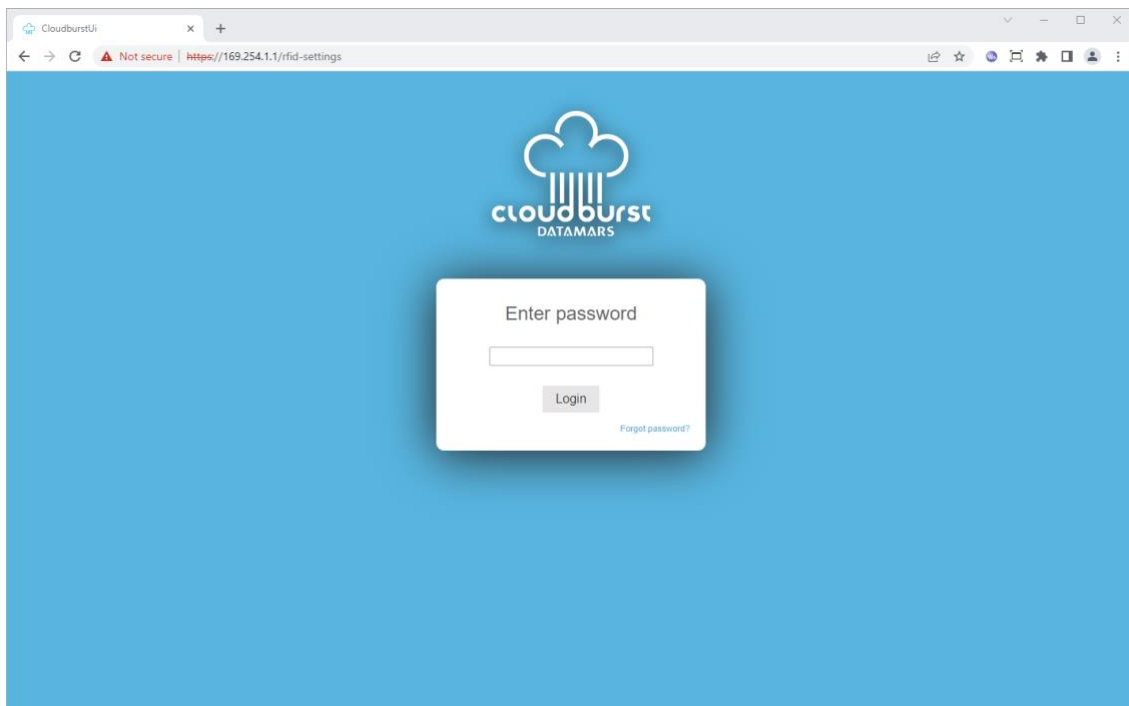


Figure 17 - Cloudburst login page

Type the password and click the “Login” button. The Cloudburst Web GUI (Graphical User Interface) shows up.

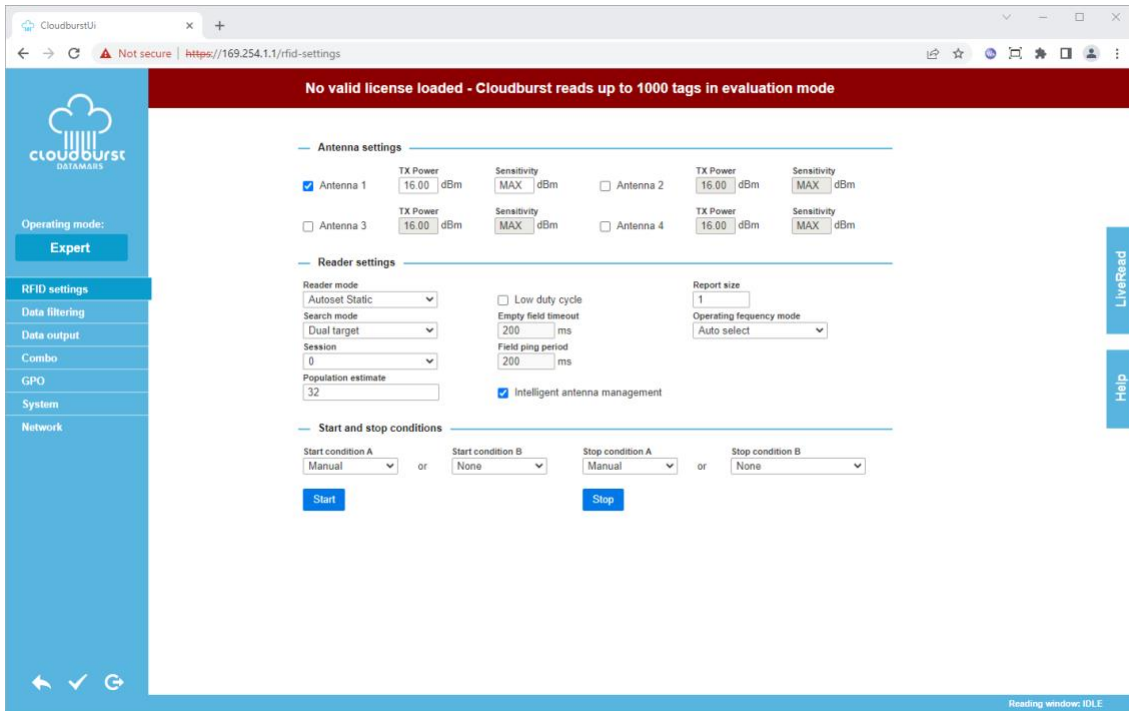


Figure 18 - Cloudburst Web GUI

Connect an antenna to the ANT1 connector on the RFID reader and put an RFID tag on the antenna.

Click on the “LiveRead” button on the right side of the page and then click on the “Start” button. The LiveRead allows to immediately see the EPC (Electronic Product Code) of the RFID tags read.

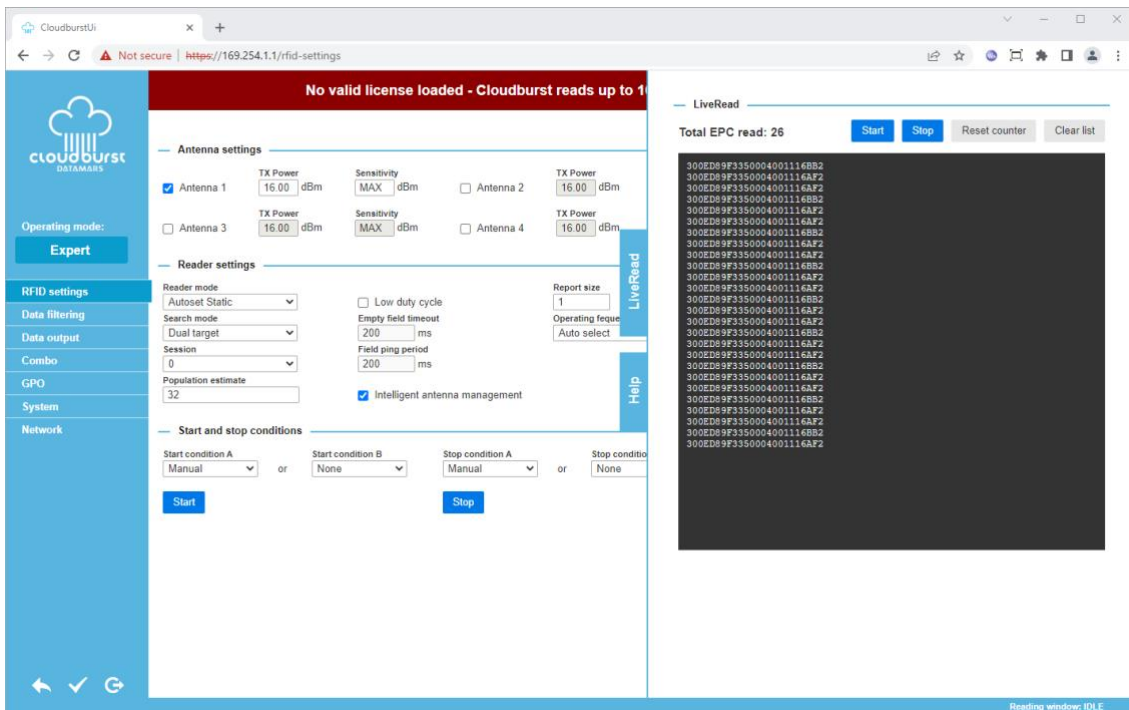


Figure 19 - LiveRead test



## 2.5 Cloudburst license

Without a valid license file provided by Datamars, Cloudburst allows you to read approximately 1000 tags for evaluation purposes. After 1000 tags are read, Cloudburst stops working and a valid license file is required to unlock all the Cloudburst functionalities.

