Protecting Your Digital Assets™

CRU® WiebeTech® Ditto® Shark

User Manual

Features

- Standalone product—operates without a PC or a Ditto Forensic FieldStation
- Captures Internet and VOIP traffic with virtually no packet loss*
- Captures sustained 10/100 Mbps network traffic and short burst gigabit network traffic*
- Filter and capture network traffic to a tcpdump/Wireshark-compatible PCAP file
- Optional live capture stream (rpcap) interface for Wireshark
- Removable drive carrier for data storage
- Fail-safe design continues passing through network traffic if power is lost
- Free firmware updates for registered users

*Packet loss is a function of the type and saturation level of traffic on the tapped network

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 PACKAGE CONTENTS

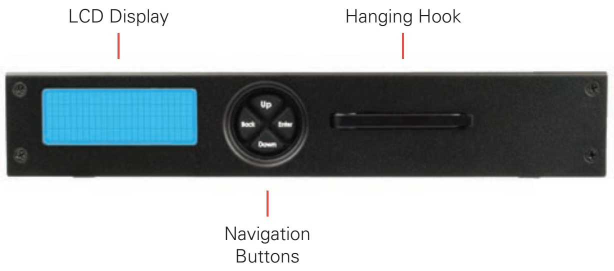
The following list contains the items that are included in the complete configuration for this device. Please contact CRU if any items are missing or damaged:

Item	Quantity
Ditto Shark	1
40W 12V AC adapter	1
Power cord	1
Unitized SATA-to-eSATA + Mini-Fit power cable	2
Ethernet cable (RJ45)	2
4GB SD card (pre-installed)	1
User Manual	1

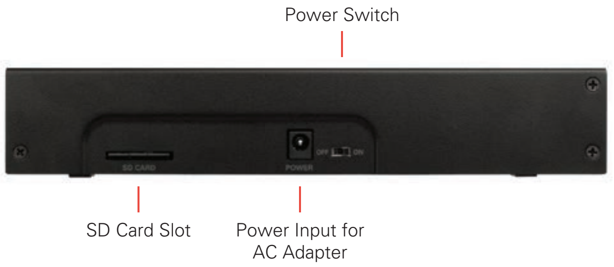
1.2 IDENTIFYING PARTS

Take a moment to familiarize yourself with the parts of the product. This will help you to better understand the following instructions.

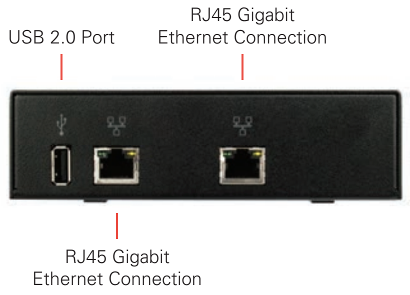
FRONT PANEL



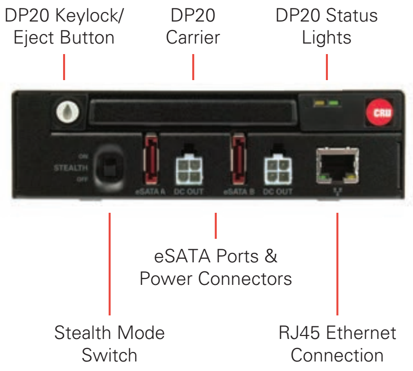
REAR OF THE UNIT



NETTAP INTERFACE


USB 2.0 Port
RJ45 Gigabit Ethernet Connection
RJ45 Gigabit Ethernet Connection

DESTINATION INTERFACE



1.3 LED BEHAVIOR

LED	COLOR	STATE	DESCRIPTION
DP20 Power	Green	Solid	The DP20 is powered on.
DP20 Drive Activity	Amber	Solid or Blinking	The drive inside the DP20 is being accessed.

1.4 THERMAL COOLING

The Ditto Shark is a passively cooled system that pulls heat out of the processor and other electronics into the all-metal housing where it dissipates. The heat generated by the Ditto Shark is an intended design feature that eliminates the need of a noisy internal cooling fan and drastically reduces the amount of particulates that are pulled through the system.

1.5 HOW TO USE THE DITTO SHARK

The **Rear Interface** side of the Ditto Shark has a power switch, a 12V input for the included power supply and an SD card slot from which to store configuration data.

Use the **NetTap Interface** side of the Ditto Shark to insert the Ditto Shark in between the target computer and the network it is connected to. The available connections include two RJ45 gigabit Ethernet ports and a USB 2.0 port for use with USB storage devices, a keyboard, or a wifi adapter. Both RJ45 ports are direction agnostic, so it doesn't matter which port is used to connect to the network and which is used to connect to the target computer.

Use the **Destination Interface** side of the Ditto Shark to store acquired data. The destination output connections include a CRU DataPort DP20 and two eSATA ports for SATA disks or eSATA devices. It also includes an RJ45 gigabit Ethernet port to allow network access to the Ditto Shark's Browser Interface (see Section 3) and a stealth switch that will turn off all external lights and enable nightvision display via Stealth Mode (see Section 10).

NOTE CRU recommends that you switch the power off to the Ditto Shark when you add or remove a device from it in order to avoid disk damage and data corruption.

2 SETUP

a. Leave the Ditto Shark disconnected from the network until you have configured it properly using the steps below.

b. Connect the power cable to the rear of the Ditto Shark and turn the Ditto Shark on with the power switch located on the rear of the unit.

c. Press the **Down** navigation button on the Ditto Shark until you reach the "Settings" menu (see Figure 1) on the Front Panel. Then press **Enter** to view the Settings.

d. Press **Up** or **Down** until you reach the "Dst Network Settings" screen shown in Figure 2 and press **Enter**.

e. Press **Up** or **Down** until you reach the "Dst Network" screen shown in Figure 3.

f. If the text on the second line says "Disabled", press the **Enter** button to edit the setting. Press **Up** once and then **Enter** to commit the change. If the text says "Enabled", continue to the next step.

g. Press **Up** or **Down** until you reach the "Dst Network Mode" screen shown in Figure 4 and then press **Enter** to edit the setting.

h. The Ditto Shark has three connection modes. Press **Up** or Down to choose which way you would like to use the Ditto Shark and press **Enter** to select it.

