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# Replicator Documentation

*Release 18.14*

**Plixer**

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<b>1</b>	<b>What is a Replicator</b>	<b>3</b>
1.1	Overview . . . . .	3
1.2	The basic concepts . . . . .	3
<b>2</b>	<b>Deployment guides</b>	<b>5</b>
2.1	Hardware appliance . . . . .	5
2.2	Virtual appliance - ESX . . . . .	6
2.3	Virtual appliance – Hyper-V . . . . .	8
2.4	Virtual appliance – KVM . . . . .	8
<b>3</b>	<b>Getting started</b>	<b>11</b>
3.1	Configure SSL . . . . .	11
3.2	Creating a signed certificate . . . . .	12
3.3	Log in for the first time . . . . .	12
3.4	Apply a license key . . . . .	12
3.5	Create a profile . . . . .	12
3.6	Verify packets are inbound . . . . .	13
3.7	Interactive mode . . . . .	13
<b>4</b>	<b>Server maintenance</b>	<b>15</b>
4.1	Hardware failure . . . . .	15
4.2	Applying security patches . . . . .	15
4.3	Upgrades . . . . .	15
4.4	Backing up the Replicator . . . . .	15
<b>5</b>	<b>Features and functionality</b>	<b>17</b>
5.1	Replication . . . . .	17
5.2	Alarming . . . . .	17
<b>6</b>	<b>Web interface</b>	<b>19</b>
6.1	Dashboard tab . . . . .	19
6.2	Streams Tab . . . . .	19
6.3	Exporters tab . . . . .	19
6.4	Collector tab . . . . .	20
6.5	Profiles tab . . . . .	20
6.6	Settings tab . . . . .	21
6.7	Server health LED . . . . .	21

<b>7</b>	<b>Interactive mode commands</b>	<b>23</b>
7.1	acknowledge . . . . .	23
7.2	backup . . . . .	23
7.3	collect supportfiles . . . . .	24
7.4	collector . . . . .	24
7.5	exporter . . . . .	24
7.6	exporter noprofile . . . . .	25
7.7	ldapadmin . . . . .	25
7.8	license . . . . .	25
7.9	notate . . . . .	26
7.10	password . . . . .	26
7.11	policy . . . . .	26
7.12	profile . . . . .	27
7.13	profile singularity . . . . .	27
7.14	rebuild . . . . .	27
7.15	restore . . . . .	28
7.16	role . . . . .	28
7.17	setting . . . . .	28
7.18	show . . . . .	29
7.19	snoop . . . . .	31
7.20	system . . . . .	31
7.21	upload supportfiles . . . . .	32
7.22	version . . . . .	32
<b>8</b>	<b>Advanced configuration</b>	<b>33</b>
8.1	Converting syslogs to IPFIX . . . . .	33
8.2	Fault tolerance . . . . .	34
8.3	Traditional configuration . . . . .	34
8.4	High availability . . . . .	35
8.5	Closed networks with no gateway . . . . .	37
<b>9</b>	<b>Replicator API</b>	<b>39</b>
9.1	Authentication . . . . .	39
9.2	Acknowledge . . . . .	40
9.3	Collector . . . . .	41
9.4	DNSCheck . . . . .	42
9.5	Exporter . . . . .	42
9.6	License . . . . .	44
9.7	Notate . . . . .	44
9.8	Policies . . . . .	45
9.9	Profile . . . . .	45
9.10	Rebuild . . . . .	47
9.11	Role . . . . .	47
9.12	Setting . . . . .	48
9.13	Show . . . . .	49
9.14	Threshold . . . . .	53
9.15	Version . . . . .	53
<b>10</b>	<b>Troubleshooting</b>	<b>55</b>
<b>11</b>	<b>Change log</b>	<b>57</b>
11.1	Change log history . . . . .	57
<b>12</b>	<b>Third party software attributions</b>	<b>61</b>
12.1	Licenses directory . . . . .	61

12.2 Third party attributions . . . . . 61



Welcome to the on-line manual. [Click Here](#) for online troubleshooting or FAQs. This manual is also available in .pdf format.

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**Important:** Don't struggle, contact [Plixer support!](#)

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## What is a Replicator

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### 1.1 Overview

Many routers, servers, and other systems can only send messages to a single log management system. The Plixer Replicator allows a single stream of log data to be transparently replicated to multiple destinations.

By configuring the network devices to send their log and flow data to the Replicator, users can control which management system(s) receive the replicated data.

A Replicator eliminates the limitation of sending log and flow data to a small number of management systems.

### 1.2 The basic concepts

The Replicator relies on profiles that contain a list of devices (exporters) sending or streaming data to management systems (collectors). A packet is received by the Replicator on a particular UDP port. The Replicator references a list of profiles to determine if the data received from an exporter should be forwarded on to one or more collectors.

- **Collectors** : A collector is a SIEM, Flow Collector, SNMPTrap Receiver, or other Network Management System that actively receives data from networked devices.
- **Exporters** : An exporter is a networked device such as a router, switch, or server that generates different types of data and is capable of sending that data to a collector.
- **Profiles** : A profile contains exporter(s), a listening port, collector(s), and sending UDP port.

#### 1.2.1 How profiles work

```
+-----+-----+
| MyProfile | IN PORT 2002 -> OUT PORT 9996
+-----+-----+
```

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Policies	Exporters	->	Collectors
(include) 10.3.1.1/32	10.3.1.1		10.11.1.165

When a packet is received from the exporter 10.3.1.1 on port 2002 it is replicated to the collector 10.11.1.165 on port 9996. Collectors interpret that packet's origin as 10.3.1.1 and not the replicator.

Profiles can contain multiple exporters and collectors.

```

+-----+-----+
| distdev-63                | IN PORT 2002 -> OUT PORT 2055
+-----+-----+

Policies      Exporters  ->   Collectors
(include) 10.1.2.18/32  10.1.2.18   10.1.10.63
(include) 10.4.1.1/32   10.4.1.1    10.1.4.203
(include) 10.9.1.254/32 10.9.1.254  10.30.11.23
(include) 192.168.0.17/32 192.168.0.17
    
```

If a packet is received from the exporters 10.1.2.18, 10.4.1.1, 10.9.1.254, or 192.168.0.7 on port 2002 it is replicated to 10.1.10.63, 10.1.4.203, and 10.30.11.23 on port 2055.

## 1.2.2 Policies

A policy is used to determine if a particular exporter should be included or excluded from the profile. Administrators add policies using CIDR notation to include or exclude exporters in a profile.

```

+-----+-----+
| steady-replays           | IN PORT 2002 -> OUT PORT 9996
+-----+-----+

Policies      Exporters  ->   Collectors
(include) 10.25.5.0/24  10.25.5.122  10.1.10.1
                               10.25.5.123
                               10.25.5.10
                               10.25.5.29
                               10.25.5.30
    
```

The replicator will automatically replicate packets from any exporter matching 10.25.5.x on port 2002 to collector 10.1.10.1 on port 9996.

Exclude policies can be used with include policies to exclude one or more exporters. In the example below any exporter matching 10.25.5.x except 10.25.5.10 will be replicated to the collector 10.1.10.1.

```

+-----+-----+
| steady-replays           | IN PORT 2002 -> OUT PORT 9996
+-----+-----+

Policies      Exporters  ->   Collectors
(include) 10.25.5.0/24  10.25.5.122  10.1.10.1
(exclude) 10.25.5.10/32 10.25.5.123
                               10.25.5.29
                               10.25.5.30
    
```

There are two types of Replicator appliances available. A subscription or evaluation key is required with either install. A key can be obtained from Plexier or a local reseller.

### 2.1 Hardware appliance

Once the hardware appliance is installed in a network rack, power it on and follow the steps below.

1. Using an SSH client, remotely log in using the username *root* and password *replicator*. The hardware appliance will perform a quick setup and immediately reboot.

```
CentOS Linux release 7.5.1804 (Core)
Kernel 3.10.0-862.3.2.el7.x86_64

localhost login: root
Password: _
```

---

**Important:** The default command line credentials are user *root* and password *replicator*.

---

2. Log into the hardware appliance again as the *root* user with the default password *replicator*. Enter the answers to the configuration questions. The hardware appliance will reboot to apply the necessary settings.

```
Last Login: Fri Nov 15 11:067:45 on tty1

*****
Replicator Virtual Appliance
Initial Configuration
*****

What is the appliances static IP Address?
10.1.15.128
```

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```
What is the appliances Netmask?  
255.255.0.0  
  