The license file can be loaded in the “System” tab of the Web GUI. The license file name is the serial number of the reader the license has been generated for (e.g.: 37015110056.clf).

Depending on the options included in the purchased license, Cloudburst unlocks additional features. The list of enabled options is shown on the Web GUI.

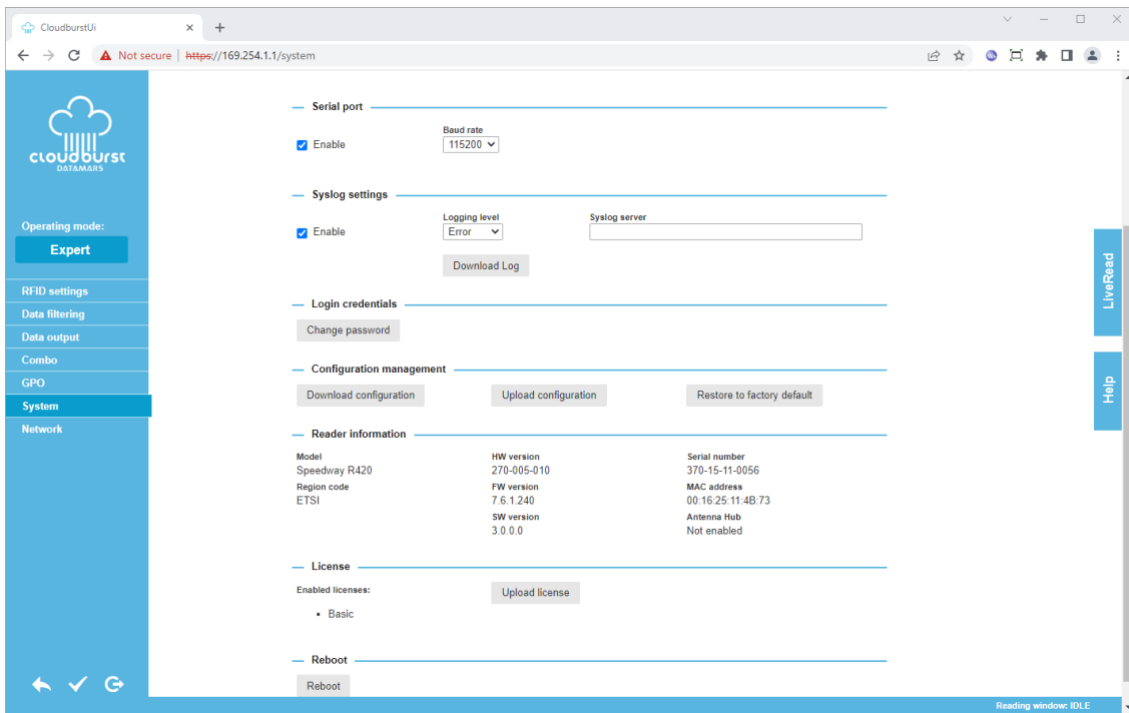


Figure 20 – System tab, license loaded

### 3 Network configuration

The network configuration of the reader can be changed in the “Network” tab of the Cloudburst Web GUI.

Any changes to the “Network” tab will automatically reboot the reader after the new settings are applied. When the reboot process completes the Cloudburst Web GUI shall be manually reloaded with the new IP address or hostname.

In case of static address mode, remember to double check that all the settings are correct before applying the new changes. In case of a mistake, the reader could potentially be not reachable anymore through the ethernet interface. If this happens, please refer to “Appendix D - Impinj Speedway Revolution readers Troubleshooting” or “Appendix H - Impinj R700 readers Troubleshooting”.

None of the network settings are saved in the Cloudburst configuration file. The network configuration is stored and managed by the operating system running on the reader.

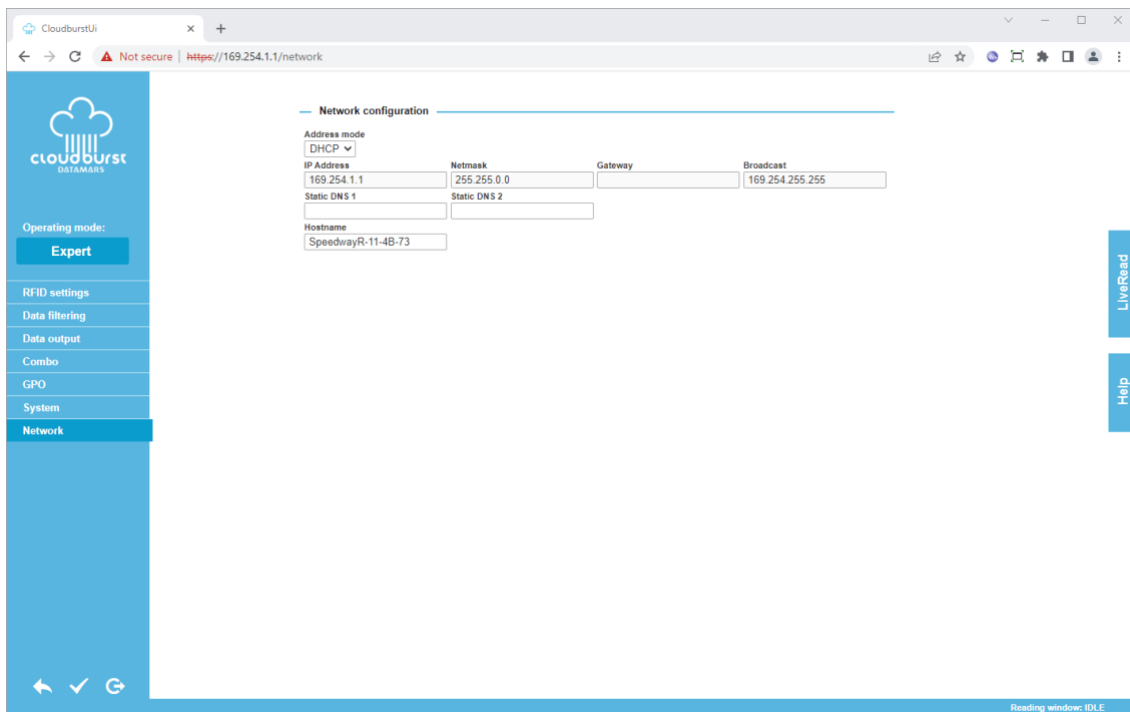


Figure 21 – Network configuration

## 4 Web GUI description

The Cloudburst Web GUI has four sections, the menu bar on the left, the main section in the middle, the LiveRead and Help tabs on the right and the status bar in the bottom left corner.