- **Client (DHCP):** The Ditto Shark acts as a client on the network and automatically detects network parameters (e.g. IP address, gateway, etc.) from a DHCP server on the network. DHCP is the protocol used by most network environments today. Unless your network administrator directs otherwise, you should probably use this mode.

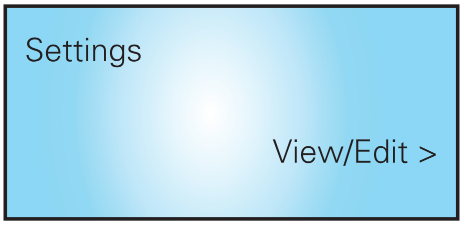


Figure 1. A depiction of the "Settings" menu on the Ditto Shark.

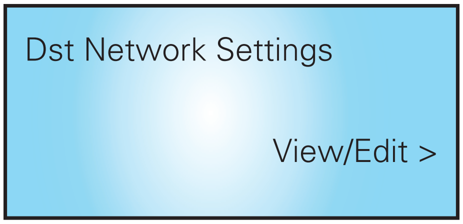


Figure 2. A depiction of the "Dst Network Settings" screen on the Ditto Shark.

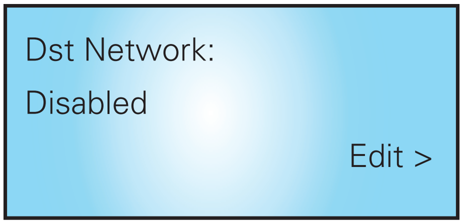


Figure 3. A depiction of the "Dst Network" screen on the Ditto Shark.

- **Client (Static IP):** The Ditto Shark acts as a client on the network and you manually input all network parameters (e.g. IP address gateway, etc.).
- **Server:** The Ditto Shark acts as the master DHCP server on the network and you manually input all network parameters. The server mode is also used to directly connect Ditto Shark to a computer.

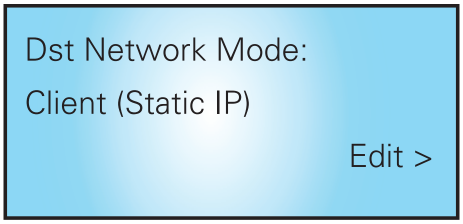

Dst Network Mode:
Client (Static IP)
Edit >

Figure 4. A depiction of the "Dst Network Mode" screen on the Ditto Shark.

STOP! After your first-time setup, **always** ensure that the Ditto Shark is properly configured to use the proper connection mode before you connect your Ditto Shark to a different computer or network. An improperly configured Ditto Shark can cause networking conflicts on the host network.

NOTE The Ditto Shark is configured by default to use "Network Client (DHCP)" mode so that it will not conflict with the most common types of networks.

i. If you selected **Client (Static IP)** or **Server**, then follow additional steps in Section 2.1 below.

If you selected **Client (DHCP)**, you are ready to start using the Ditto Shark. You may access its settings via the Browser Interface (see Sections 3-8) or via the Front Panel (see Section 9).

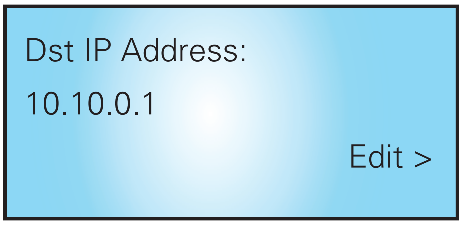

Dst IP Address:
10.10.0.1
Edit >

Figure 5. A depiction of the "Dst IP Address" screen on the Ditto Shark.

2.1 ADDITIONAL STEPS FOR "CLIENT (STATIC IP)" AND "SERVER"

a. Press **Up** or **Down** until you reach the "Dst IP Address" screen shown in Figure 5.

b. Press **Enter** to edit the IP address. You can use a keyboard that you've attached to the USB 2.0 port on the "NetTap Interface" side of the Ditto Shark to enter the static IP address your network administrator gave you.

If you do not have a keyboard, press **Back** and **Enter** to scroll the cursor right and left, and press **Up** or **Down** to increase or decrease the number highlighted by the cursor.

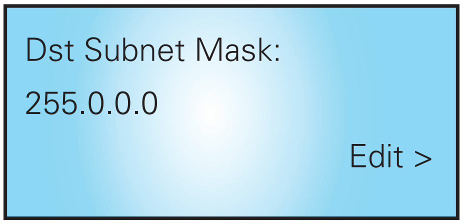

Dst Subnet Mask:
255.0.0.0
Edit >

Figure 6. A depiction of the "Dst IP Address" screen on the Ditto Shark.

c. When you have finished, press **Enter** until the cursor has moved all the way to the right, and then press **Enter** once more to commit the changes.

d. Press **Up** or **Down** until you reach the "Dst Subnet Mask" screen shown in Figure 6 and press **Enter** to edit the subnet mask.

e. Use the keys on the Front Panel or your USB keyboard to enter the subnet mask your network administrator gave you. If your administrator did not give you a subnet mask, the default setting will usually suffice.

f. When you have finished, press **Enter** until the cursor has moved all the way to the right, and then press **Enter** once more to commit the changes.

NOTE Additional network parameters can be input using the Browser Interface's Configure screen (see Section 5.2)

You are ready to start using the Ditto Shark. You may access its settings via the Browser Interface (see Section 3) or via the Front Panel (see Section 9).

3 BROWSER INTERFACE

The Ditto Shark can be configured and operated either from the Front Panel (see Section 9) or through a web browser.