What is the appliances gateway?  
10.1.1.1  
  
What is the hostname for this appliance?  
replicator.plxr.local_
```

3. Log into the hardware appliance command line as the replicator user with the password configured in the previous step.
4. To apply the license key, issue the *license set* command:
  - a) In the new window, under “license=”, paste in the license key.
  - b) Press CTRL+x to save.

---

**Hint:** In the user interface, manage the replicator’s license key and review the license details via the **Settings > Licensing** page.

---

The Replicator is now ready for configuration.

## 2.2 Virtual appliance - ESX

The Replicator virtual appliance is packaged as an all-in-one virtual machine template known as an OVF template.

For VMware deployments, ESX/ESXi 5 or higher is required. VMware Tools will be required to shut down the machine through the VMware vSphere Client.

### 2.2.1 System requirements

Component	Recommended specifications
RAM	2GB
Disks	100GB
Processor	2 CPU 2 Core 2GHz+
Operating System	ESXi5+

### 2.2.2 Deploying the OVF template

1. Connect to the ESX host using VMware vSphere, or vCenter.
2. Select File, then Deploy OVF Template.
3. Select Deploy from File, browse to the OVF Template, and click Next.
4. Review the OVF template details and click Next.
5. Define the name of the Replicator virtual appliance and click Next.
6. Select a datastore and click Next.
7. Select the disk format and click Next.

8. Select the Network Mapping and click Next.
9. Review the Virtual Settings and click Finish to import the OVF Template.
10. Right-click on the Replicator virtual machine and power it on.
11. Navigate to the Console tab and log in as the *root* user with the password *replicator*. The virtual appliance will perform a quick setup and immediately reboot.

---

**Important:** The default command line credentials are user *root* and password *replicator*.

---

12. Log into the virtual appliance again as the *root* user. Enter the answers to the configuration questions. The virtual appliance will reboot to apply the necessary settings.
13. Log into the appliance command line as the *replicator* user with the password configured in the previous step.
14. To apply the license key, issue the *license set* command:
  - a) In the new window, under “license=”, paste in the license key.
  - b) Press CTRL+x to save.

---

**Hint:** In the web interface, manage the Replicator’s license key and review the license details via the **Settings > Licensing** page.

---

The Replicator is now ready for configuration.

### 2.2.3 Installing VMware Tools

VMware Tools are not required for proper function of the virtual appliance. However, there are certain advantages to deploying them. For more information, see VMware’s documentation.

---

**Note:** VMware Tools are not installed by default, since each version of ESX installs a different VMware Tools package. A script is included with the virtual Replicator to simplify the install process.

---

1. In the VMware vSphere Client, right-click on the Replicator virtual machine. Select Guest, then Install/Upgrade VMware Tools.
2. Log into the console of the Replicator virtual appliance as the *root* user. Launch the command below:

```
/home/replicator/conf/vmwareToolsInstall.sh
```

### 2.2.4 Upgrading the virtual machine hardware version

The Replicator virtual appliance is built on virtual machine hardware version 7 to maintain backwards compatibility with ESXi 5 hypervisors.

To upgrade, power off the virtual machine. In vSphere (or vCenter) right-click on the virtual machine and select Upgrade Virtual Hardware.

## 2.3 Virtual appliance – Hyper-V

### 2.3.1 System requirements

Component	Recommended specifications
RAM	2GB
Disks	100GB
Processor	2 CPU 2 Core 2GHz+

### 2.3.2 Importing virtual machine

1. Download the latest Replicator.
2. Unzip the file on the Hyper-V server.
3. Open Hyper-V Manager and select Import Virtual Machine.
4. Specify the Replicator system folder.
5. Select the Virtual Machine.
6. Choose the import type.
7. Go to Settings.
8. Select the Network Adapter and assign it to the appropriate Virtual Switch.
9. Expand the Network Adapter section, select Advanced Features, set the MAC Address to Static, enter in a unique MAC Address, and then press “OK”.
10. Start the Virtual Machine.
11. Right-click on the Virtual Machine and click Connect to log into the Replicator appliance as the root user with the password replicator. The server will perform a quick setup and immediately reboot.
12. To apply the license key, issue the *license set* command:
  - a) In the new window, under “license=”, paste in the license key.
  - b) Press CTRL+x to save.

---

**Hint:** In the web interface, manage the Replicator’s license key and review the license details via the **Settings > Licensing** page.

---

The Replicator is now ready for configuration.

## 2.4 Virtual appliance – KVM

### 2.4.1 System requirements

Component	Recommended specifications
RAM	2GB
Disks	100GB
Processor	2 CPU 2 Core 2GHz+

## 2.4.2 Importing virtual machine

1. Create a directory for the install:

```
mkdir kvm/Scrut_VM_Guide/
```

2. Download the latest Replicator virtual appliance to the KVM install:

```
wget https://files.plixer.com/Replicator_KVM.tar.gz
```

---

**Note:** Contact support for the latest image if the url above does not work.

---

3. Unzip the file in the install directory on the KVM server:

```
sudo tar xvzf Replicator_KVM.tar.gz
```

4. Run the Replicator install script:

```
sudo ./install.sh
```

5. Log into the appliance. Run the command below to get to the console:

```
virsh console Replicator
```

6. Log in as the *root* user with the default password *replicator*. The machine will reboot and prompt to log in again. This time, there will be a shell script asking for networking information.
7. To apply the license key, issue the *license set* command:
  - a) In the new window, under “license=”, paste in the license key.
  - b) Press CTRL+x to save.

---

**Hint:** In the web interface, manage the Replicator’s license key and review the license details via the **Settings > Licensing** page.

---

The Replicator is now ready for configuration.





The web interface contains a wizard to assist users in the initial configuration process. It consists of three steps:

1. Apply a license key;
2. Create a profile;
3. Verify packets are inbound.

### 3.1 Configure SSL

Enabling SSL support in Replicator can be done during the initial deployment or by using the `enable_ssl.sh` script located in the `/home/replicator/conf/` directory.

---

**Important:** Internet access is required to download the latest `openssl` and `httpd` packages.

---

To create a self-signed certificate, enter the information when prompted by the script:

Name Field	Explanation
Country Name	The two-letter ISO abbreviation for the desired country example: US = United States
State / Province	The state/province where the organization is located. Do not abbreviate. example: Maine
City / Locality	The city where the organization is located. example: Kennebunk
Organization	The exact legal name of the organization. Do not abbreviate. example: Plexier
Email Address	The email address for the CA (who to contact) example: <code>someone@your.domain</code>
Common Name	URL to attach to the certificate example: 10.1.1.19 or <code>replicator.company.com</code>
Extra attributes	The challenge password and the optional company name can be added to the certificate request.

## 3.2 Creating a signed certificate

1. Enable SSL as described above.
2. Send the `/etc/pki/tls/private/ca.csr` file to the Certificate Authority (CA) and ask them to sign and return it as **Base64** encoded.

---

**Important:** When exporting a certificate, do **NOT** select **DER** encoded export file format.

---

3. When the signed certificate is received, stop the apache service:

```
service httpd stop
```

4. Replace the active SSL certificate with the new one and rename the file to `/etc/pki/tls/certs/ca.crt`.
5. Start the apache service:

```
service httpd start
```

## 3.3 Log in for the first time

Future versions of the Replicator will support multiple local user accounts and roles. The current version provides all users with an administrator role account to update and maintain any configuration via the web interface.

The default login credentials are user **admin** with the default password **admin**.

---

**Note:** The password can be updated using the interactive mode `password webui` command.

---

To set up the LDAP authentication, navigate to the Settings tab and enter the LDAP server information. The LDAP password can be updated using the interactive mode `ldapadminpass` command.

## 3.4 Apply a license key

After a user logs in for the first time, the Replicator will check for a valid licence key. If the key has not been applied, the license wizard will appear. Otherwise, the Replicator wizard will proceed to creating a first profile.

A license key can be requested directly from Plixer or a reseller. Evaluation keys are available for testing and proof of concept purposes.

---

**Note:** Manage the Replicator's license key and review the license details via the **Settings > Licensing** page.

---

## 3.5 Create a profile

Once a valid license key is applied, the replicator checks if there are any profiles configured. A profile defines how packets are received and sent from the Replicator.

If there are no profiles configured, the Replicator wizard will walk a user through creating a first profile. A profile requires the port packets will come in, the port packets should go out, a policy to match incoming IP Addresses on the defined port, and a collector to send the packets.

---

**Hint:** To match all incoming IP addresses, use the policy of 0.0.0.0/0.

---

## 3.6 Verify packets are inbound

The Streams and Dashboard tabs provide users with instant feedback of packet activity. If this is the first time configuring the Replicator, the last step of the wizard will direct the user to the Streams tab.

## 3.7 Interactive mode

Using an SSH client, ssh to the Replicator and log in as the replicator user with the password configured during the installation process. Refer to the *interactive mode* for a list of available commands.

```
[root@demo ~]# ssh replicator@qa.replicator.local
replicator@qa.replicator.local's password:
Plixer Replicator (TM) v18.14.1.2410
2019-12-03 13:07:44 -0500 (Tue, 03 Dec 2019)
Copyright (C) 2012 - 2019 Plixer, All rights reserved.
Replicate Anything!
Need an IPFIX Collector? Download Scrutinizer at https://www.plixer.com
Machine ID : 6YZ6XEPT66FPH6364A1VQ8NY
Customer ID : qa replicator
Licensed Version : 18.5
Licensed Type : subscription (standalone/primary)
Expiration : 11/30/2020
REPLICATOR>
```

The REPLICATOR> prompt indicates the Replicator is ready for commands.

Before beginning any configuration of the Replicator, set up one or more network devices (exporters) to send flow or log data to the Replicator. Note the UDP port(s) used to send data during the configuration process. For example: a Cisco router is configured to send NetFlow v9 using port 9996 to the Replicator. 9996 will be used during the profile creation process.

---

**Important:** Send data to the Replicator first.

---

Once the exporters are sending data to the Replicator, proceed with configuring profiles to replicate the data to the appropriate collectors. USE the *profile* command to manage profiles on the Replicator. The required parameters for creating a profile are name, listening port, and sending port.

```
profile <add|update> name listen_port send_port
```

For example, the Cisco router is sending data to the Replicator on port 9996. The Scrutinizer flow collector is listening for flows on port 2055. A profile is created to listen on port 9996 and send on port 2055 as follows:

```
REPLICATOR> profile add maine 9996 2055

Success: Profile 'maine' has been added and enabled.

Done in 0.316286 secs

REPLICATOR> show profile maine

+-----+-----+
| maine          | IN PORT 9996 -> OUT PORT 2055
+-----+-----+

Policies          Exporters    ->    Collectors
-                 -             -

+-----+-----+
Done in 0.01249 secs
```

Next, add the exporter (i.e. the Cisco router) to the maine profile using the *exporter* command:

```
REPLICATOR> exporter add 10.1.1.1 maine

Success: Exporter [10.1.1.1] -> Profile [maine]

Done in 0.183711 secs

REPLICATOR> show profile maine

+-----+-----+
| maine          | IN PORT 9996 -> OUT PORT 2055
+-----+-----+

Policies          Exporters    ->    Collectors
(include) 10.1.1.1/32  -             -

+-----+-----+
Done in 0.014918 secs
```

As soon as the Replicator detects traffic from 10.1.1.1 on port 9996, the exporter will show up in the *Exporters* column. Lastly, add a collector to the profile.