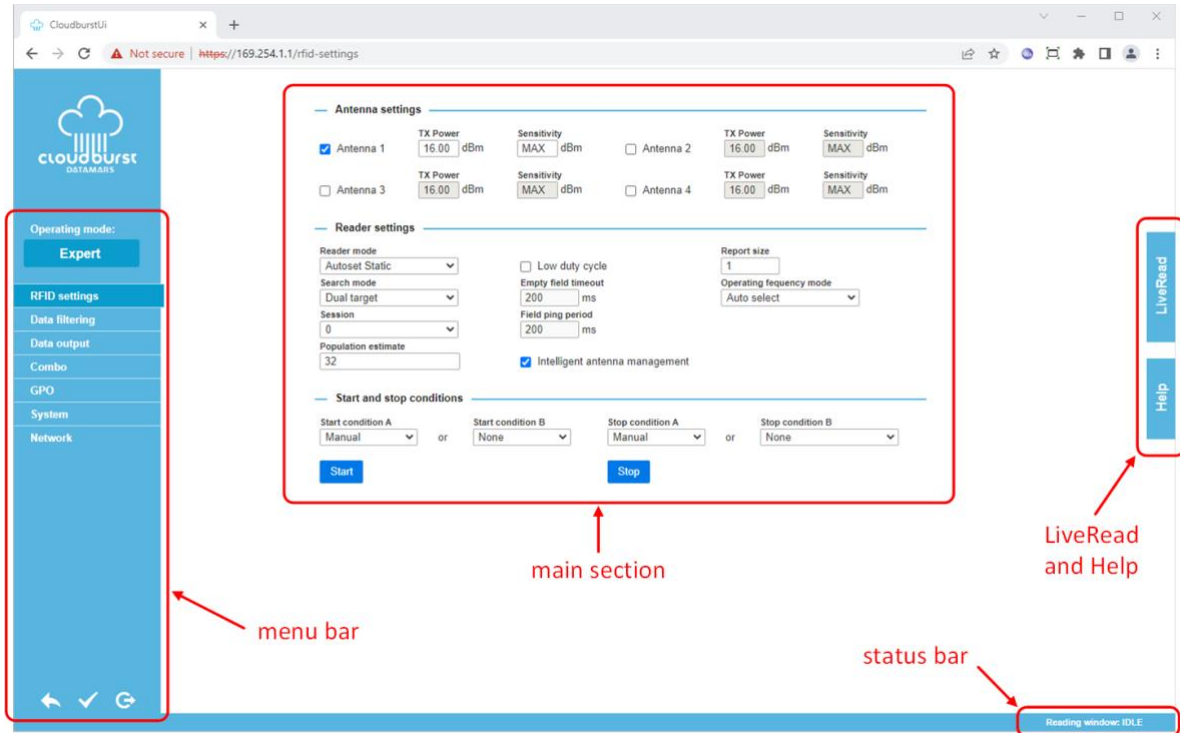


Figure 22 - Cloudburst Web GUI sections

The menu bar allows to select the operating mode, navigate through the different tabs and at the bottom there are three buttons to discard changes, apply changes and log out.

The main section shows the settings and the parameters available depending on the selected tab.

The LiveRead and Help tabs on the right side of the page allow to open the LiveRead tab and see the online Help.

The online Help provides detailed description of every parameter and functionality.

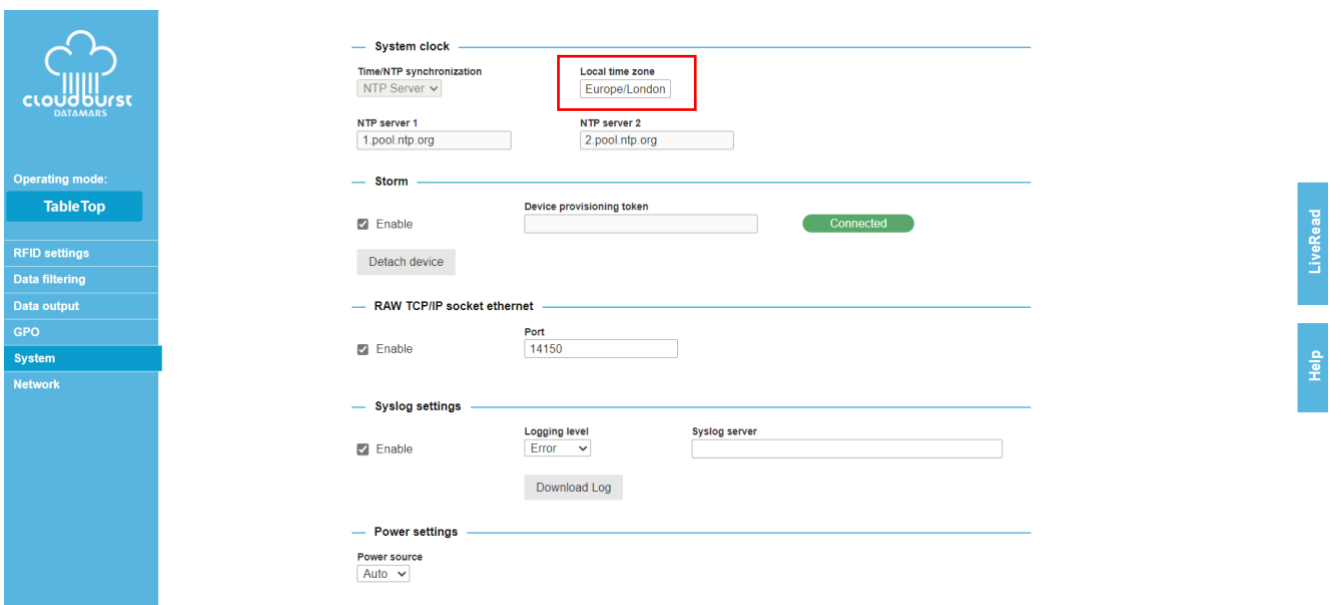
The status bar provides information on the current status of the reading window.

## 5 Time zone management

With release of Cloudburst version 3.1.3, we are introducing a new feature that allows the possibility to set a local time zone for the device in the Cloudburst itself. The user has the option to select a time zone from the list of dropdowns that contains curated list of different time zone across the globe.

User can also start typing the country or region name while the dropdown is active to filter results. By default, the user would have the time zone as UTC which can be changed when they update reader to the Cloudburst version 3.1.3.

The selection of the time zone would signify that the outputs and timestamps across the output of the reader would be based on the local time zone selected by the user.



The screenshot displays the Cloudburst web interface. On the left is a blue sidebar with the Cloudburst logo and a menu including 'TableTop', 'RFID settings', 'Data filtering', 'Data output', 'GPO', 'System' (highlighted), and 'Network'. The main content area is titled 'System clock' and contains several sections: 'Time/NTP synchronization' with a dropdown set to 'NTP Server' and a highlighted 'Local time zone' dropdown showing 'Europe/London'; 'NTP server 1' and 'NTP server 2' both set to '1.pool.ntp.org'; 'Storm' section with 'Enable' checked, a 'Device provisioning token' field, a 'Connected' status button, and a 'Detach device' button; 'RAW TCP/IP socket ethernet' section with 'Enable' checked and a 'Port' field set to '14150'; 'Syslog settings' section with 'Enable' checked, a 'Logging level' dropdown set to 'Error', a 'Syslog server' field, and a 'Download Log' button; and 'Power settings' section with a 'Power source' dropdown set to 'Auto'. On the right side of the interface, there are two vertical buttons: 'LiveRead' and 'Help'.

## 6 Operating modes

The Operating modes are Datamars made pre-sets to allow easier and quicker RFID setup without requiring deep RFID knowledge.

Depending on the license and the reader Cloudburst is installed on, some operating modes are not available. The full list of available modes is:

- Disabled
- Expert
- S-UHF-LITECAB
- S-UHF-CAB
- S-UHF-PORTAL
- S-UHF-PORTAL+
- TableTop
- S-UHF-ARCH
- RoF
- S-UHF-TUNNEL
- S-UHF-PORTAL-201

The Disabled operating mode allows to establish an LLRP connection to the RFID reader with an external application without having to remove Cloudburst. The disabled operating mode is not permanently saved, the previous Cloudburst configuration will be restored after reboot. If the LLRP connection is not available (because the external application is still connected) Cloudburst will refuse to switch to back to another operating mode.

The Expert operating mode allows to set every parameter of the reader. It is intended for installations where a standard setup is not applicable.

The Datamars reading systems work properly only if the appropriate Operating mode is selected.

Please visit Datamars Textile ID website for more information about our reading systems: <https://www.textile-id.com/textile-id-rfid-products>

## 7 Interfacing Cloudburst

### 7.1 Cloudburst messages and data

Cloudburst data output is flexible and customizable. The Web GUI allows to specify which information shall be included in the output simply dragging and dropping tokens in the desired order.

The screenshot shows the 'Tag data output format' configuration window. It has several input fields and dropdown menus for customizing the data output. The fields include Prefix, Suffix, EPC length (set to 0), EPC pointer (set to 0), Timestamp format (set to 'Date and time'), Prefix Suffix mode (set to 'Standard'), Antenna ID offset (set to 0), Separator (set to comma), and New line (set to 'LF/CR'). Below these fields is a row of buttons: Prefix, EPC, Timestamp, RSSI, Suffix, and New Line. At the bottom, there is a dashed box labeled 'Drop tokens to disable here:' which contains a single token labeled 'Antenna'.