3.1 ACCESSING THE BROWSER INTERFACE

a. Using the Front Panel, navigate to “Dst Network Settings” → “Dst IP Address”.

b. Type the IP address shown into your web browser.

c. Log into the Browser Interface (the default user name and password for the administrator account are both “admin”).

NOTE CRU recommends that you change the admin account password and create user accounts for individual users as best data management practices.

You are now ready to use the Browser Interface to configure settings and preview, image, or clone attached disks.

3.2 ICONS USED IN THE BROWSER INTERFACE

The Browser Interface uses several icons that may be clicked on to perform certain actions.

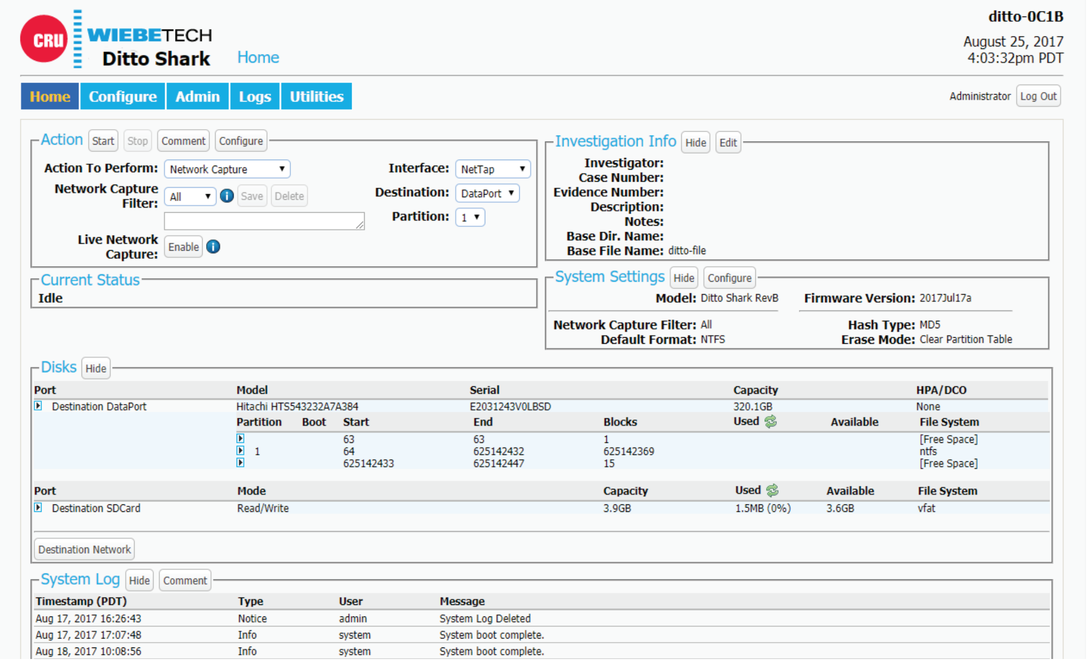
ICON	ACTION
ⓘ Information	Opens a window with a brief description of the setting that the information icon appears next to.
🔄 Refresh	Refreshes the field that the icon appears next to in order to give updated information.
↶ Reset	Loads the defaults for the setting that the Refresh icon appears next to.
➕ Add	Adds a user defined field to a list of items.
➖ Remove	Removes a user defined field from a list of items.

3.3 USER ACCOUNTS

The Ditto Shark employs a user account system to control access to its features. The “Login” screen presents you with the ability to log in through http, or you can click the **Secure Login (HTTPS)** link to log in securely. Accept the certificate and/or continue to the website, even if your browser tells you it does not recognize it.

The default user name and password for the Administrator account are both “**admin**”. CRU recommends that you change the admin account password and create user accounts for individual users as best data management practices.

Click on the **Log Out button** at the top right of the Browser Interface to log out.



ditto-0C1B
August 25, 2017
4:03:32pm PDT

Action

Action To Perform: Network Capture
Network Capture Filter: All
Live Network Capture:
Interface: NetTap
Destination: DataPort
Partition: 1

Investigation Info

Investigator:
Case Number:
Evidence Number:
Description:
Notes:
Base Dir. Name:
Base File Name: ditto-file

Current Status

Idle

System Settings

Model: Ditto Shark RevB
Firmware Version: 2017Jul17a
Network Capture Filter: All
Default Format: NTFS
Hash Type: MD5
Erase Mode: Clear Partition Table

Disks

Port	Model	Serial	Capacity	HPA/DCO
Destination DataPort	Hitachi HTS543232A7A384	E2031243V0LBSD	320.1GB	None

Partition	Boot	Start	End	Blocks	Used	Available	File System
		63	63	1			[Free Space]
1		64	625142432	625142369			ntfs
		625142433	625142447	15			[Free Space]

Port	Mode	Capacity	Used	Available	File System
Destination SDCard	Read/Write	3.9GB	1.5MB (0%)	3.6GB	vfat

System Log

Timestamp (PDT)	Type	User	Message
Aug 17, 2017 16:26:43	Notice	admin	System Log Deleted
Aug 17, 2017 17:07:48	Info	system	System boot complete.
Aug 18, 2017 10:08:56	Info	system	System boot complete.

Figure 7. The “Home” screen.

4 HOME SCREEN

The “Home” screen is where you will perform most of your operations with the Ditto Shark, and is the default screen to load upon logging into the Browser Interface. Click on the **Home tab** to access the “Home” screen from any other area of the Browser Interface.

4.1 ACTION

The “Action” panel lets you start, abort, and document the following actions. The “Start” button begins the action. The “Abort” button stops the action in progress. Click the **Comment button** to write a note that will be appended to the log. Click the **Configure button** to modify the default settings for each action, which can also be modified on the “Configure” screen (See Section 5).

4.1.1 Network Capture

The Ditto Shark provides two methods of capturing network traffic that can be combined and used simultaneously if you wish. The first method captures network traffic and stores it in a series of incremented PCAP files on the local target destination. The second method captures network traffic in real-time and outputs it to a remote monitor that uses a third-party Wireshark network protocol analyzer. Instructions for both methods as well as instructions for using them simultaneously can be found below.