```
REPLICATOR> collector add 10.1.4.20 maine

Success: Collector [10.1.4.20] -> Profile [maine]

Done in 0.439209 secs

+-----+-----+
| maine          | IN PORT 9996 -> OUT PORT 2055
+-----+-----+

Policies          Exporters    ->    Collectors
(include) 10.1.1.1/32  10.1.1.1      10.1.4.20

+-----+-----+
Done in 0.011346 secs
```

The profile is complete. Verify the replicated traffic within the collector's interface.

### 4.1 Hardware failure

If any hardware malfunctions occur, contact technical support for assistance.

### 4.2 Applying security patches

Although there are efforts made to minimize the risk for security breaches on the appliance, updates to core OS components may be necessary. It is recommended that updates are not installed unless technical support advises or assists. For more information, contact technical support.

### 4.3 Upgrades

Customers are entitled to upgrades provided that maintenance is active. For further instructions, contact technical support.

### 4.4 Backing up the Replicator

The Replicator database can be backed up and restored using the backup and restore interactive mode commands.



---

## Features and functionality

---

### 5.1 Replication

During normal operation the Replicator will replicate incoming packets to all configured collectors in enabled profiles. At any time, the Streams tab or an output of the *show realtime* command will display the exporters in and out packet rates and totals.

---

**Important:** When a new exporter starts sending UDP packets to the replicator, the packets will not get forwarded for up to two minutes.

---

### 5.2 Alarming

The Replicator is actively tracking the number of packets received, packets sent, and the state of any exporter and collector. An alarm is generated and a syslog is sent if an exporter stops sending packets or a collector becomes unreachable.

By default, the Replicator is configured to stop replicating traffic to collectors that are considered offline. Replication will resume once the collector is reachable.

#### 5.2.1 Dropped packets

The Replicator examines the netstat details of each interface and each direction (Rx and Tx) once every minute. When the OS reports there are interface drops a syslog alarm is sent to the server configured in the Notifications section of the settings tab.

The counting system used for the web interface that tracks the number of packets traversing the Replicator uses tcpdump instead of netstat and does a hard cut off on a timed basis. This means in the web interface there may be packets counted inbound that haven't been counted outbound yet. The counters increment close to realtime, but not

instantly. In addition to device state and dropped packets, the Replicator will send a notification if CPU is high or processes were terminated abnormally.

---

**Note:** The web interface metrics are a good reference point for packet activity, but not for drops.

---

The following settings control alarming capabilities in the Replicator.

- `downDisplayHour` : The number of hours before an incoming stream is automatically acknowledged as being down. Default is 24 hours.
- `flowStopAlert` : The number of minutes an incoming stream must stop or a collector is unreachable before it is considered down.
- `highCPUThreshold` : Send alerts about the CPU when it exceeds this percentage. Default is 90%
- `noRepWhenDown` : If ping is enabled and a collector is unreachable, stop replicating data to that device. Replication will continue when the collector begins to respond to pings.
- `notificationSent` : Send Replicator Alert and Notification Syslogs to the SERVER and Port specified.
- `pingCollectors` : If enabled, the Plixer replicator will routinely check the configured collectors for availability.

Use the `setting` CLI command to change the global behavior of alarming.

---

**Hint:** Plixer's Scrutinizer Incident Response System includes policies for all possible alarms from the Replicator.

---

### 5.2.2 Reporting

The `show` or `list` command has several different options to generate reports based on live data. Additionally, the Replicator can export replication statistics as IPFIX to a Flow Collector.

- `metricsSent` : Export Replicator Statistics and Metrics to an IPFIX Collector on the specified Collector IP and Port Number.

---

**Hint:** Use the `setting` command to manage IPFIX metrics.

---

A profile can be set up to send IPFIX metrics to multiple collectors by configuring the `metricsSent` option to send metrics back to the Replicator on a certain port (e.g. 10.1.4.66:2003)

```
+-----+-----+
| replicator_metrics          | IN PORT 2003 -> OUT PORT 2056 |
+-----+-----+

Policies          Exporters    ->    Collectors
(include) 0.0.0.0/0    10.1.4.66    10.1.10.1
                                     10.1.4.20

+-----+-----+
Done in 0.00897 secs
```



### 6.1 Dashboard tab

The Dashboard tab provides real time visualization of the overall operations of the Replicator. Information, such as total packets inbound, packets outbound, bits inbound, and bits outbound, is provided in the gauge charts and live trends (line graphs) displaying the last 20 data points of traffic. The time span of each trend will vary depending on the overall refresh rate of the live data.

Below the trends is a summary of total exporters, collectors, exporter/collector pairs, profiles, and last sample of traffic totals.

### 6.2 Streams Tab

The streams tab provides real time status of exporters sending packets to the Replicator. The streams that stopped will highlight in red. The user can summarize all stopped streams by checking the alarm only box. A filter box is provided to quickly narrow the list down based on a keyword match.

Clicking on the DNS Name globe button prompts the Replicator to attempt resolving the name of the exporter.

Additional details such as Last Status check, current status, and traffic details are displayed.

### 6.3 Exporters tab

The Exporters tab provides details related to the devices sending packets to the Replicator. If there are any alarm conditions detected, the total number of alerts will be highlighted by the Exporter tab.

There are two sub tabs: Exporters in profiles and Exporters not in a profile.

### 6.3.1 Exporters in profiles

Any exporter that is in an alarm state is highlighted in red. The total number of exporters in profiles with alarms are highlighted beside the sub tab. The same checkbox and filter is available on each tab to quickly find the desired exporter(s).

### 6.3.2 Exporters not in a profile

The sub tab includes the incoming streams from exporters that are currently not associated with a profile. It helps quickly find and configure streams that are not replicated to any collectors. Exporters highlighted in red indicate a stream that was previously known has stopped. The user can click the globe button to attempt to resolve the DNS name of the exporter. Clicking the + button will open a dialog box to select a profile to associate this stream with. To remove an exporter from a profile, use the - link. The eye icon will display the configuration of the profile associated with the selected exporter.

Additional details such as packets and bits received are also displayed.

## 6.4 Collector tab

The collector tab displays real time data associated with collectors. The number beside the tab represents the number of collectors in an alarm state.

Any row highlighted in red indicates an issue with that collector. To manage collectors, use the following options:

- [-] the collector from all the profile;
- [note] add description or a note to a collector;
- [globe] attempt resolving the DNS name;
- [gauge] set a threshold to alarm if a certain packet rate is exceeded;
- [circle] acknowledge an alarm;
- [+] add a collector to a profile;
- [-] remove a collector from a profile;
- [eye] view a profile associated with the alarm.

## 6.5 Profiles tab

Profiles define how packets come in and go out of the Replicator. The profiles tab lists all configured profiles and their current state. The number beside the tab represents the number of profiles in an alarm state.

Real time data such as inbound and outbound traffic is shown as well as total policies, exporters, and collectors. Profiles highlighted in red indicate an issue with the policy. [edit] a policy will provide details on why that policy is in an alarm state.

The following actions are available from the profile tab:

- [-] remove the profile which will stop packets to the collectors configured for the defined exporter streams;
- [pencil] edit the current profile;
- [+] add a new profile.

### 6.5.1 Creating a new Profile

Clicking the plus button will launch the new profile wizard. A profile consists of a name, an In Port, and an Out Port. These are the UDP ports which will define what ports Replicator will be listening on and send packet traffic to.

In most cases, users want to replicate traffic from any exporter sending packets on the in port. Otherwise, users can uncheck the match all box and specify a network and CIDR (e.g. 192.168.2.0/24) to match a certain set of exporters.

Multiple policies can be later added to a profile. See the next section for more information.

After the configuration has been completed, click save.

### 6.5.2 Editing a Profile

Clicking the pencil button next to a profile will display its current configuration, such as a name, description, real time data, policies, exporters, and collector.

---

**Important:** Profiles are not considered complete until there are at least one exporter and one

---

collector configured.

From this interface the following actions are available:

- [-] returns the user to the list of profiles
- [+] launches the new profile wizard
- [-] permanently removes the profile
- [note] add description or a note
- [pencil] launches the edit profile modal to modify the name, the in port, and out port, or the description modal to modify the description of the profile
- [+ policy] launches the add policy modal
- [+ exporter] launches the add exporter modal
- [+ collector] launches the add collector modal
- [-] removes the policy, exporter, or collector depending on which one is selected.

## 6.6 Settings tab

The Settings tab is where users can modify the configuration of the Replicator. Certain features can be enabled and disabled by checking or unchecking the enabled checkbox in the setting column. The settings column also contains the current value of the option. The description column explains what the option does.

If the user enters an invalid value, the Replicator will provide feedback informing the user what entry values should be.

## 6.7 Server health LED

The Server health LED lists the state of all services and profiles and provides a status of each. It is a high level view of the health of the Replicator processes.



---

## Interactive mode commands

---

At any time, running the command `help`, `help <command>`, `<command> ?`, or `?`  will display help in the interface.

### 7.1 acknowledge

The Replicator actively monitors the state of exporters and collectors. If either one is in an alarm state, the `acknowledge` command can be used to stop the Replicator from sending notifications about unavailable resources.

- `acknowledge <exporter|collector> ip_address:port`

```
REPLICATOR> acknowledge exporter 10.1.1.2
REPLICATOR> acknowledge collector 10.1.1.1:2055
```

### 7.2 backup

Creates a backup of the database in `/home/replicator/backups/<filename>`. Lists the files in `/home/replicator/backups` with the date they were last accessed. Backups can be restored using the `restore` command. Backup names can not contain any spaces.

- `backup [filename]`
- `show backups [filename]`
- `restore [filename]`

```
REPLICATOR> backup replicator_backup
REPLICATOR> show backups
REPLICATOR> restore replicator_backup
```

## 7.3 collect supportfiles

Gathers all relevant logs and configuration files and compresses them into a tar.gz file.