Figure 23 - Tag data output format

Tag data include:

- EPC (HEX format, supports any EPC length e.g. 96 or 128 bits, customizable length filter to cut the EPC)
- Timestamp (Date and time or UNIX format)
- Antenna port
- RSSI
- Customizable prefix and suffix (in standard ASCII characters or HEX format for special characters)

Cloudburst also allows to send some status messages to indicate the status of the system and ongoing operations. They can be enabled if needed.

The following messages are currently available:

- <START> sent every time a reading window begins. It is guaranteed that all the tag codes belonging the just started reading window are sent after the <START> message.
- <STOP> sent every time a reading window ends. It is guaranteed that all the tag codes belonging to the just ended reading window are sent before the <STOP> message.
- <ABORT> sent when the reading has been stopped due to a failure or a misuse of the reading system. EPCs of the current acquisition should be discarded.
- <SIDE\_A> sent when a cart enters the S-UHF-PORTAL+ on side A.
- <SIDE\_B> sent when a cart enters the S-UHF-PORTAL+ on side B.
- <KEEPLIVE> periodically sent to allow the upper software layers to check if the RFID system and the connection is alive.
- <GPIXXXX> sent every time the status of a GPI changes. X represents the logic level of the respective GPI, and it can be 0 or 1, e.g. <GPI0110>

Every message is followed by a new line character(s).

Please note that other messages can be added in the future. The upper software layer shall be able to handle “unexpected” messages.

## 7.2 Keepalive and Keepalive acknowledge

Cloudburst allows to periodically send a Keepalive message to allow the upper software layer to check if the RFID system and the connection is alive. This could be used, for example, to show a warning on the application software that informs the RFID system is not working.

Cloudburst also allows to receive a Keepalive acknowledge message that can be used to let Cloudburst know that the Keepalive message has been received and processed by the upper software layer. This is especially useful in headless reading stations where a PC or a display is not available, and an operator is not directly operating the RFID equipment.

If the “Keepalive acknowledge” option is enabled, Cloudburst shall receive a keepalive acknowledge message within 10 seconds or the Keepalive period if shorter than 10 seconds, from the last Keepalive message. If no keepalive message is received, Cloudburst sets a communication error.

The keepalive acknowledge string to be sent to Cloudburst shall be the following: <ACK>

The Keepalive acknowledge feature is available when using the RAW TCP/IP socket, the Websocket or the RS-232 port as a communication interface/protocol.

As an example, this feature, together with a device attached to the reader’s GPIOs such as a red light or a buzzer, allows to show a physical alarm if the communication between the RFID equipment and the upper software layer does not work properly.

## 7.3 Physical interfaces

Cloudburst manages the following physical interfaces of the RFID reader:

- Ethernet
- RS-232 serial port
- USB keyboard wedge (HID) \*

\* Not available on the R700 reader. For readers that support keyboard wedge, using the reader as a HID device connected to a USB 3.0 port on the host computer is not supported [Impinj].

## 7.4 Protocols and data formats available over the physical interfaces

Over the Ethernet interface the following protocols and data formats are available:

- WebSocket (client and server)
  - JSON
  - RAW string
- HTTP POST
  - JSON
  - XML
  - Form encoded RAW string
- RAW TCP/IP socket (server)
  - RAW string

- FTP (client)
  - CSV file containing RAW string

The WebSocket server uses Ping/Pong frames. Cloudburst periodically send a Ping frame every 60 seconds. The client shall respond with a Pong frame. After five consecutive missing Pong frames, Cloudburst closes the WebSocket connection.

When using the HTTP POST data output and the transfer condition is set to “Minimum POST period”, it is important to remember that the HTTP POST data transmission cannot always be immediate. Only the first POST message is sent as soon as (at least) one message is available. Consecutive messages are periodically sent on a configurable time base if EPCs come faster than the minimum POST period.

Independently from the selected HTTP POST transfer condition, Cloudburst can buffer up to 5000 EPCs between two consecutive messages. If the buffer fills up a data loss will occur. It is user responsibility to prevent this.

If an HTTP POST fails, Cloudburst re-tries to send the message up to five times with one second delay between each attempt. EPCs in the buffer are discarded if the HTTP POST doesn’t succeed (after the fifth attempt), resulting in a data loss.

Up to five simultaneous RAW TCP/IP connections can be established. When the limit is reached, Cloudburst will not allow new connections to be established, automatically closing them.

When using FTP, cloudburst can buffer up to 5000 EPCs between two consecutive file transfers. If the buffer fills up a data loss will occur. It is user responsibility to prevent this. If a file transfer fails, Cloudburst re-tries to send the file up to five times with one second delay between each attempt. EPCs in the buffer are discarded if the file transfer doesn’t succeed (after the fifth attempt), resulting in a data loss.

Over the RS-232 serial interface the RAW string is the only format available.

Over the USB keyboard wedge interface, the RAW string is the only format available. Some special characters may not be supported by the keyboard wedge, this also depends on the keyboard layout. A “\_” character is typed if the corresponding character is not supported. The New line character(s) does not apply to keyboard wedge, at the end of every line the virtual keyboard simulates an “Enter” key.

## 7.5 JSON data format

An example of JSON format is the following:

```
{
  antennaPort:integer
  peakRssi:integer
  epc:string
  timestamp:string
  peakRssi:integer
  statusMessage:string
  prefix:string
  suffix:string
}
```

Please note that the content of the structure is dynamic, it depends on the configuration in the tag data output format.



Format for HTTP JSON keepalive message:

```
{
  "reader_name": "Reader101",
  "mac_address": "00:11:11:11:11:11",
  "prefix": "",
  "suffix": "",
  "tag_reads": [
    {
      "timestamp": "",
      "antennaPort": 0,
      "tid": "",
      "statusMessage": "<START>",
      "peakRssi": 0,
      "epc": ""
    }
  ]
}
```

Format for HTTP JSON EPC output:

```
{
  "reader_name": "Reader101",
  "mac_address": "00:11:11:11:11:11",
  "tag_reads": [
    {
      "timestamp": "20.08.2024 16:28:28",
      "antennaPort": 1,
      "tid": "",
      "statusMessage": "",
      "peakRssi": -39,
      "epc": "CCCCCCCCCCCC088544"
    }
  ]
}
```

## 7.6 XML data format in HTTP POST

Cloudburst also supports XML format for the HTTP output. The typical format for the XML structure looks like the following:

Format for XML JSON EPC output:

```
<reports>
  <report>
    <statusMessage>&lt;START&gt;</statusMessage>
    <passiveLocation>Reader101</passiveLocation>
  </report>
  <report>
    <tagType>PASSIVE</tagType>
    <tagId>CCCCCCCCCCCC088544</tagId>
    <antennaPort>1</antennaPort>
    <peakRssi>-38</peakRssi>
    <timestamp>22.08.2024 09:46:29</timestamp>
    <passiveLocation>Reader101</passiveLocation>
    <prefix>pre </prefix>
    <suffix>post</suffix>
    <macAddress>00:11:11:11:11:11</macAddress>
  </report>
</reports>
```

## 7.7 RAW string data format

In the RAW string format, the information is sent out as a regular string terminated by a configurable new line character(s).

The string content and format as well as the separator and the new line character(s) are widely customizable through Cloudburst Web GUI.

Strings are sent out over the selected output interface(s) one after the other when tags are read.

The following picture show some RAW strings collected with a terminal emulator.

```

192.168.0.209 - PuTTY
<GPI1100>
<START>
300ED89F3350005001116B74,27.11.2018 09:15:03,1,-15
300ED89F3350004001116BFB,27.11.2018 09:15:03,1,-20
300ED89F3350008CCCD53759,27.11.2018 09:15:03,1,-38
300ED89F3350008CCCD5387D,27.11.2018 09:15:03,1,-32
300ED89F3350004001116B3C,27.11.2018 09:15:03,1,-24
300ED89F3350004001116B96,27.11.2018 09:15:03,1,-48
<STOP>
<GPI0100>

```

Figure 24 - RAW string data format example

## 7.8 Form encoded RAW string in HTTP POST

The form encoded RAW string is available only for HTTP POST. RAW strings are encoded in the form of the POST message.