PCAP Network Capture

a. Using the Browser Interface, select **Network Capture** from the “Action to Perform” drop-down box.

b. Select the network capture filter from the “Network Capture Filter” drop-down box or type in the ports you wish to capture in the text box directly below that using the syntax “port ## or ##” without quotes (e.g. port 80 or 81 or 443).

c. Select “NetTap” from the “Interface” drop-down box.

d. Select the media from the “Destination” drop-down box that you want Ditto Shark to save your captured data.

e. Select the partition on the destination media you want to capture to from the “Partition” drop-down box.

f. Bypass “Live Network Capture” and leave it disabled.

g. Click the **Start button** to begin capturing network data. When you are finished, click the **Stop button**.

You can view the log of the network capture action by scrolling down to the “System Log” panel on the “Home” screen. Find and click on the latest link, which will be denoted by a filename with a date/timestamp format: “S_yyyymmddhhmmss”. Alternatively, you can click on the **Logs button** from the top menu bar.

You can view the data retrieved from the network capture action by examining the destination media, which will contain a folder named with the same data/timestamp format: “S_yyyymmd-dhhmmss”. This folder includes the PCAP files containing the captured data, an XML file containing the log information of the network capture, and—if hashing is enabled—a TXT file that contains each of the generated PCAP files’ MD5 or SHA-1 hash value (see Section 5.1.2 to enable hashing).

Live Network Capture

a. Using the Browser Interface, select **Network Capture** from the “Action to Perform” drop-down box.

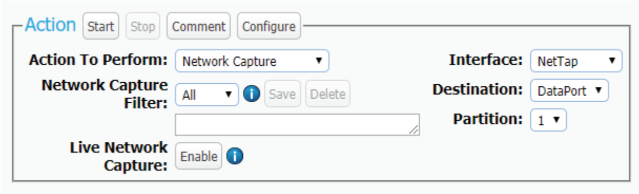
b. Select the network capture filter from the “Network Capture Filter” drop-down box or type in the ports you wish to capture in the text box directly below that using the syntax “port ## or ##” without quotes (e.g. port 80 or 81 or 443)

c. Disregard the “Interface” and “Destination” drop-down boxes.

d. Ensure your third party Wireshark network protocol analyzer is standing by to receive data. If you need help in configuring Wireshark itself, click the ⓘ **Information icon** next to “Live Network Capture” for a link to Wireshark’s remote capture documentation.

e. Click the **Enable button** next to “Live Network Capture” to turn live network capture on. When you are finished capturing network traffic, click the **Disable button**.

STOP! Do **NOT** click the Start button! This button actually enables the PCAP network capture function that captures network traffic to your local destination media. It does **NOT** enable live network capture.



Action To Perform: Network Capture
Network Capture Filter: All
Live Network Capture: Enable
Interface: NetTap
Destination: DataPort
Partition: 1

Figure 8. The “Action” section on the “Home” screen, showing the options available for the “Network Capture” action.

Simultaneous PCAP and Live Network Capture

a. Using the Browser Interface, select **Network Capture** from the “Action to Perform” drop-down box.

b. Select the network capture filter from the “Network Capture Filter” drop-down box or type in the ports you wish to capture in the text box directly below that using the syntax “port ## or ##” without quotes (e.g. port 80 or 81 or 443).

c. Select “NetTap” from the “Interface” drop-down box.

d. Select the local media from the “Destination” drop-down box that you want Ditto Shark to save your captured data to as a series of incremented PCAP files.

e. Select the partition on the local destination media you want to capture to from the “Partition” drop-down box.

f. Ensure your third party Wireshark network protocol analyzer is standing by to receive data. If you need help in configuring Wireshark itself, click the ⓘ **Information icon** next to “Live Network Capture” for a link to Wireshark’s remote capture documentation.

g. Click the **Enable button** next to “Live Network Capture” to turn live network capture on. When you are finished capturing network traffic, click the **Disable button**.

h. Click the **Start button** to begin capturing network data to your local destination media. When you are finished, click the **Stop button**.

You can view the log of the PCAP network capture action by scrolling down to the “System Log” panel on the “Home” screen. Find and click on the latest link, which will be denoted by a filename with a date/timestamp format: “S_yyyymmddhhmmss”. Alternatively, you can click on the **Logs button** from the top menu bar.

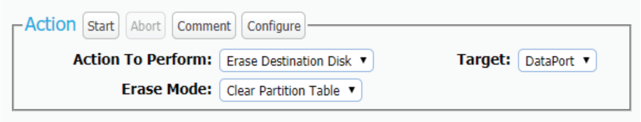
You can view the data retrieved from the PCAP network capture action by examining the destination media, which will contain a folder named with the same data/timestamp format: “S_yyyymmddhhmmss”. This folder includes the PCAP files containing the captured data, an XML file containing the log information of the network capture, and—if hashing is enabled—a TXT file that contains each of the generated PCAP files’ MD5 or SHA-1 hash value (see Section 5.1.2 to enable hashing).

4.1.2 Erase Destination Disk

The Ditto Shark erases your preferred destination media. The available Erase Modes are Clear Partition Table and Quick Erase.

To erase a disk, follow these steps:

a. Select **Erase Destination Disk** from the “Action to Perform” drop-down box.



Action To Perform: Erase Destination Disk ▾

Erase Mode: Clear Partition Table ▾

Target: DataPort ▾

Figure 10. The “Action” section on the “Home” screen, showing the options available for the “Erase Destination Disk” action.

b. Select the Erase Mode to use from the “Erase Mode” drop-down box. (You can modify which erase mode appears by default in the drop-down box on the “Configure” screen’s “System” tab. See Section 5.1.)

c. Select the target destination media from the “Target” drop-down box.

d. Click the **Start button**. A “Completed” message box will pop up when the action has finished. Click on the message to continue.