```
REPLICATOR> collect supportfiles
```

---

**Hint:** The collected files can be found in the `/home/replicator/supportfiles` directory.

---

## 7.4 collector

The collector command is used to add or remove collectors from profiles.

- `collector <add|remove> collector_ip profile`

```
REPLICATOR> collector add 10.1.1.1 maineStreet
REPLICATOR> collector remove 10.1.1.1 maineStreet
```

The allremove directive will remove the specified collector IP address from all profiles.

- `collector allremove collector_ip`

```
REPLICATOR> collector allremove 10.1.1.1
```

Collectors receive replicated packets. Some collectors may not be able to handle high volume. Use this option to set or remove a packet per second threshold.

- `collector threshold collector_ip threshold`

```
REPLICATOR> collector threshold 10.1.1.1 100000
```

## 7.5 exporter

The exporter command is used to add or remove exporters from profiles.

- `exporter <add|remove> exporter_ip profile`

```
REPLICATOR> exporter add 10.1.1.2 maineStreet
REPLICATOR> exporter remove 10.1.1.2 maineStreet
```

The allremove directive will remove the specified exporter IP address from all profiles.

- `exporter allremove exporter_ip`

```
REPLICATOR> exporter allremove 10.1.1.2
```

The noprofile directive will list all exporters actively sending packets to the Replicator that are not configured in any profiles.

It's recommended to either add these exporters to a profile or configure them to stop sending packets to the Replicator.

## 7.6 exporter noprofile

```

REPLICATOR> exporters noprofile

+-----+
| 10.1.73.1      Fri Nov 15 13:48:52 2019      1 packet (s)
| 10.1.29.60     Fri Nov 15 13:48:52 2019      2 packet (s)
| 10.202.0.103   Fri Nov 15 13:48:52 2019      5 packet (s)
| 10.200.10.1    Fri Nov 15 13:48:52 2019     32 packet (s)
| 172.20.124.41  Fri Nov 15 13:48:52 2019      1 packet (s)
+-----+
Done in 0.035998 secs

```

This list contains the IP address of the exporter, the last time stamp a packet was received, and the number of packets counted since the last packet summary.

**Note:** It is possible to have 0 packet(s) for exporters that export data infrequently.

## 7.7 Idapadmin

Set the admin password for ldap configuration.

## 7.8 license

The license command is used to manage the Replicator license key.

To generate a license key, Plexier or the reseller will need the Replicator's unique machine ID. The machine ID is displayed when issuing the *license check* command:

- *license <check|status>*

```

REPLICATOR> license check

Machine ID : 6YZ6XEPT66FPH6364A1VQ8NY
Customer ID : austin replicator
Licensed Version : 18.5
Licensed Type : subscription (standalone/primary)
Expiration : 11/30/2020

```

The license key can be configured on the Replicator using the license set command.

- *license <set|update>*

```

REPLICATOR> license set

```

**Important:** When applying the license key, make sure it is a continuous string without any line feeds or carriage returns on the same line as the license=.

```
[replicator]
engine=pg
dbname=/home/replicator/html/db/replicator.db
user=
pass=
license=Nb7RuYhxJWxUv9u+nTdHCnRj5R9EiXQv5qDS9W041jC4XBBYkErNZ6Q+Oi+Q+6uGwfaQJZO6QzE3wjgWsf2Cfq1Cp3Ssd
↪txz6yhFurK7Cz4Js1kuraTt96Q1pRru9zCk5gUxbNjISzI3B1Y75eMMDddTFv2XKJRxzDe8CK8N1Ov4Okkod1gx9tWW2xFTToAJr
↪HgVVMahQgDjPHhbuq2ft2HA1iuhRZU2q0Bt8TbSy+6CmvKLe7tSqht5V9bSLYQSdaJ1/
↪gntqAJaa4dGG4fBGmDgK30zLkC+OEFm402axzCmQ==
```

In the new window, under “license=” paste in the license key. Press CTRL+x to save.

---

**Hint:** Issuing either the license check or show status command will verify the key is properly installed. Contact technical support to acquire a new license key.

---

## 7.9 notate

The notate command can be used to add a description to a profile or IP Address. The description does not require enclosure quotation marks.

- *notate <profile|ip> <profile\_name|ip\_address> description*

```
REPLICATOR> notate profile maineStreet A fun and happy place
REPLICATOR> notate ip 10.1.1.2 my awesome router
```

This description will show up in various reports generated by the show command.

## 7.10 password

The password command will change the password used for the replicator user in interactive mode and the admin user in the web interface.

---

**Hint:** When changing the interactive password, the utility will prompt for the current replicator user’s password, i.e (current) UNIX password.

---

- *password <interactive|webui>*

```
REPLICATOR> password interactive
(current) UNIX password:
New password:
Retype new password:

Successful password changes will be applied to the next log in.
```

## 7.11 policy

The policy command manages what exporters are automatically included or excluded in profiles. Policy inclusion policies are checked first, then exclusion policies. Policies are defined in subnet/cidr notation.



- *policies <add/remove> subnet/cidr profile <include/exclude>*

```
REPLICATOR> policy add 192.168.0.0/16 maineStreet include
REPLICATOR> policy add 192.168.2.0/24 maineStreet exclude
REPLICATOR> policy remove 192.168.2.0/24 maineStreet
```

The include/exclude option is only required if using the add directive.

Collectors are not affected by policies.

## 7.12 profile

The profile command is used to add, update, remove, enable, disable, and rename profiles.

The name, listening port, and sending port are required when adding or updating a profile.

- *profile <add/update> name listen\_port send\_port*

```
REPLICATOR> profile add maineStreet 2002 2055
REPLICATOR> profile update maineStreet 2003 2056
```

Removing a profile will also remove any policies assigned to it. However, other profiles will remain unmodified.

Disabling a profile will keep its settings, policies, exporters, and collectors intact. However, replication will not occur.

- *profile <remove/disable/enable> name*

```
REPLICATOR> profile remove maineStreet
REPLICATOR> profile disable maineStreet
REPLICATOR> profile enable maineStreet
```

Profiles can also be renamed with the rename directive. Only the name of the profile will be updated. Use profile update to change other details such as the sending port or listening port.

- *profile rename old\_name new\_name*

```
REPLICATOR> profile rename maineStreet streetOfMaine
```

## 7.13 profile singularity

Singularity mode will replicate packets as the replicator IP instead of the original exporter's IP. This allows users to combine packets from multiple exporters into a single exporter IP.

```
REPLICATOR> profile singularity maineStreet <enable|disable>
```

By default, the replicator will replicate packets using the original sources of those packets as the exporter.

## 7.14 rebuild

The rebuild command is only necessary when replication services are down and the administrator wishes to rewrite the internal configuration. Otherwise, the Replicator manages all configurations as real time changes are detected.

```
REPLICATOR> rebuild
```

The `sampcfg` command is an alias to the `rebuild` command.

### 7.15 restore

The `restore` command is used to recover a database from backup `<filename>` in `/home/replicator/backups`

---

**Important:** Restore to the same version of PostgreSQL that was used during the backup.

---

### 7.16 role

The `role` command is used when setting up a fault tolerant environment.

- `role set ha master <ip_address>`
- `role set ha off`
- `role set ha on <priority> <virtual_ip> <ifname> <master\backup>`
- `role set primary`
- `role set secondary <primary_replicator_ip:listener_port> [timeout]`
- `role test <halsecondary>`

```
REPLICATOR> role set master <ip_address>
REPLICATOR> role set ha off
REPLICATOR> role set ha on 101 10.1.4.223 eth0 master
REPLICATOR> role set primary
REPLICATOR> role set secondary 10.1.4.66:2002 10
REPLICATOR> role test secondary
```

Reference the section on fault tolerance for more information.

### 7.17 setting

The `setting` command manages the global configuration for the Replicator. Features can be enabled, disabled, and set.

- `setting set name value`
- `setting <enable|disable> name`

```
REPLICATOR> setting set metricsSent 10.1.4.66:2003
REPLICATOR> setting disable convertSyslog
```

Use the `show setting` command to get a list of settings in the global configuration.

## 7.18 show

The show command generates reports based on configuration settings and real time data.

- *show alarm [filter]*
- *show asset [filter]*
- *show backups*
- *show collector [filter]*
- *show config*
- *show exporter [filter]*
- *show profile [filter]*
- *show realtime [filter]*
- *show setting [filter]*
- *show status*

Most show commands also have a [filter] option which will only display details that match the filter. The entire report is displayed if no filter is included.

The list and sh commands are aliases to the show command.

### 7.18.1 alarm

Lists exporters that have stopped sending data to the replicator and collectors that are no longer reachable by the replicator.

- *show alarm [filter]*

```
REPLICATOR> show alarm
REPLICATOR> show alarm 10.1.4
```

### 7.18.2 asset

Generates a report detailing IP addresses, whether the IP address is an exporter and/or collector, dns names, and descriptions.

- *show asset [filter]*

```
REPLICATOR> show asset
REPLICATOR> show asset plxr.local
```

### 7.18.3 backups

Lists the files in /home/replicator/backups with the date they were last accessed.