The following is an example of how an HTTP POST message looks like:

```

Details
-----
ID: 1620001
Timestamp: 2018-11-13 17:27:18.766579 +0000 UTC
Method: POST
IP: 46.140.130.59
Headers
-----
Accept: */*
Content-Length: 490
Content-Type: application/x-www-form-urlencoded
Host: ptsv2.com
X-Cloud-Trace-Context: b5801757a8a3dfbffcec2133c48a6924/12616760292335380827
X-Google-Apps-Metadata: domain=gmail.com,host=ptsv2.com
Parameters
-----
reader_name="test"
mac_address="00:16:25:11:4B:73"
field_delim=,
field_names=epc,timestamp,antenna_port,peak_rssi

```

```
field_values:300ED89F3350005001116B74,27.11.2018 09:15:03,1,-15
300ED89F3350004001116BFB,27.11.2018 09:15:03,1,-20
300ED89F3350008CCCD53759,27.11.2018 09:15:03,1,-38
300ED89F3350008CCCD5387D,27.11.2018 09:15:03,1,-32
300ED89F3350004001116B3C,27.11.2018 09:15:03,1,-24
300ED89F3350004001116B96,27.11.2018 09:15:03,1,-48
Body
----
No body
Files
-----
No files
Multipart Values
-----
No Multipart Values
```

## 7.9 FTP file transfer

Cloudburst allows to save on an FTP server a .csv file containing the EPCs and status messages.

The supported FTP protocols are: FTP, FTPS and SFTP.

There are three conditions that trigger the file transfer:

- End of reading window
- Timeout
- Number of tag observations

The file name header is customizable, and it is followed by the timestamp and the .csv extension e.g.:  
filename\_20190809153423.csv

When FTP is enabled, keep alive can be used to periodically verify that a file can be written on the server. Every time the keep alive is triggered a “.keepalive” file is saved on the FTP server.

The FTP output protocol is optional, it is not included in the basic license.

## 8 Communication error

When HTTP POST or FTP output interfaces are enabled or when the Keepalive acknowledge is enabled, Cloudburst can trigger a communication error.

The communication error is shown in the status bar of the Web GUI. The communication error state can also be linked to a GPO allowing to turn on a physical alarm (e.g., a buzzer or an LED) whenever a communication error occurs.

The HTTP POST sets the communication error when a POST does not end up successfully.

The FTP sets the communication error only when the Keepalive is enabled (Keepalive period different from 0). If a keepalive message cannot be successfully saved on the FTP server the communication error is set.

The Keepalive acknowledge sets the communication error when no acknowledge message is received by Cloudburst within the specified amount of time.

The communication error is cleared as soon as the POST or FTP communication is restored, when the Keepalive acknowledge message is received or when they are disabled in the configuration.

## 9 Command Line Interface

Cloudburst offers a Command Line Interface. It is available over the RAW TCP/IP socket, WebSocket and RS-232 serial.

Commands may be implemented in the upper SW layer to control the reader operation. For example, start reading when the user clicks a button on the SW's GUI.

Commands must be followed by the enter key to be accepted.

Depending on the selected Operating mode, some commands may not be available, or their behaviour might be different.

The available commands are listed in the following table.

command	syntax	n parameter	x parameter
start reading	*d	-	-
stop reading	*i	-	-
set a GPO	*go[n][x]	GPO number	active level (0 or 1)

A terminal emulator (e.g. Putty) can be used to manually send commands to the Cloudburst' Command Line Interface.

## 10 Cloudburst logs

Cloudburst allows to log useful information to help checking the status of the system and make troubleshooting easier in case of problems.

Logs are saved on the reader's memory, additionally, the address of a syslog server can also be specified. Syslog is a standard and widely used protocol to manage logs.

Local logs can be downloaded directly from the Cloudburst Web GUI.

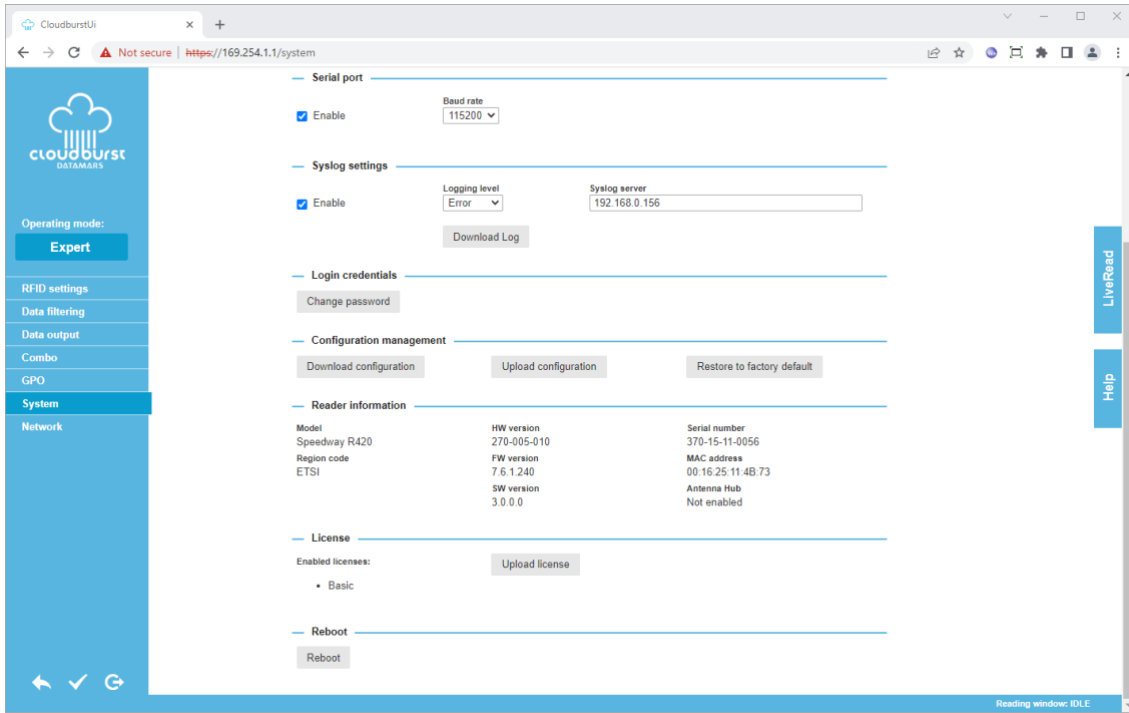


Figure 25 – System tab, syslog settings

## 11 Hardware accessories and combo installation

One of the main features of Cloudburst is the Combo mode. It allows to connect together LF, HF and UHF readers through the serial interface to make the coexistence of different RFID technologies easy and to simplify the migration between different technologies.

Special cables are needed to connect the LF and HF readers to the UHF reader.

When in combo mode the Impinj Speedway Revolution reader can act as a master, collecting the data from the LF or HF reader connected to it and sending the tag ID codes of both systems on the selected communication interfaces. An example is an LF and UHF combo installation, the tagIDs and the EPCs are collected by Cloudburst and sent over the Ethernet interface.

Several settings and combo modes are available in Cloudburst. Refer the online Help in the Web GUI for more information.

### 11.1 P-UHF-CBO for SR420/SR220 (Art. N.: 800 3075-967)

The P-UHF-CBO cable allows to connect an LF or HF reader to the UHF reader (R-UHF-SR420 or R-UHF-SR220) and take advantage of the combo mode available in Cloudburst.

With this special cable LF/HF data is sent to the UHF reader and it still allows, depending on Cloudburst settings, to combo codes to the PC via serial port if needed. It is important to note that when this cable is used, the Cloudburst Command Line Interface over serial port is not accessible anymore.

Connect the male DB-9 connector to the serial port of the LF or HF reader. Connect the HDB-15 connector to the GPIO port of the UHF reader. The female DB-9 connector allows to connect the PC.



*Figure 26 - P-UHF-CBO for SR420/SR220 cable*

When using the system in combo mode the baud rate of the UHF reader shall match the one of the LF or HF reader.

Using this cable and the combo mode continuous reading is allowed without any risk of data collision.

## 11.2 P-UHF-CBO for R700/R510 (Art. N.: 800 3075-949)

The P-UHF-CBO cable allows to connect an LF or HF reader to the UHF reader (R-UHF-R700) and take advantage of the combo mode available in Cloudburst.

With this special cable LF/HF data is sent to the UHF reader and it still allows, depending on Cloudburst settings, to combo codes to the PC via serial port if needed. It is important to note that when this cable is used, the Cloudburst Command Line Interface over serial port is not accessible anymore.