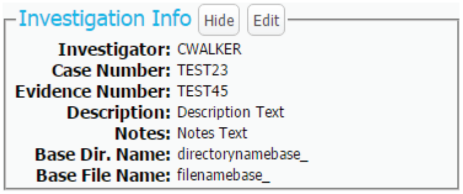
You can view the results of the erasure action by scrolling down to the “System Log” panel on the “Home” screen. Find and click on the latest link, which will be denoted by a filename with a date/timestamp format: “S_yyyymmddhhmmss”. Alternatively, you can click on the **Logs button** from the top menu bar.

Format After Erase

You can configure the Ditto Shark to automatically format a disk after you erase it. Make sure that **Erase Destination Disk** is selected from the “Action to Perform” drop-down box. Then click on the **Configure button**. Make sure that “Format After Erase” is checked for each of the erase modes on which you’d like to enable this setting. Finally, click **OK**.

4.2 INVESTIGATION INFO

The Investigation Info panel groups related information that may also be used in creating custom directories and file names (see Section 5.9). The “Hide” button allows you to minimize the panel.



Investigator: CWALKER
Case Number: TEST23
Evidence Number: TEST45
Description: Description Text
Notes: Notes Text
Base Dir. Name: directorynamebase_
Base File Name: filenamebase_

Figure 9. The “Investigation Info” section.

Click the **Edit button** to enter information about the Investigator, Case Number, Evidence Number, Description, Notes, Base directory prefix, and a Base filename prefix for a PCAP file.

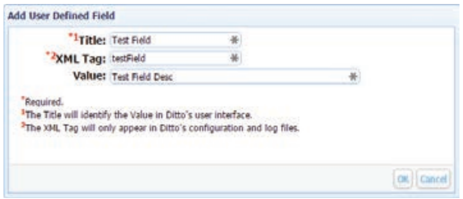
Each field is filtered to block non-printable ASCII characters. Any characters at the file system level that may not be safe for a directory name or file name will be filtered out and replaced with an underscore. Only printable ASCII characters are currently allowed for directory and filenames. Multiple underscores will also be reduced to a single underscore per naming item.

The Ditto Shark will generate an error message if you enter a non-printable ASCII character or if your message exceeds the 58 character limit. Additionally, when the final directory or filename that uses any of these fields is created, another level of filtering is applied.

STOP! Using apostrophes (‘) in the name fields will cause an error when the file or folder name is created. They should not be used in the Investigation Info fields.

4.2.1 User Defined Fields

Click on the **green plus sign icon** to open the “Add User Defined Field” window (see Figure 11). You may add as many user defined fields as you wish. Each user defined field must have a title, XML tag, and value.



*[1]Title: Test Field
*[2]XML Tag: testField
Value: Test Field Desc

*Required.
[1]The Title will identify the Value in Ditto’s user interface.
[2]The XML Tag will only appear in Ditto’s configuration and log files.

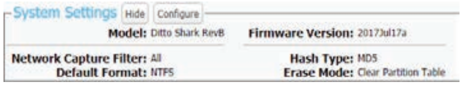
Figure 11. The “Add User Defined Field” window.

The title identifies the value in the Ditto Shark's browser and LCD interfaces, and the XML tag only appears in the configuration and log files.

To remove a user defined field, click on the **green minus sign icon**.

4.3 SYSTEM SETTINGS

Displays the most commonly used configuration settings of the Ditto Shark. These settings are loaded as the default settings for the actions you perform in the "Action" panel. The "Hide" button allows you to minimize the panel. Click the **Configure button** to customize these settings as well as additional advanced settings. See Section 5.1 for details on each option.

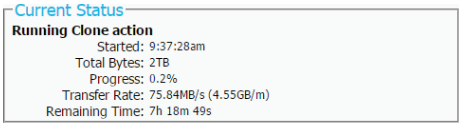


Model: Ditto Shark RevB
Firmware Version: 2017Jul17a
Network Capture Filter: All
Default Format: NTFS
Hash Type: MD5
Erase Mode: Clear Partition Table

Figure 12. The "System Settings" section.

4.4 CURRENT STATUS

Reports either as "Idle" or displays info about the action that the Ditto Shark is currently performing.

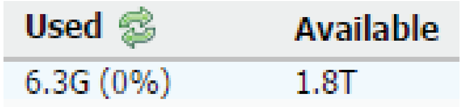


Running Clone action
Started: 9:37:28am
Total Bytes: 2TB
Progress: 0.2%
Transfer Rate: 75.84MB/s (4.55GB/m)
Remaining Time: 7h 18m 49s

Figure 13. The "Current Status" section, displaying a the status of a Physical Image action.

4.5 DISKS

Displays information about the attached media that are currently connected to the Ditto Shark. The "Hide" button allows you to minimize the panel. To see the available space a disk has, click the **green double arrow icon** next in the "Used" column header (see Figure 14). The disk usage will refresh and give an updated amount.



Used	Available
6.3G (0%)	1.8T

Figure 14. Clicking the green double arrow icon displays and updates amount of space currently used and available.

The "Destination Network" button allows you to mount an iSCSI, NFS, or SMB share to the Ditto Shark so that you can capture network data to it. For more information, see Section 11.

4.5.1 View Hexidecimal Data

To view a disk's hexidecimal data, click on the disk name under the "Port" column and then select **HexView.** To view a disk partition's hexidecimal data, click on the partition's number under the disk's "Partition" column and then select **HexView** (see Figure 15).