```
REPLICATOR> show backups
```

### 7.18.4 collector

Generates a report showing the collector(s) IP address, dns name, description, and which profiles currently include the collector(s).

- *show collector [filter]*

```
REPLICATOR> show collector
REPLICATOR> show collector 10.1.1.1
```

### 7.18.5 config

Lists all commands necessary to rebuild all profile settings.

- *show config*

```
REPLICATOR> show config
```

### 7.18.6 exporter

Generates a report showing the exporter(s) IP address, dns name, description, and which profiles are currently including the exporter(s).

- *show exporter [filter]*

```
REPLICATOR> show exporter
REPLICATOR> show exporter 10.1.2.5
```

### 7.18.7 profile

Lists profiles and all policies, exporters, and collectors associated.

- *show profile [filter]*

```
REPLICATOR> show profile
REPLICATOR> show profile maineStreet
```

### 7.18.8 realtime

Peers into the live stream and shows statistics of exporters, in and out statistics, and CPU usage.

- *show realtime [filter]*

```
REPLICATOR> show realtime
REPLICATOR> show realtime 192.168
```

Press CTRL+C to exit the realtime report.

## 7.18.9 setting

Displays a list of all global configuration settings, the current values, and whether they are enabled or disabled.

- *show setting [filter]*

```
REPLICATOR> show setting
REPLICATOR> show setting metric
```

## 7.18.10 status

Lists all replicator services and licenses, and shows the status of each.

- *show status*

```
REPLICATOR> show status
+-----+
| Version                v18.5.24.2345
| Replicating Port 2055  ACTIVE
| Replicator Vitalizer   ACTIVE
| Replicator API         ACTIVE
| Replicator Monitor     ACTIVE
| Replicator State       ACTIVE
| Replicator License     License Expires: 380
+-----+
+ process checking took 0.22578 secs
```

## 7.19 snoop

The snoop command can be used to verify that packets are being received by or sent from the replicator for a certain IP address.

- *snoop <ip\_address>*

```
REPLICATOR> snoop 10.1.1.1
```

Specifying the interface will display activity from it.

- *snoop interface <interface\_name> [port <port\_number>]*

```
REPLICATOR> snoop eth0
```

---

**Hint:** Press CTRL+C to exit the snoop command.

---

## 7.20 system

The system command is used to change state of the replicator. The directive change is used to change the host name or IP address.

- *system <change|restart|shutdown>*

```
REPLICATOR> system change
REPLICATOR> system restart
REPLICATOR> system shutdown
```

- *system virtualip enable <ifname> <virtual\_ip>*
- *system virtualip disable <ifname> <virtual\_ip>*

```
REPLICATOR> system virtualip enable eth0 10.1.4.223
REPLICATOR> system virtualip disable eth0 10.1.4.223
```

These commands allow users to add or remove a virtual IP address for high availability (HA) configurations.

## 7.21 upload supportfiles

Sends collected support files to Plixer support for analysis. Make sure to run *collect supportfiles*.

```
REPLICATOR> upload supportfiles
```

## 7.22 version

Shows the current version of the Replicator appliance.

```
REPLICATOR> version
```

---

 Advanced configuration
 

---

## 8.1 Converting syslogs to IPFIX

The Replicator is capable of converting syslogs into IPFIX. A global configuration setting `convertSyslog` specifies what UDP port to convert.

```

REPLICATOR> show setting convertSyslog
+-----+-----+-----+
| convertSyslog          | 514          | Enabled
|
| When enabled, syslogs sent to the specified port will be converted to
| IPFIX and sent to the sender port(s) in the profile.
+-----+-----+-----+
Done in 0.168892 secs
  
```

By default, this functionality is disabled.

```

+-----+-----+-----+
| syslog                  | IN PORT 514 -> OUT PORT 9995
+-----+-----+-----+

Policies                Exporters    ->    Collectors
(include) 0.0.0.0/0      10.1.1.242   10.1.10.1
                       10.1.1.249   10.1.4.101
                       10.1.1.252   10.1.4.19
                       10.12.1.98   10.1.4.222
                       10.3.1.1    10.1.4.93
                       192.168.21.254
                       24.39.1.172
+-----+-----+-----+
Done in 0.009376 secs
  
```

If `convertSyslog` is disabled, a syslog received from one of the exporters on port 514 is replicated as a syslog to all the collectors on port 9995.

If `convertSyslog` is enabled and set to 514, the same syslog received from one of the exporters on port 514 is converted and replicated as IPFIX to all the collectors on port 9995. The syslog will not be replicated as a syslog.

## 8.2 Fault tolerance

A second Replicator can be set up to provide a fault tolerant environment in case the primary Replicator goes offline.

A fault tolerant environment will function with either a virtual or hardware appliance. There are two methods available for fault tolerance environments.

The first method (i.e. traditional method) is used when two Replicators exist on different subnets. The second method (i.e. high availability) can be used when two Replicators are on the same subnet.

---

**Note:** If desired, the traditional method can also be used when Replicators are on the same subnet.

---

## 8.3 Traditional configuration

### 8.3.1 How it works

The secondary Replicator actively monitors the state of the primary Replicator and frequently synchronizes its database with the settings from the primary.

When a Replicator is in secondary mode, it will no longer maintain its current configuration and any current configuration is lost. At any time, it will not allow any configuration changes. With the exception of the role and show commands, all profile and global configuration must be changed on the primary Replicator.

If the secondary Replicator determines that the primary is offline, it attempts to contact collectors. If the collectors are reachable, the secondary Replicator takes over replication based on the configured profiles in the last known good synchronized database. If the collectors are not reachable, it maintains the secondary status until a collector or the primary Replicator is reachable.

Additionally, the secondary Replicator continues to monitor the state of the primary. When the primary Replicator is reachable, replication on the secondary appliance stops. The secondary Replicator synchronizes any updates made to the primary database and begins the process of monitoring the state of the primary Replicator.

### 8.3.2 Requirements

The following requirements must be met to set up a fault tolerant environment:

- A primary and secondary Replicators;
- Each exporter configured to send data to both the primary and secondary Replicator IP addresses

A primary and secondary server can be a mix of virtual and hardware appliances. Configure the primary with the desired profiles, global configuration settings, and verify the collectors are receiving the replicated data.

---

**Note:** The secondary Replicator requires a fault tolerance license key. To acquire a fault tolerance license key contact Plexier directly.

---



### 8.3.3 Configuring a secondary Replicator

After deploying a second Replicator, use the role command to set up a fault tolerant environment:

- `role set secondary <primary_Replicator_ip>:listener_port [timeout]`

Replace the `<primary_Replicator_ip>` with the IP address of the primary server and `<listener_port>` with a port on which the primary is actively listening for packets.

The timeout represents the number of consecutive missed polls before the secondary takes the role as the primary. The default is 2 polls if timeout is not passed in.

```
REPLICATOR> role set secondary 10.1.4.66:2002 3
```

### 8.3.4 Testing a secondary Replicator

Once the Replicator has been successfully set to secondary, the last step is to verify connectivity to the primary.

- `role test secondary`

```
REPLICATOR> role test secondary
```

The fault tolerant environment is active if the test runs successfully.

### 8.3.5 Disabling fault tolerance

At anytime, a secondary Replicator can become a stand-alone appliance by issuing the `role set primary` command.

```
REPLICATOR> role set primary
```

## 8.4 High availability

### 8.4.1 How it works

Packets are sent to a virtual IP address that both the primary/master and secondary/backup Replicator are configured to listen for traffic. The primary and secondary configurations each contain a priority so the Replicators are aware of their role.

When the master Replicator fails, the packets are instantly picked up by the backup and forwarded to the collectors configured as part of the Replicator profiles.

Once the primary is active again, it starts forwarding the packets to the configured collectors. This method can be used to set up redundancy beyond a primary and secondary role.

### 8.4.2 Requirements

The following requirements must be met to set up a fault tolerant environment:

- A primary/master and secondary/backup Replicators;
- Each exporter configured to send data to a single virtual IP address.

Primary and secondary servers can be a mix of virtual and hardware appliances. Configure the primary with the desired profiles, global configuration settings, and verify the collectors are receiving the replicated data.

### 8.4.3 Configuring high availability

1. On the primary/master Replicator, run the following commands to add the virtual IP address:

```
REPLICATOR> system virtualip enable eth0 <virtual_ip_here>
```

2. Set the IP address of the master:

```
REPLICATOR> role set ha master <primary_ip>
```

---

**Note:** When prompted, enter the root user's password for the primary/master Replicator.

---

3. Enable high availability on the primary Replicator:

```
REPLICATOR> role set ha on 101 <virtual_ip_here> eth0 master
```

4. On the secondary Replicator, run the following commands to add the virtual IP address:

```
REPLICATOR> system virtualip enable eth0 <virtual_ip_here>
```

5. Enter the IP address of the master:

```
REPLICATOR> role set ha master <primary_ip>
```

6. Enable high availability on the secondary:

```
REPLICATOR> role set ha on 100 <virtual_ip_here> eth0 backup
```

---

**Note:** When prompted, enter the admin user's password for the primary/master Replicator.

---

### 8.4.4 Testing a secondary Replicator

1. Run the following command on both the primary and secondary Replicators:

```
REPLICATOR> role test ha
```

2. Purposely shutdown the master Replicator and ping the virtual IP. If a response is received, high availability has been properly configured.
3. Restart the master Replicator.

### 8.4.5 Disabling high availability

To turn off high availability, run the following command on the primary and secondary Replicators.