To use the combo cable with the R700 reader an USB to RS232 adaptor (P-UHF-RS232 for R700/R510 – 800 3075-948) is required.

Connect the cable with the male DB-9 connector to the serial port of the LF or HF reader. Connect the USB-RS232 adaptor coming from the reader to the male DB-9 connector. The female DB-9 connector allows to connect the PC.



*Figure 27 - P-UHF-CBO for R700/R510 cable*

When using the system in combo mode the baud rate of the UHF reader shall match the one of the LF or HF reader.

Using this cable and the combo mode continuous reading is allowed without any risk of data collision.



### 11.3 P-UHF-RS232 for SR420/SR220 (Art. N.: 800 3075-969)

To connect the UHF RFID reader (R-UHF-SR420 or R-UHF-SR220) via RS-232 interface, the P-UHF-RS232 is needed. Connect the HDB-15 connector to the GPIO port of the UHF reader and the DB-9 connector to the PC.



Figure 28 - P-UHF-RS232 for SR420/SR220 cable

### 11.4 P-UHF-RS232 for R700/R510 (Art. N.: 800 3075-948)

To connect the UHF RFID reader (R-UHF-R700) via RS-232 interface, the P-UHF-RS232 is needed. Connect the USB connector to the UHF reader and the DB-9 connector to the PC.



Figure 29 - P-UHF-RS232 for R700/R510 cable

**Important:** The Cloudburst web GUI shall be refreshed if the P-UHF-RS232 cable is connected to the reader after the web GUI has been opened.

### 11.5 P-UHF-SRMIX for SR420/SR220 (Art. N.: 400 5009-358)

The P-UHF-SRMIX cable allows to connect an LF or HF reader and the UHF reader (R-UHF-SR420 or R-UHF-SR220) to a PC via RS-232 interface.

With this special cable LF/HF data and UHF data is mixed and sent to the PC directly. It is important to note that it is not possible to read at the same time LF/HF and UHF codes, only single readings are allowed. A collision would make impossible to correctly receive the tag codes.

The Cloudburst combo mode does not work with this cable.

Connect the male DB-9 connector to the serial port of the LF or HF reader. Connect the HDB-15 connector to the GPIO port of the UHF reader. The female DB-9 connector allows to connect the PC.



*Figure 30 - P-UHF-SRMIX for SR420/SR220 cable*

When using this cable, the baud rate of the UHF reader shall match the one of the LF or HF reader.

## Appendix A - Impinj Speedway Revolution readers ports and LEDs

The Impinj Speedway Revolution reader is equipped with standard communication interfaces like Ethernet, USB and RS-232.

It offers four General Purpose Inputs (GPI) and four General Purpose Outputs (GPO) which allow to integrate its operation in automated systems or connect sensors and actuators to it.

Four, two or one antenna ports are available depending on the model of the reader (SR420 / SR220 / SR120).

See “Appendix B - Impinj Speedway Revolution readers GPIO pinout configuration” for functional and electrical specifications and details for each pin of the GPIO DE-15 connector.

Status LEDs are also available, see “Appendix C - Impinj Speedway Revolution readers LEDs status”.

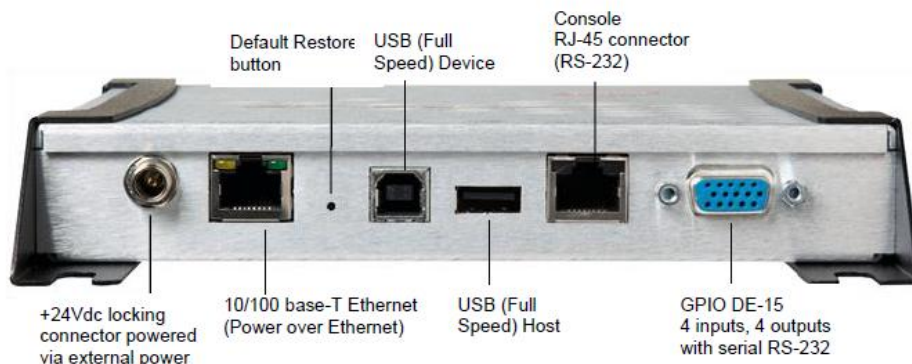


Figure 1.A - Impinj Speedway Revolution reader interfaces

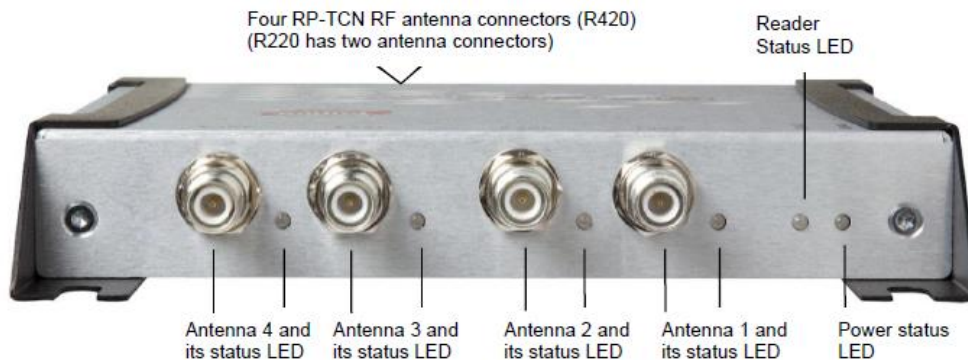


Figure 2.A - Impinj Speedway Revolution reader antenna ports and status LEDs

## Appendix B - Impinj Speedway Revolution readers GPIO pinout configuration

Speedway R420 / R220 / R120 include a multipurpose I/O port that contains an RS-232 serial port, four opto-isolated inputs, four opto-isolated outputs and a +5V supply. They can be accessed through a DE15 connector mounted on the side of the Reader.

The reader considers an input of 0-0.8V as a logic 0, and an input of 3-30V as a logic 1 on the GPIOs. The four opto-isolated inputs allowed voltage range is 0-30V DC.

The reader also provides four opto-isolated DC outputs. An external provided supply must be connected between V+ and V-. The maximum allowed voltage is 30V DC.

When the user configures a GPO to logic 0, an isolated FET switch within the reader effectively shorts that output to V- with a current sink capability of up to 100mA. When the user configures a GPO to logic 1, the selected output is pulled to V+ through a 10K resistor. If GPIO isolation is not required, the reader provides a +5V supply and a ground pin on the DE-15 that can be connected to V+ and V-.

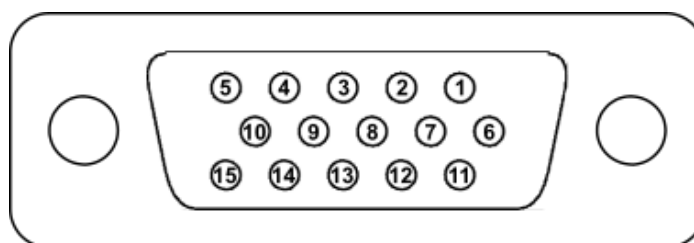


Figure 1.B - GPIO connector pin numbering

Pin	I/O Name	I/O Function
1	+5V Supply	Reader supplied (not isolated) power source
2	RS-232 RX	For auxiliary serial port functions
3	RS-232 TX	For auxiliary serial port functions
4	Processor Reset	Reserved for future use. Do not connect this pin to any signal
5	V+	Power source for isolated outputs
6	V-	Return for isolated inputs and outputs
7	Ground	Reader (not isolated) return
8	User OUT 1	Isolated output 1 (active pull down to V-)
9	User OUT 2	Isolated output 2 (active pull down to V-)
10	User OUT 3	Isolated output 3 (active pull down to V-)
11	User OUT 4	Isolated output 4 (active pull down to V-)
12	User IN 1	Isolated input 1
13	User IN 2	Isolated input 2
14	User IN 3	Isolated input 3
15	User IN 4	Isolated input 4

Table 1.B – DB15 connector pinout

Pin	Parameter	Description	Min	Max	Unit	Conditions
+5V Supply	IO	Output current		200	mA	
User IN 1-4	VIH	HIGH level input voltage	3	30	V	
User IN 1-4	VIL	LOW level input voltage	0	0.8	V	
User IN 1-4	VLI	Input current		5	mA	24V input
User IN 1-4	VI	Input voltage range	0	30	V	No damage
User Out 1-4	VOH	Output high voltage		V+*	V	10k $\Omega$ pull-up
User Out 1-4	VOL	Output low voltage		(V-)+0.5	V	100mA load
V+*	IO	Input voltage range	0	30	V	

*Table 2.B – GPIO interface, electrical specification*

\* User-supplied voltage.