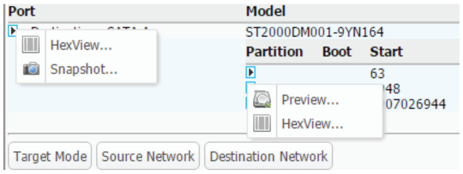
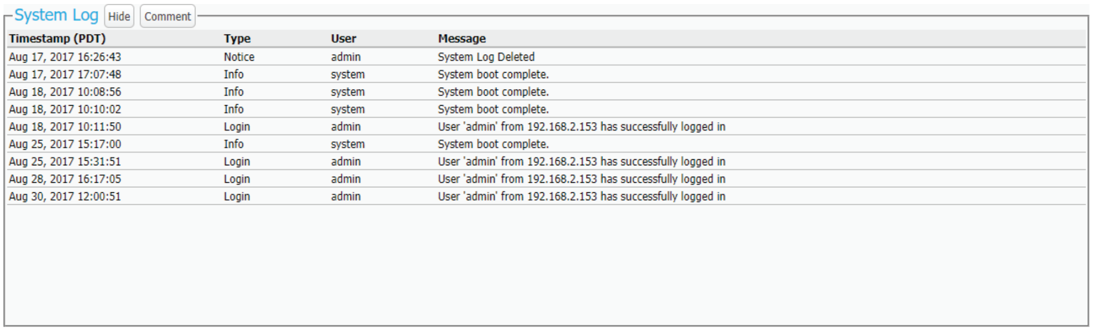


Figure 15. Drop-down menus for a disk (left) and a disk's partition (right).

4.5.2 View Snapshot Data

To view a disk's snapshot information, click on the disk name under the "Port" column and then select **Snapshot**.



Timestamp (PDT)	Type	User	Message
Aug 17, 2017 16:26:43	Notice	admin	System Log Deleted
Aug 17, 2017 17:07:48	Info	system	System boot complete.
Aug 18, 2017 10:08:56	Info	system	System boot complete.
Aug 18, 2017 10:10:02	Info	system	System boot complete.
Aug 18, 2017 10:11:50	Login	admin	User 'admin' from 192.168.2.153 has successfully logged in
Aug 25, 2017 15:17:00	Info	system	System boot complete.
Aug 25, 2017 15:31:51	Login	admin	User 'admin' from 192.168.2.153 has successfully logged in
Aug 28, 2017 16:17:05	Login	admin	User 'admin' from 192.168.2.153 has successfully logged in
Aug 30, 2017 12:00:51	Login	admin	User 'admin' from 192.168.2.153 has successfully logged in

Figure 16. The "System Logs" section on the "Home" screen.

4.6 SYSTEM LOG

Shows the actions that the Ditto Shark has performed (see Figure 16). The “Hide” button allows you to minimize the panel. The “Comment” button allows you to write a note that is appended to the System log.

If there is no SD card present in the SD card slot, this panel displays the logs that have been stored in volatile memory since the Ditto Shark’s last power cycle. These logs are deleted when the Ditto Shark is powered down. If there is an SD card present, this panel displays all actions saved on the SD Card.

To view the log details of a particular action, click on the link under the “Message” column. which will be denoted by a filename with a date/timestamp format: “S_yyyymmddhhmmss”. Alternatively, you can click on the **Logs button** from the top menu bar.

5 CONFIGURE SCREEN

The “Configure” screen allows you to modify the way the Ditto Shark functions to suit your specific needs. Click on the **Configure tab** to access the “Configure” screen from the Browser Interface.

5.1 SYSTEM

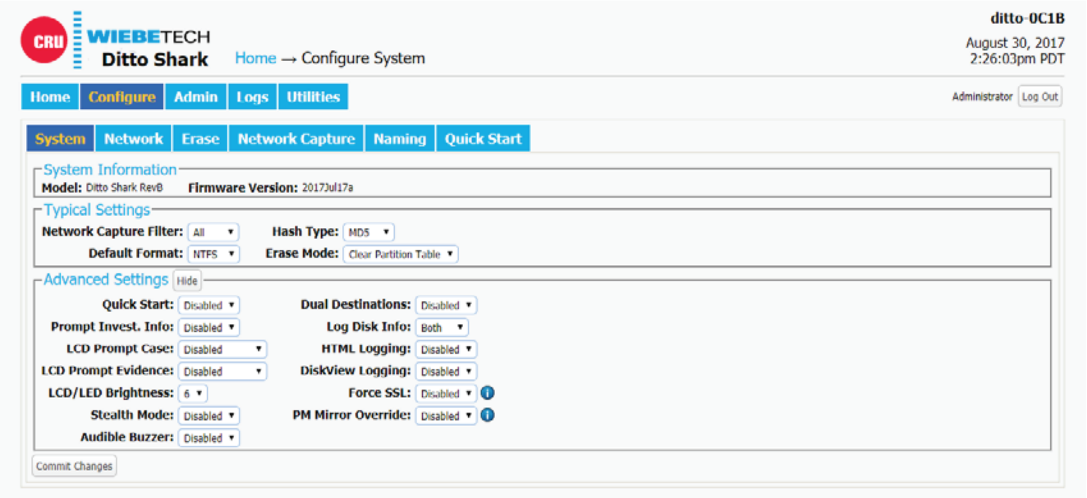
The “System” tab allows you to view and customize the following settings. This information is also displayed in the “System Settings” panel on the “Home” screen. When you are finished, click the **Commit Changes** button to save the changes.

5.1.1 System Information

The “System Information” section displays the Ditto Shark’s model name and current firmware version.

5.1.2 Typical Settings

- **Network Capture Filter:** Sets the default network capture filter for the “Network Capture” action. The available filters are All, HTTP, E-Mail, SSH, or any available custom filter that you have saved onto the currently installed SD card. To create your own custom filter, see Section 11.3.



ditto-0C1B
August 30, 2017
2:26:03pm PDT

System Information
Model: Ditto Shark RevB Firmware Version: 2017Jul17a

Typical Settings
Network Capture Filter: All
Hash Type: MD5
Default Format: NTFS
Erase Mode: Clear Partition Table

Advanced Settings
Quick Start: Disabled
Dual Destinations: Disabled
Prompt Invest. Info: Disabled
Log Disk Info: Both
LCD Prompt Case: Disabled
HTML Logging: Disabled
LCD Prompt Evidence: Disabled
DiskView Logging: Disabled
LCD/LED Brightness: 6
Force SSL: Disabled
Stealth Mode: Disabled
PM Mirror Override: Disabled
Audible Buzzer: Disabled

Figure 17. The “Configure” screen, showing the “System” tab.