```
REPLICATOR> role set ha off  
REPLICATOR> system virtualip disable eth0 <virtual_ip_here>
```

## 8.5 Closed networks with no gateway

This configuration currently requires root access and a reboot of the Replicator.

In the */etc/sysctl.conf* file, there is a setting called *net.ipv4.all.rp\_filter*. When this value is set to 1 (i.e. *net.ipv4.all.rp\_filter = 1*), all packets that come into an interface that the host doesn't have a route are filtered (dropped).

For example: a user has a closed network of 192.168.250.x with no gateway. The packets sent to the Replicator that were not 192.168.0.0/24 are dropped and never replicated to any configured collectors.

The solution is to edit the */etc/sysctl.conf* file and change *net.ipv4.all.rp\_filter = 1* to *net.ipv4.all.rp\_filter = 0*. A reboot is required.



## 9.1 Authentication

Users must authenticate before using any of the API calls. This is done through the resource URL `/api/1/login`. To log out manually, use the resource URL `/api/1/logout`. Log out is not required to end sessions. Sessions are automatically expired after 30 minutes.

### 9.1.1 Log in

Used to start a new API session.

#### GET request

---

**Note:** Legacy API – Deprecated- recommend using POST

---

#### Resource URL

`https://{[replicator]}/api/1/login/{[sha2]}`

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[sha2]	The interactive (CLI) mode's password converted to sha2 512-bit hex

#### Example request

`https://10.30.17.131/api/1/login/098f6bcd4621d373ca098f6bcd4621d563cade4e832629b4f6d098f4bcd4621d373cade4e831627b4f6e4`

#### POST request

Used to start a new API session.

#### Resource URL

---

POST [https://\[{}replicator{}/api/1/login/](https://[{}replicator{}/api/1/login/)

```
{
  "user" : "admin"
  "passwd": "[passwd]"
}
```

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[passwd]	The sha512 hash of the password for admin

**Example response**

```
{
  "path": "login successful.",
  "result": "success"
}
```

### 9.1.2 Log out

Used to manually stop an API session.

**Resource URL**

[https://\[{}replicator{}/api/1/logout](https://[{}replicator{}/api/1/logout)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

**Example request**

<https://10.30.17.131/api/1/logout>

**Example response**

```
{
  "path": "logout successful.",
  "result": "success"
}
```

## 9.2 Acknowledge

Used to acknowledge collectors and exporters in an alarm state.

**Resource URL**

[https://\[{}replicator{}/api/1/acknowledge/\[{}entity{}/\[{}ip:port\]](https://[{}replicator{}/api/1/acknowledge/[{}entity{}/[{}ip:port])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[entity]	valid options are collector or exporter
[ip:port]	The IP address and port of the [entity] to acknowledge

**Example request**

<https://10.30.17.131/api/1/acknowledge/collector/10.1.10.4:2055>

**Example response**

```
{
  "description": "Success: collector '10.1.10.4:2055' acknowledged.",
  "result": "success"
}
```

## 9.3 Collector

Perform actions to manage collectors in profiles.

**RESOURCE URL**

Use this resource to manage a collector for an individual profile.

[https://\[{}replicator{}/api/1/collector/\[{}action{}/\[{}ip{}/\[{}profile\]](https://[{}replicator{}/api/1/collector/[{}action{}/[{}ip{}/[{}profile])

Parameter	Description
[replicator]	The hostname or IP address of the replicator appliance
[action]	valid actions are add or remove
[ip]	The IP address of the collector
[profile]	The profile to perform the [action] for the [ip]

**Example request**

<https://10.30.17.131/api/1/collector/add/10.1.10.60/myprofile>

**Example response**

```
{
  "description": "Success: Collector [10.1.10.60] -> Profile [myprofile]",
  "result": "success"
}
```

**RESOURCE URL**

Use this resource to remove a collector from all profiles.

[https://\[{}replicator{}/api/1/collector/allremove/\[{}ip\]](https://[{}replicator{}/api/1/collector/allremove/[{}ip])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[ip]	The IP of the collector to remove from all profiles

**Example request**

<https://10.30.17.131/api/1/collector/allremove/10.1.10.4>

**Example response**

```
{
  "description": "Success: Collector [10.1.10.4] <- All Profiles",
  "result": "success"
}
```

## 9.4 DNSCheck

Performs a DNS check on an IP Address

### RESOURCE URL

Use this resource to manually perform a DNS Name resolve on an IP address.

[https://\[replicator\]/api/1/dnscheck/\[ip\]](https://[replicator]/api/1/dnscheck/[ip])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[ip]	The IP address to resolve

### Example request

<https://10.30.17.131/api/1/dnscheck/10.1.1.3>

### Example response

```
{
  "dnscheck": {
    "addr": "10.1.1.3",
    "expiry": {
      "epoch": 1462801036,
      "time": "Mon May 9 09:37:16 2016"
    },
    "name": "newexp.plxr.local",
    "resolveTime": 0.04485,
    "status": "success"
  }
}
```

## 9.5 Exporter

Perform actions to manage exporters in profiles.

### RESOURCE URL

Use this resource to manage an exporter for an individual profile.

[https://\[replicator\]/api/1/exporter/\[action\]/\[ip\]/\[profile\]](https://[replicator]/api/1/exporter/[action]/[ip]/[profile])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[action]	valid actions are add or remove
[ip]	The IP address of the exporter
[profile]	The profile to perform the [action] for the [ip]



**Example request**

<https://10.30.17.131/api/1/exporter/add/10.1.1.1/myprofile>

**Example response**

```
{
  "description": "Success: Exporter [10.1.1.1] -> Profile [myprofile]",
  "result": "success"
}
```

**RESOURCE URL**

Use this resource to remove an exporter from all profiles.

[https://\[{}replicator{\]}/api/1/exporter/allremove/\[{}ip\]](https://[{}replicator{]}/api/1/exporter/allremove/[{}ip])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[ip]	The IP of the exporter to remove from all profiles

**Example request**

<https://10.30.17.131/api/1/exporter/allremove/10.1.1.4>

**Example response**

```
{
  "description": "Success: Exporter [10.1.1.4] <- All Profiles",
  "result": "success"
}
```

**RESOURCE URL**

This resource identifies exporters sending data to the replicator that are not members of any profiles.

[https://\[{}replicator{\]}/api/1/exporter/noprofile/\[{}filter\]](https://[{}replicator{]}/api/1/exporter/noprofile/[{}filter])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[filter]	The filter to apply against the list of exporters in no profiles. To get the entire list, pass a 0.

**Example request**

<https://10.30.17.131/api/1/exporter/noprofile/0>

**Example response**

```
{
  "noprofile": {
    "10.30.17.131": {
      "in_o_delta": 0,
      "in_o_rate": "0.0",
      "in_p_delta": 0,
      "in_p_rate": "0.0",
      "lastseen": "Tue Apr 19 09:55:18 2016",
      "out_o_delta": 1493,
      "out_o_rate": "49.8",
      "out_p_delta": 6,

```

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```

    "out_p_rate": "0.2",
    "unixtime": 1461074118
  },
  "total": 1
}

```

## 9.6 License

Check the status of the current license

### RESOURCE URL

This resource returns current license details.

[https://\[{}replicator{}/api/1/license/check](https://[{}replicator{}/api/1/license/check)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

### Example request

<https://10.30.17.131/api/1/license/check>

### Example response

```

{
  "daysLeft" : "365 day(s)",
  "expiration" : "Thu May 18 2017",
  "licensedType" : "eval",
  "licensedVersion" : "16.6",
  "machineID" : "6YZ6XEPTA66JA6VHFPG749B",
  "role" : "failover"
}

```

## 9.7 Notate

Users can add descriptions for profiles, collectors, and exporters.

### RESOURCE URL

[https://\[{}replicator{}/api/1/notate/\[{}entity{}/\[{}identity{}/\[{}description\]\]](https://[{}replicator{}/api/1/notate/[{}entity{}/[{}identity{}/[{}description]])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[entity]	valid options are profile or ip.
[identity]	Use a profile name when [entity] profile is specified, or the IP address of a collector or exporter when [entity] ip is specified.
[description]	the description of the entity. Use standard ASCII characters the are URI compatible.

**Example request**

[https://10.30.17.131/api/1/notate/profile/myprofile/My\\_Fantastic\\_Description](https://10.30.17.131/api/1/notate/profile/myprofile/My_Fantastic_Description)

**Example response**

```
{
  "description": "Success: Profile 'myprofile' has a new description",
  "result": "success"
}
```

## 9.8 Policies

Manage policies that are associated to profiles.

**RESOURCE URL**

[https://\[{}replicator{\]}/api/1/policies/\[{}action{\]}/\[{}network{\]}/\[{}cidr{\]}/\[{}profile{\]}/\[{}incexc{\]](https://[{}replicator{]}/api/1/policies/[{}action{]}/[{}network{]}/[{}cidr{]}/[{}profile{]}/[{}incexc{])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[action]	valid options are add or remove
[network]	the address to the network (e.g. 172.17.0.0)
[cidr]	the CIDR to the network specified (e.g. 16)
[profile]	the name of the profile to perform the [action]
[incexc]	valid options are include or exclude

**Example request**

<https://10.30.17.131/api/1/policies/add/10.1.20.0/16/myprofile/include>

**Example response**

```
{
  "description": "Success: Policy [10.1.20.0/16] -> Profile [myprofile]",
  "result": "success"
}
```

## 9.9 Profile

Manage characteristics and behaviors of profiles.

**RESOURCE URL**

Use this resource to rename an existing profile.

[https://\[{}replicator{\]}/api/1/profile/rename/\[{}current{\]}/\[{}new{\]](https://[{}replicator{]}/api/1/profile/rename/[{}current{]}/[{}new{])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[current]	The name of the profile to rename
[new]	The new name of the profile

**Example request**

<https://10.30.17.131/api/1/profile/rename/oldprofile/myprofile>

### Example response

```
{
  "description": "Success: Profile 'oldprofile' is now 'myprofile'",
  "result": "success"
}
```

### RESOURCE URL

Use this resource to toggle the singularity flag.

[https://\[replicator\]/api/1/profile/singularity/\[name\]/\[action\]](https://[replicator]/api/1/profile/singularity/[name]/[action])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[name]	the name of the profile to toggle singularity
[action]	valid options are enable and disable

### Example request

<https://10.30.17.131/api/1/profile/singularity/myprofile/enable>

### Example response

```
{
  "description": "Success: Profile 'myprofile' singularity enabled",
  "result": "success"
}
```

### RESOURCE URL

Use this resource to enable, disable, or remove a profile

[https://\[replicator\]/api/1/profile/\[action\]/\[name\]](https://[replicator]/api/1/profile/[action]/[name])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[action]	valid options are enable, disable, and remove
[name]	the name of the profile to perform the [action]

### Example request

<https://10.30.17.131/api/1/profile/disable/myprofile>

### Example response

```
{
  "description": "Success: Profile myprofile has been set to 'disable'",
  "result": "success"
}
```

### RESOURCE URL

Use this resource to create or update an existing profile.