## Appendix C - Impinj Speedway Revolution readers LEDs status

The following table describes the LEDs behavior for various reader states:

Reader operation		LED	Expected behaviour
Start-up (power on) normal completion	Power applied, Attempting to start boot code	Power	Solid red
		Status	Off
	Bootloader calling firmware image	Power	Solid green
		Status	Off
	Bootloader completed successfully; Reader is ready	Power	Solid green
		Status	Solid green
Startup (reset) normal completion	Default restore button pressed	Power	Turns off
		Status	Off
	Default restore button pressed for 3 seconds	Power	Blinks once (red), indicates a configuration default restore will occur
	Default restore button pressed for 10 seconds	Power	Blinks twice (red), indicates a factory default restore will occur. Resets reader configuration and removes CAP (if present)
Startup (failure)	Hardware problems detected, unable to boot	Power	Continuous blinking red
		Status	Off
Upgrade activity	Upgrading the firmware during boot process	Status	Alternates between red and green
Detection of antenna activity	Detects no activity on antenna port	Antenna	Off
	Detects antenna transmission activity on antenna port	Antenna	Solid green
Inventory activity	Performing an inventory operation	Status	Blinks orange, blinks faster as tag volume increases
LLRP activity	Active LLRP connection	Status	Double blink pattern (green)
LLRP activity	Disconnect operation	Status	Single blink pattern (green)

Table 1.C – LEDs status description

## Appendix D - Impinj Speedway Revolution readers Troubleshooting

If any problem arises while using Cloudburst, the following table should help to correct the issue. If the problem persists, contact Datamars support at [support-tid@datamars.com](mailto:support-tid@datamars.com) or call the landline support at: +41 91 935 73 80.

Symptom	Cause and/or corrective actions
There are UHF transponder on the antenna but no EPCs are sent over the interface	<ul style="list-style-type: none"> <li>Is the reading running, check the status bar in the Web GUI?</li> <li>Open the LiveRead tab and check if EPCs are shown.</li> <li>Is the antenna connected to the right antenna port? (by default, the antenna 1 is enabled and set to 16 dBm transmitting power)</li> <li>Check if the Antenna 1 LED nearby the antenna connector is light up in green/blue.</li> </ul>
Cloudburst is not running right after power up	<ul style="list-style-type: none"> <li>If the reader is not connected to the LAN through the Ethernet cable, Cloudburst could take about 2 minutes before start-up. This behaviour can be avoided assigning a fixed IP to the Ethernet interface of the reader even if it is not used or connecting it to the LAN.</li> </ul>
The network configuration is unknown, or the reader is not reachable through Ethernet interface	<ul style="list-style-type: none"> <li>Restore the Default Configuration of the reader. The procedure is explained in the next page.</li> <li>The network configuration can be change via console port. A CISCO console cable is required for the Speedway Revolution readers. For more information about the IP settings through the console port see readers documentation available on the Impinj website: <a href="https://support.impinj.com/hc/en-us/categories/200156268-Readers">https://support.impinj.com/hc/en-us/categories/200156268-Readers</a></li> </ul>

Table 1.G - Troubleshooting symptoms and actions

### Restoring to the Default Configuration

If you are experiencing a problem with the reader and are having difficulty pinpointing the cause, it is useful to return the reader to a known state. We recommend resetting to the default configuration. Then try the reader again.

Please carefully read the whole paragraph before proceeding with this procedure. Important: Configuration Default Restore returns the reader configuration to its default state. It leaves any custom applications, such as Cloudburst, installed in the CAP (Custom Application Partition) intact. To restore the reader to its default state and remove any CAP contents, use Factory Default Restore.

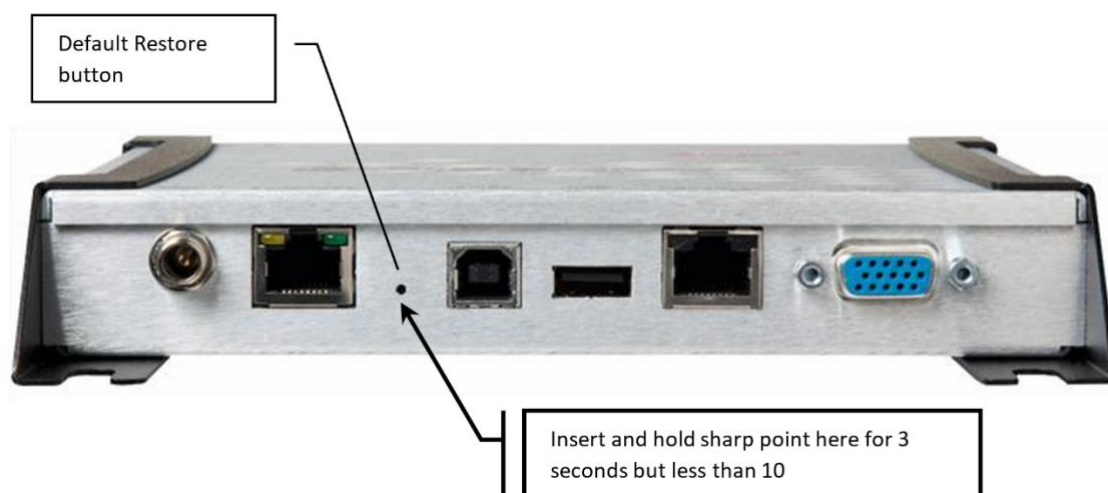
### To return the Reader to its default configuration and leave CAP intact through the RShell

At the RShell prompt, enter the following command: *config image default*

When the command completes successfully, the Reader automatically reboots and returns to the login prompt.

**To return the Reader to its default configuration and leave CAP intact using the Default Restore button**

1. Power off the reader.
2. Use an object with a sharp tip, such as a probe or paper clip to press and hold the default restore button on the back of the reader while applying power to the reader.
3. Continue holding the default restore button for 3 seconds after the power LED light turns off, but not longer than 10 seconds.
4. Release the default restore button when the LED blinks red once. The reader will boot up normally with the default configuration.



*Figure 1.G - Speedway revolution reader default restore button timings*

**Warning:** pressing the default restore button for 10 seconds or more will cause a factory default restore to occur. The factory default restore removes the reader's custom application partition (CAP) if one exists. The reader returns to the original, factory shipped state. It is important to avoid accidentally removing the CAP, although there may be situations where CAP removal is necessary.



## Appendix E - Impinj R700 reader ports and LEDs

The Impinj R700 reader is equipped with standard communication interfaces like Ethernet and USB.

It offers two General Purpose Inputs (GPI) and three General Purpose Outputs (GPO) which allow to integrate its operation in automated systems or connect sensors and actuators to it.

Four antenna ports are available.

See “Appendix F - Impinj R700 reader GPIO pinout configuration”, for functional and electrical specifications and details for each pin of the Phoenix Contact MC 1,5/ 9-G-3,81 modular connector.

Status LEDs are also available, see “Appendix G - Impinj R700 readers LEDs status” for details about LEDs status meaning.