- **Default Format:** Sets the default format for the "Erase Destination Disk" action. The available format types are ext2, ext3, ext4, XFS, HFS+, FAT32, and NTFS.
- **Hash Type:** Sets the default hash algorithm that will be used for PCAP file verification. The available algorithms are None, MD5, and SHA-1.
- **Erase Mode:** Sets the default erase mode for the "Erase Destination Disk" action. The available options are Clear Partition Table and Quick Erase.

5.1.3 Advanced Settings

- **Quick Start:** Enables the "Quick Start" screen on the LCD that appears after you boot or reboot the Ditto Shark. The settings for this mode may be modified in the "Quick Start" tab on the "Configure" Screen. See Section 5.6.
- **Prompt Invest. Info:** Opens a "Configure Investigation Info" window after the user has hit the "Start" button in the "Action" panel on the "Home" screen. This allows the user to customize the Investigator, Case Number, Evidence Number, Description, Notes, Base Directory Name, and the Base File Name information prior to performing the requested action.
- **LCD Prompt Case:** Four options may be chosen to modify the case number specified in the "Investigation Info" section of the "Home" screen. The case number is included in the log for the requested action. "Disabled" leaves the case number as it is. "Inc/Dec" allows you to manually increment the case number up or down using the navigation buttons on the face of the Ditto Shark. "AutoInc" automatically increments the case number, and "AutoInc/Pause" automatically increments the case number, but displays a confirmation prompt the LCD screen before beginning the requested action. These options require a number to be present on the end of the Case Number specified in the "Investigation Info" section.
- **LCD Prompt Evidence:** Four options may be chosen to modify the evidence number specified in the "Investigation Info" section of the "Home" screen. The evidence number is included in the log for the requested action. "Disabled" leaves the evidence number as it is. "Inc/Dec" allows you to manually increment the evidence number up or down using the navigation buttons on the face of the Ditto Shark. "AutoInc" automatically increments the evidence number, and "AutoInc/Pause" automatically increments the evidence number, but displays a confirmation prompt the LCD screen before beginning the requested action. These options require a number to be present on the end of the Evidence Number specified in the "Investigation Info" section.
- **LCD/LED Brightness:** Sets the relative brightness of the LCDs and LEDs on the face of the Ditto Shark on a scale of 0 to 6. Setting a value of "0" will turn off all LCDs and LEDs on the unit.
- **Stealth Mode:** Turns off all LEDs and LCDs on the Ditto Shark. The physical "Stealth Mode" Switch serves the same purpose (see Section 1.2). If Stealth Mode is enabled from the Browser Interface, the physical switch cannot override it.
- **Audible Buzzer:** Alerts the user to various actions that occur when using the Ditto Shark.
- **Dual Destinations:** Enables software mirroring mode to write the same data to two destinations at the same time.

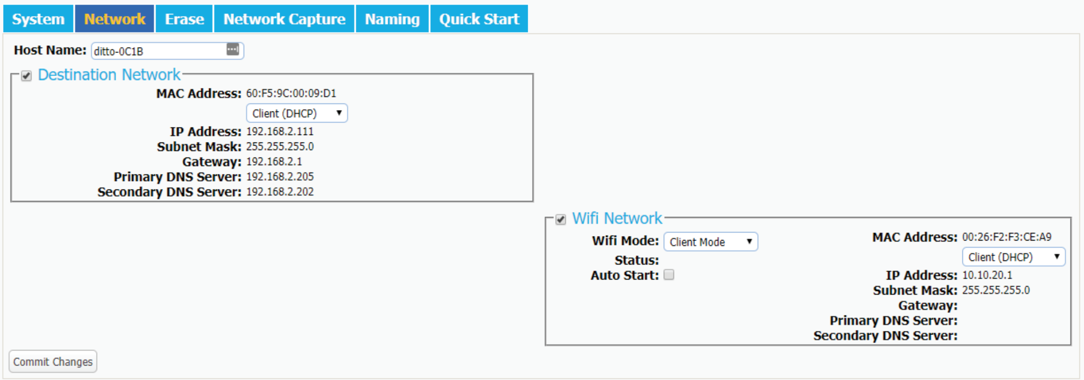
- **Log Disk Info:** Determines whether S.M.A.R.T. and hdparm disk information is logged before running an action, after running an action, both, or not at all. CRU recommends that you log disk information before and after an action.
- **HTML Logging:** Logs are always saved in XML format. This option causes the Ditto Shark to save logs in HTML format as well.
- **DiskView Logging:** Logs any action to preview a disk (i.e. creating a disk snapshot, starting or finishing a HexView action).
- **Force SSL:** When enabled, this setting forces any browser to use HTTPS to access the Ditto Shark Browser Interface.
- **PM Mirror Override**: Overrides the Ditto Shark's check that tells you whether two devices attached to the Ditto Shark can be mirrored. In some cases, attached devices may not appear as mirrorable to the Ditto Shark because of the way their firmware implements RAID or port-multiplication (PM). This option gives you the ability to mirror any two devices you attach regardless of these implementations. However, the attached devices must still be empty, so use the "Erase Destination Disk" action from the "Home" screen if the devices are not empty (see Section 4.1.6) before attempting to mirror them.

5.2 NETWORK

The "Network" tab allows you to view and customize the following settings. If you are unsure or have questions about changing your network settings, contact your network administrator. When you are finished, click the **Commit Changes** button to save the changes.

5.2.1 Host Name

Allows you to change what name for the Ditto Shark will be displayed on a network. Host names are **not** case sensitive, but **must** begin with any letter "A-Z". They can contain the the letters A-Z, numbers 0-9, underscore "_", and dash "-" characters. Host names must also be limited to 64 characters.