[https://\[replicator\]/api/1/profile/\[action\]/\[name\]/\[listeningport\]/\[sendingport\]](https://[replicator]/api/1/profile/[action]/[name]/[listeningport]/[sendingport])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[action]	valid options are add and update
[name]	The name of the profile
[listeningport]	The UDP port for this profile to listen for incoming packets
[sendingport]	The UDP port for this profile to send packets out

**Example request**

<https://10.30.17.131/api/1/profile/add/myprofile/2055/4739>

**Example response**

```
{
  "description": "Success: Profile 'myprofile' has been added and enabled.",
  "result": "success"
}
```

## 9.10 Rebuild

Force the replicator to rebuild its configuration immediately instead of waiting for the replicator to automatically do it.

**RESOURCE URL**

[https://\[replicator\]/api/1/rebuild](https://[replicator]/api/1/rebuild)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

**Example request**

<https://10.30.17.131/api/1/rebuild>

**Example response**

```
{
  "description": "rebuild request submitted",
  "result": "success"
}
```

## 9.11 Role

When a replicator is configured as a secondary/backup, send a test to verify its configured properly.

**RESOURCE URL**

[https://\[replicator\]/api/1/role/test/secondary](https://[replicator]/api/1/role/test/secondary)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

**Example request**

<https://10.30.17.131/api/1/role/test/secondary>

**Example response**

```
{
  "description": "!!! This replicator is the primary !!!",
  "result": "error"
}
```

## 9.12 Setting

Manage global settings of the replicator.

**RESOURCE URL**

Use this resource to set values for specified settings

[https://\[{}replicator{\]}/api/1/setting/set/\[{}name{\]}/\[{}value\]](https://[{}replicator{]}/api/1/setting/set/[{}name{]}/[{}value])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[name]	the exact name of the setting to modify
[value]	the value to set the setting specified in [name]

**Example request**

<https://10.30.17.131/api/1/setting/set/metricssent/10.1.2.3:2055>

**Example response**

```
{
  "description": "Success: setting 'metricssent' has been set to '10.1.2.3:2055'",
  "result": "success"
}
```

**RESOURCE URL**

Use this resource to enable or disable the specified setting.

[https://\[{}replicator{\]}/api/1/setting/\[{}action{\]}/\[{}name\]](https://[{}replicator{]}/api/1/setting/[{}action{]}/[{}name])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[action]	valid options are enable or disable
[name]	the exact name of the setting to modify

**Example request**

<https://10.30.17.131/api/1/setting/disable/metricssent>

**Example response**

```
{
  "description": "Success: setting 'metricssent' has been set to 'disable'",
  "result": "success"
}
```

## 9.13 Show

Shows configuration and realtime information from the replicator.

### RESOURCE URL

Use this resource to view the current configuration of the replicator.

[https://\[{}replicator{}/api/1/show/config](https://[{}replicator{}/api/1/show/config)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

### Example request

<https://10.30.17.131/api/1/show/config>

### Example response

```
{
  "api": {
    "collector": [
      "/api/1/collector/add/10.30.1.20/benchmark-20",
      ...
    ],
    "notate": [
      "/api/1/notate/ip/10.1.4.101/ej-win2012 install test machine (fresh)",
      ...
    ],
    "policy": [
      "/api/1/policies/add/10.1.1.252/32/buildqa/include",
      ...
    ],
    "profile": [
      "/api/1/profile/add/frandev/2002/2055",
      ...
    ]
  },
  "cli": {
    "collector": [
      "collector add 10.30.1.20 benchmark-20",
      ...
    ],
    "notate": [
      "notate ip 10.1.4.101 ej-win2012 install test machine (fresh)",
      ...
    ],
    "policy": [
      "policy add 10.1.1.252/32 buildqa include",
      ...
    ],
    "profile": [
      "profile add frandev 2002 2055",
      ...
    ]
  }
}
```

### RESOURCE URL

Use this resource to view the current status of the replicator.

[https://\[{}replicator{}/api/1/show/status](https://[{}replicator{}/api/1/show/status)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

### Example request

<https://10.30.17.131/api/1/show/status>

### Example response

```
{
  "converting syslog" : "active",
  "ipfixify system metrics" : "active",
  "replicating port 2002" : "active",
  "replicating port 2003" : "active",
  "replicating port 2055" : "active",
  "replicator api" : "active",
  "replicator license" : "259 day(s)",
  "replicator monitor" : "active",
  "replicator vitalizer" : "active",
  "result" : "success",
  "version" : "v17.12.19.2255"
}
```

## RESOURCE URL

Use this resource to see realtime data from the replicator.

[https://\[{}replicator{}/api/1/show/realtime/\[{}filter\]](https://[{}replicator{}/api/1/show/realtime/[{}filter])

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[filter]	Currently filter is not supported. Pass in 0 to get the entire state of statistics.

### Example request

<https://10.30.17.131/api/1/show/realtime/0>

### Example response

```
{
  "collector": {
    "10.1.4.19": {
      "in": {
        "octets": {
          "delta": 0,
          "rate": 0
        },
        "packets": {
          "delta": 0,
          "rate": 0
        }
      }
    },
    "10.1.4.20": {
```

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```
...
},
},
"exporter": {
  "10.30.17.131": {
    "awareness": {
      "last_epoch": 1461175921,
      "last_timestamp": "2016-04-20 14:12:01"
    },
    "in": {
      "octets": {
        "delta": 0,
        "rate": "0.0"
      },
      "packets": {
        "delta": 0,
        "rate": "0.0"
      }
    },
    "out": {
      "octets": {
        "delta": 0,
        "rate": "0.0"
      },
      "packets": {
        "delta": 0,
        "rate": "0.0"
      }
    },
    "profiles": [
      "benp"
    ]
  },
},
"pair": {
  "10.30.17.131 -> 10.1.4.19": {
    "octets": {
      "delta": 0,
      "rate": 0
    },
    "packets": {
      "delta": 0,
      "rate": 0
    }
  },
  "10.30.17.131 -> 10.1.4.20": {
    ...
  },
},
"profile": {
  "benp": {
    "in": {
      "octets": {
        "delta": 0,
        "rate": 0
      },
      "packets": {
        "delta": 0,
```

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```

    "rate": 0
  }
},
"out": {
  "octets": {
    "delta": 0,
    "rate": 0
  },
  "packets": {
    "delta": 0,
    "rate": 0
  }
}
},
"stats": {
  "totals": {
    "collectors": 2,
    "exporters": 1,
    "pairs": 2,
    "profiles": {
      "disabled": 3,
      "enabled": 67,
      "total": 70
    }
  }
},
"system": {
  "cpu": "0"
}

```

**RESOURCE URL**

Use this resource to show various configured information from the replicator.

[https://{\[replicator\]}/api/1/show/{\[entity\]}/{\[filter\]}](https://{[replicator]}/api/1/show/{[entity]}/{[filter]})

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[entity]	Valid options are alarms, assets, collectors, config, exporters, profile, realtime, settings, and status
[filter]	A custom keyword match filter can be specified. If no filter is necessary, pass 0.

**Example request**

<https://10.30.17.131/api/1/show/collector/10.1.10.1>

**Example response**

```

{
  "collector": {
    "10.1.10.1": {
      "acknowledged": [
        9996
      ],
      "description": "erpdev",
      "in_profiles": [
        "steady-replays"
      ]
    }
  }
}

```

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```

    ],
    "ip": "10.1.10.1",
    "name": null,
    "status": {
      "unreachable_port": [
        "9996"
      ],
    },
    "threshold": 10000
  }
}
}
}

```

## 9.14 Threshold

Set thresholds on collectors to warn when replicated packets are exceeding the current packet per second replicated.

### RESOURCE URL

[https://{\[\]replicator\[\]}/api/1/collector/threshold/{\[\]collector\[\]}/{\[\]threshold}](https://{[]replicator[]}/api/1/collector/threshold/{[]collector[]}/{[]threshold})

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance
[collector]	The IP address of the collector
[threshold]	The threshold to set. It represents packets per second. Set this to a number higher than 0. If 0 is set, the threshold is removed.

### Example request

<https://10.30.17.131/api/1/collector/threshold/10.1.5.2/10000>

### Example response

```

{
  "description": "Success: Collector [10.1.5.2] threshold set to 10000",
  "result": "success"
}

```

## 9.15 Version

Returns version information about the replicator.

### RESOURCE URL

[https://{\[\]replicator\[\]}/api/1/version](https://{[]replicator[]}/api/1/version)

Parameter	Description
[replicator]	The hostname or IP address of the Replicator appliance

**Example request**

`https://10.30.17.131/api/1/version`

**Example response**

```
{ "apiversion" : "1", "bestipfixcollector" : "Need an IPFIX Collector? Download Scrutinizer at https://www.plixer.com", "build" : "2019-12-03 13:07:44 -0500 (Tue, 03 Dec 2019)", "copyright" : "Copyright (C) 2012 - 2019 Plixer, All rights reserved.", "name" : "Plixer Replicator (TM) v18.14.1.2410", "result" : "success", "yeswe-can" : "Replicate Anything!" }
```

**Important:** Don't struggle, [contact Plixer support!](#)

### Frequently Asked Questions

**Q)** I've configured my router to send flows to the replicator, but the replicator says it hasn't received traffic from this device.

**A)** There may be a firewall or an access control list blocking traffic from reaching the Replicator. Verify that the Replicator is seeing traffic from the device by using the `snoop <ip_of_network_device>` command.

**Q)** I've configured my router to send flows to the replicator. How long will it take for the packets to be forwarded to the collectors?

**A)** When a new device starts sending UDP packets to the replicator, the packets will not get forwarded for up to two minutes.

**Q)** Is there a way to get a list of exporters that are not in any profiles but still sending packets to the replicator?

**A)** To get a list of the exporters that haven't been assigned to any profiles, click on the **Exporters** tab and set the view to **Exporters Not In a Profile**. Alternatively, use the following interactive mode command:

```
REPLICATOR> exporters noprofile
```

```
+-----+
| 10.1.73.1      Fri Nov 15 13:48:52 2019      1 packet (s)
| 10.1.29.60     Fri Nov 15 13:48:52 2019      2 packet (s)
| 10.202.0.103   Fri Nov 15 13:48:52 2019      5 packet (s)
| 10.200.10.1    Fri Nov 15 13:48:52 2019     32 packet (s)
| 172.20.124.41  Fri Nov 15 13:48:52 2019      1 packet (s)
+-----+
```

```
Done in 0.035998 secs
```

**Q)** I want to send syslog notifications and IPFIX metrics generated by the replicator to multiple collectors. The setting seems to only support a single collector. How do I configure it for multiple collectors?

A) Configure the setting to send the notifications and/or IPFIX metrics back to the Replicator. Next, create a profile to send the data to one or more collectors. However, since one setting is for syslogs and the other one is for IPFIX, the configuration will require two different profiles. Assuming the Replicator’s IP is 10.1.4.66, below is an example of the profile settings.

```

+-----+-----+
| replicator_notifications | IN PORT 514 -> OUT PORT 514
+-----+-----+

Policies          Exporters    ->    Collectors
(include) 0.0.0.0/0  10.1.4.66          10.1.10.1
                                     10.1.4.19
                                     10.1.4.20
                                     10.1.4.222
                                     10.1.4.93
                                     10.1.4.94

+-----+-----+

| replicator_metrics      | IN PORT 2003 -> OUT PORT 2056
+-----+-----+

Policies          Exporters    ->    Collectors
(include) 0.0.0.0/0  10.1.4.66          10.1.10.1
                                     10.1.4.19
                                     10.1.4.20
                                     10.1.4.222
                                     10.1.4.93
                                     10.1.4.94

+-----+-----+

```

Q) Can a profile have the same listening and receiving port?

A) Yes. The Replicator will perform additional checking to make sure a loop isn’t introduced by new collectors and exporters.

Q) I’m trying to add an exporter or collector and the Replicator will not add it because it will create a loop. What does it mean?

A) A loop is when flows are repeatedly exported from a device and sent back to itself. This makes a device both an exporter and a collector. If the profile is configured with the same listening and sending ports, the packets will be sent back and forth continuously.

Q) How do I change the root password on the Replicator?

A) Log into the Replicator as the root user and issue the `passwd` command.

Q) How do I change the admin password on the Replicator?

A) Log into the Replicator as the root user and use the interactive mode `password webui` command.

Q) How do I change the hostname and IP address of the Replicator?

A) There are two options to change the hostname and IP address. Log in as the root user and run the `/home/replicator/conf/sethostname.sh` command. Alternatively, log in as the replicator user and issue the interactive mode `system change` command.

For more details on the new features below, reference the [Plixer website](#) and Replicator documentation.

KEY: ACTION: (Bug Ticket Number) description

Ex. ADDED: (1640) Thresholds based on outbound traffic

## 11.1 Change log history

---

### 11.1.1 Version 18.14.1 - 1/28/2020

#### **New Features**

Updated the EULA

New skin on Replicator UI

#### **Bug Fixes**

(Bug 931) Fixed a potential issue when setting up High Availability pairs

(Bug 1739) Replicator's vitals processes can no longer enter a bad state which could cause it to hang indefinitely

(Bug 1771) Replicator excludes collectors from being exporters in profiles with the same destination port the collector is already receiving on

(Bug 1891) Exporters will now be added to profiles correctly regardless of the time of the matching policy's creation

(Bug 2007) Very high volume Replicators can no longer crash due to a database integer overflow

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### **11.1.2 Version 18.12.14 - 1/25/2019**

#### **Updates**

Future Replicator releases will no longer support CentOS 6

#### **Bug Fixes**

(Bug 410) Replication no longer starts and restarts spontaneously

(Bug 428) Replicator can no longer attempt to sync with its own database

(Bug 436) 'system change' command now works on all configurations

(Bug 611) Replicator stats are now more reliable

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### **11.1.3 Version 18.5 - 5/31/2018**

(Bug 25633) Updated the EULA

(Bug 25257) The show config output now has quotes around profile names

(Bug 25292) Fixed an issue where Apache fails to start if SSL enabled/setup either from install script or enable\_SSL.sh

(Bug 25653) Updated Licensing checks

(Bug 25770) Fixed an issue where an install script pointed to a previous version

(Bug 25828) Added the new online manual from docs.plixer.com

(Bug 25832) Fixed an issue where policy remove profile include/exclude gives internal error (500) but still removes profile

(Bug 26000) Fixed an issue where the refresh countdown timer would default to 1 day

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### **11.1.4 Version 18.1 - 1/30/2018**

#### **New Features**

LDAP authentication support

Profiles displayed in alphabetical order

Replicator install and upgrade logs

Backup Process from the CLI

Ability to make API calls via HTTPS

Support for upper case letters and spaces in profile names

Ability to restrict snoop command by port

Current Replicator version displayed under the Status LED

Postgres replicator database support

#### **Bug Fixes**



- (Bug 22918) Improved performance and responsiveness of the Web Interface
  - (Bug 23820) Replicator now replicates SNMP traps on low port numbers
  - (Bug 23824) Exporters no longer false alarm at start up
  - (Bug 23828) Exporters, no longer sending, and not in profiles no longer show up as 'exporters not in profiles' indefinitely
  - (Bug 23904) Search filters are no longer lost on page refresh
  - (Bug 23977) Fixed issue that could cause phantom collector alarms
  - (Bug 24299) Upgrades no longer reset the Web Interface password
- 

### 11.1.5 Version 17.6 - 7/14/2017

#### New Features

Web interface updates  
Fully supported and documented API  
Ability to receive packets from multiple interfaces  
Profile singularity

#### Bug Fixes

- (Bug 19835) Licensing says expired one day before expiration date
- (Bug 19396) ICMP drops have been added to iptables
- (Bug 19285) semicolon at end of command yields unexpected results
- (Bug 20848) Removing a policy doesn't remove the associated exporters
- (Bug 21086) Replicator falsely reporting more packets inbound then out

### 11.1.6 Version 16.9 - 10/3/2016

#### New Features

New web interface  
Fully supported and documented API  
Ability to receive packets from multiple interfaces  
Profile singularity

#### Bug Fixes

- (Bug 19835) Licensing says expired one day before expiration date
- (Bug 19396) ICMP drops have been added to iptables
- (Bug 19285) semicolon at end of command yields unexpected results

(Bug 20848) Removing a policy doesn't remove the associated exporters  
(Bug 21086) Replicator falsely reporting more packets inbound then out

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## Third party software attributions

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### 12.1 Licenses directory

Required License Documentation can be found under the */home/replicator/files/licenses* directory.

### 12.2 Third party attributions

The open source or other third-party software components listed below are integrated and/or redistributed Replicator software. The licenses are reproduced here in accordance with their licensing terms. These terms only apply to the libraries themselves, not Replicator software.

#### 12.2.1 Backbone.js

<https://github.com/jashkenas/backbone/blob/master/LICENSE> Copyright (c) 2010-2017 Jeremy Ashkenas, DocumentCloud Licensed under the MIT License – see Licenses Directory

#### 12.2.2 C3.js

<https://github.com/c3js/c3/blob/master/LICENSE> Copyright (c) 2013 Masayuki Tanaka Licensed under the MIT License – see Licenses Directory

#### 12.2.3 D3.js

<https://github.com/d3/d3/blob/master/LICENSE> Copyright (c) 2010-2014 2010-2017 Mike Bostoc Licensed under the BSD 3-clause License – see Licenses Directory

### 12.2.4 Hogan.js

<https://github.com/twitter/hogan.js/blob/master/LICENSE> Copyright (c) 2011 Twitter, Inc. Licensed under the Apache License 2.0 – see Licenses Directory

### 12.2.5 JQuery

<https://jquery.org/license/> Copyright jQuery Foundation and other contributors, <https://jquery.org> This software consists of voluntary contributions made by many individuals. For exact contribution history, see the revision history available at <https://github.com/jquery/jquery> Licensed under the MIT License – see Licenses Directory

### 12.2.6 JQuery.floatThread.js

<https://github.com/mkoryak/floatThead/blob/master/LICENSE> Copyright (c) 2012-2017 Misha Koryak Licensed under the MIT License – see Licenses Directory

### 12.2.7 jsSHA

<https://github.com/Caligatio/jsSHA/blob/master/LICENSE> Copyright (c) 2008-2017 Brian Turek Licensed under the BSD 3-clause License – see Licenses Directory

### 12.2.8 JustGage

<https://github.com/toorshia/justgage/blob/master/LICENSE> Copyright (c) 2012-2015 Bojan Djuricic Licensed under the MIT License – see Licenses Directory

### 12.2.9 Raphaël

<https://github.com/DmitryBaranovskiy/raphael/blob/master/license.txt> Copyright © 2008-2013 Dmitry Baranovskiy, Sencha Labs Licensed under the MIT License – see Licenses Directory

### 12.2.10 UDP Sampilicator

<https://github.com/sleinen/sampilicator/blob/master/COPYING> Copyright (c) 2000-2015 Simon Leinen Licensed under the GNU GPL 2.0 – see Licenses Directory

### 12.2.11 Underscore.js

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