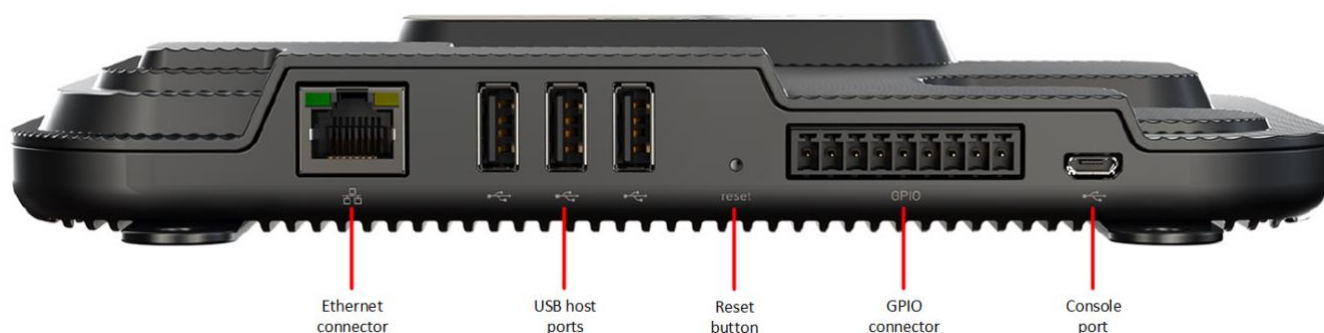


Figure 1.D – Impinj R700 reader interfaces

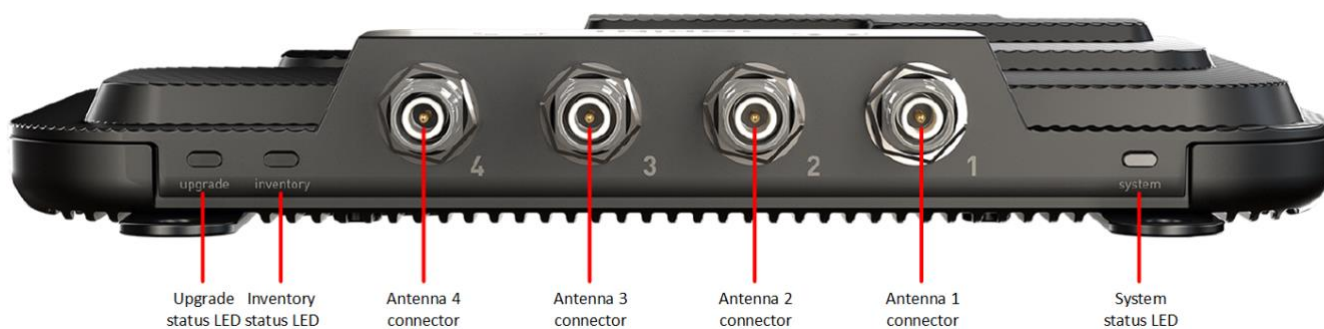


Figure 2.D – Impinj R700 reader antenna ports and status LEDs

## Appendix F - Impinj R700 reader GPIO pinout configuration

The Impinj R700 reader includes a multipurpose I/O port that provides two general-purpose opto-isolated inputs, three opto-isolated outputs, and a +5V supply. You access these features through a 9-pin connector mounted on the side of the reader.

The reader considers an input of 0-0.8V as a logic 0, and an input of 3-30V as a logic 1 on the GPIOs. The four opto-isolated inputs allowed voltage range is 0-30V DC.

The reader also provides three opto-isolated DC outputs. An external provided supply must be connected between V+ and V-. The maximum allowed voltage is 30V DC.

When the user configures a GPO to logic 0, an isolated FET switch within the reader effectively shorts that output to V- with a current sink capability of up to 1500mA. When the user configures a GPO to logic 1, the selected output is pulled to V+ through a 10K resistor. If GPIO isolation is not required, the reader provides a +5V supply and a ground pin on the connector that can be connected to V+ and V-. The +5V pin is current limited to 500mA, max.



Figure 1.E GPIO connector pin numbering reference

Pin	I/O Name	I/O Function
1	+5V Supply	Reader supplied (not isolated) power source, 500 mA max
2	Chassis ground	Reader (not isolated) return
3	User IN 1	Isolated input 1
4	User IN 2	Isolated input 2
5	User OUT 1	Isolated output 1 (active pull down to V-)
6	User OUT 2	Isolated output 2 (active pull down to V-)
7	User OUT 3	Isolated output 3 (active pull down to V-)
8	V-	Return for isolated inputs and outputs
9	V+	Power source for isolated outputs

Table 1.E GPIO connector pinout

Pin	Parameter	Description	Min	Max	Unit	Conditions
+5V Supply	IO	Output current		500	mA	
User IN 1-2	VIH	HIGH level input voltage	3	30	V	
User IN 1-2	VIL	LOW level input voltage	0	0.8	V	
User IN 1-2	VLI	Input current		5	mA	24V input
User IN 1-2	VI	Input voltage range	0	30	V	No damage
User Out 1-3	VOH	Output high voltage		V+*	V	10kΩ pull-up
User Out 1-3	VOL	Output low voltage		(V-)+0.5	V	100mA load
V+*	IO	Input voltage range	0	30	V	

*Table 2.E GPIO interface, electrical specification*

\* User-supplied voltage.

## Appendix G - Impinj R700 readers LEDs status

The following table describes the LEDs behaviour for various reader states:

Upgrade LED patterns:

LED state	Reader state
OFF	FW upgrade inactive or FW upgrade fail
Blinking blue	FW upgrade in progress
Solid blue (until next reboot)	FW upgrade successful

*Table 1.F – Upgrade LED patterns*

Inventory LED patterns:

LED state	Reader state
OFF	RO spec disabled (IDLE)
Blinking blue	RO spec inactive (ARMED)
Solid blue	RO spec active (RUNNING)

*Table 2.F – Inventory LED patterns*

System LED patterns:

LED state	Reader state
OFF	Power not applied
Blinking yellow	Factory default restore detected
Solid yellow	Power applied, booting
Solid blue	Boot successful
Blinking red	Boot error, USB upgrade error, other error

*Table 3.F – System LED patterns*

Antenna LED patterns:

LED state	Reader state
OFF	Antenna inactive
Solid blue	Antenna active

*Table 4.F – Inventory LED patterns*

## Appendix H - Impinj R700 readers Troubleshooting

If any problem arises while using Cloudburst, the following table should help to correct the issue. If the problem persists, contact Datamars support at [support-tid@datamars.com](mailto:support-tid@datamars.com) or call the landline support at: +41 91 935 73 80.

Symptom	Cause and/or corrective actions
There are UHF transponder on the antenna but no EPCs are sent over the interface	<ul style="list-style-type: none"> <li>Is the reading running, check the status bar in the Web GUI?</li> <li>Open the LiveRead tab and check if EPCs are shown.</li> <li>Is the antenna connected to the right antenna port? (by default, the antenna 1 is enabled and set to 16 dBm transmitting power)</li> <li>Check if the Antenna 1 LED nearby the antenna connector is light up in green/blue.</li> </ul>
Cloudburst is not running right after power up	<ul style="list-style-type: none"> <li>If the reader is not connected to the LAN through the Ethernet cable, Cloudburst could take about 2 minutes before start-up. This behaviour can be avoided assigning a fixed IP to the Ethernet interface of the reader even if it is not used or connecting it to the LAN.</li> </ul>
The network configuration is unknown, or the reader is not reachable through Ethernet interface	<ul style="list-style-type: none"> <li>Restore the Default Configuration of the reader. The procedure is explained in the next page.</li> <li>The network configuration can be change via console port. A micro USB cable is required for the R700 reader. For more information about the IP settings through the console port see readers documentation available on the Impinj website: <a href="https://support.impinj.com/hc/en-us/categories/200156268-Readers">https://support.impinj.com/hc/en-us/categories/200156268-Readers</a></li> </ul>

Table 1.G - Troubleshooting symptoms and actions

### Restoring to the Default Configuration

If you are experiencing a problem with the reader and are having difficulty pinpointing the cause, it is useful to return the reader to a known state. We recommend resetting to the default configuration. Then try the reader again.

Please carefully read the whole paragraph before proceeding with this procedure. Important: Configuration Default Restore returns the reader configuration to its default state. It leaves any custom applications, such as Cloudburst, installed in the CAP (Custom Application Partition) intact. To restore the reader to its default state and remove any CAP contents, use Factory Default Restore.

### To return the Reader to its default configuration and leave CAP intact through the RShell

At the RShell prompt, enter the following command: *config image default*

When the command completes successfully, the Reader automatically reboots and returns to the login prompt.

**To perform a Factory Default restore and remove any installed CAP using the Default Restore button.**

1. Power off the reader.
2. Use an object with a sharp tip, such as a probe or paper clip to press and hold the default restore button on the back of the reader while the reader is powered off.
3. Be sure to be pressing the default restore button while plugging in power to the reader.
4. Release the default restore button when the System LED blinks yellow once, when 5 or more seconds have passed. The reader will boot up normally with the default configuration and any installed CAP will have been removed.



*Figure 2.G - R700 reader default restore button timings*