Host Name: ditto-0C1B

☑ Destination Network

MAC Address: 60:F5:9C:00:09:D1
Client (DHCP)
IP Address: 192.168.2.111
Subnet Mask: 255.255.255.0
Gateway: 192.168.2.1
Primary DNS Server: 192.168.2.205
Secondary DNS Server: 192.168.2.202

☑ Wifi Network

Wifi Mode: Client Mode
Status:
Auto Start: □

MAC Address: 00:26:F2:F3:CE:A9
Client (DHCP)
IP Address: 10.10.20.1
Subnet Mask: 255.255.255.0
Gateway:
Primary DNS Server:
Secondary DNS Server:

Figure 18. The "Network" tab on the "Configure" screen, showing the "Destination Network" and "Wifi Network" settings. The "Wifi Network" section only appears when a USB wireless network adapter has been plugged in.

5.2.2 Destination Network

The "Destination Network" section displays the destination Ethernet port's MAC Address as well as its network mode. You can enable or disable it using the check box.

To set the network mode, choose either "Server", "Client (DHCP)", or "Client (Static IP)" from the drop-down box.

Server

"Server" allows you to configure the Ditto Shark for use as a server. This can be helpful if you are connecting an iSCSI device to the destination Ethernet port, for example (see Section 11.1.2), or you are connecting Ditto Shark directly to your computer instead of through your office network. The default settings below will work for most environments. This is an advanced option, so do not customize the default server configuration below unless directed to do so by your network administrator.

See the Server settings on the next page.

IP Address: 10.10.10.1
Subnet Mask: 255.255.255.0
DHCP Server: Enabled
DHCP Start Address: 10.10.10.100
DHCP End Address: 10.10.10.199
DNS Server: Enabled
DNS Domain Name: ditto.local
NTP Server: Enabled
NAT Gateway: Disabled

STOP! Do not connect the Ditto Shark to another network while it is configured as a server. Doing so will cause network conflicts and may disrupt network traffic.

Client (DHCP)

This option automatically configures the destination Ethernet port to connect to the attached network.

Client (Static IP)

This option allows you to manually configure the destination Ethernet port to connect to the attached network.

5.2.3 Wifi Network

The "Wifi Network" section allows you to configure a third party USB wifi network adapter that's been plugged into the "NetTap Interface" USB port. You can enable or disable it using the check box.

This section also displays that port's MAC Address. Adapters with an Atheros chipset and some adapters with Realtek chipsets are compatible.

"Wifi Mode" allows you to determine whether the Ditto Shark connects to a wifi network or acts as a wifi hot spot itself. Hot Spot Mode is helpful if you are working in a separate location from the Ditto Shark that is still within range of a wireless network, or if there is no hardwired network available in the location.

Choose “Client Mode” to connect to an existing wifi network or “Hot Spot Mode” to make the Ditto Shark into a wifi hot spot.

Client Mode

Check “Status: Auto Start” if you want the Ditto Shark to connect to the specified wireless network automatically.

To select the client mode’s networking mode, you can choose either “Client (DHCP)” or “Client (Static IP) from the drop-down box underneath the MAC Address. “Client (DHCP)” automatically configures the USB wifi network adapter to connect to a wifi network. “Client (Static IP)” allows you to manually configure the connection.

Hot Spot Mode

Check “Status: Auto Start” if you want the Ditto Shark to begin broadcasting as a hot spot automatically whenever a wifi adapter is plugged in.

The default settings below will work for most environments, with several exceptions.

STOP! Input your own key to ensure that your Ditto Shark remains secure.

STOP! You may be required to conform to your country’s laws and regulations regarding wireless radio frequency usage. Select your two-digit country code from the “Regulatory Domain” drop down list, and the Ditto Shark will limit the frequencies it may broadcast on to only those in the permitted range(s).

STOP! Do not connect the Ditto Shark to a wired network while it is configured as a hot spot. Doing so can cause network conflicts and may disrupt network traffic.

SSID: {Host Name}-wifi

Regulatory Domain: Global

Band: G - 2.4 GHz

Channel: Auto

Broadcast: Checked

Security: WPA2 Personal

Key: ditto123

Show Key: Unchecked

IP Address: 10.10.10.1

Subnet Mask: 255.255.255.0

DHCP Server: Enabled

DHCP Start Address: 10.10.20.100

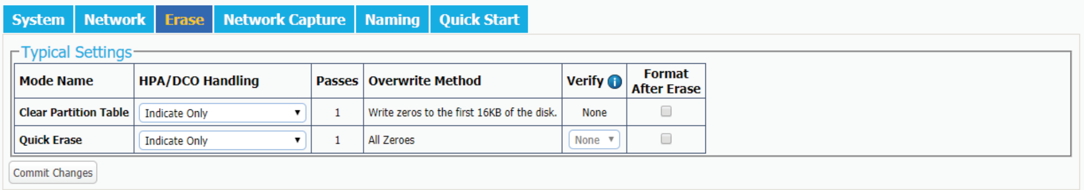
DHCP End Address: 10.10.20.199

DNS Server: Enabled

DNS Domain Name: dittowifi.local

NTP Server: Enabled

NAT Gateway: Disabled



Mode Name	HPA/DCO Handling	Passes	Overwrite Method	Verify	Format After Erase
Clear Partition Table	Indicate Only ▾	1	Write zeros to the first 16KB of the disk.	None	□
Quick Erase	Indicate Only ▾	1	All Zeroes	None ▾	□

Figure 19. The "Erase" tab on the "Configure" screen, showing the available erase modes and their customizable settings.

5.3 ERASE

The Ditto Shark allows you to view and customize settings for how the Ditto Shark erases disks.

5.3.1 Available Erase Modes

ERASE MODE	EXPLANATION
Clear Partition Table	Removes the partition table on the disk.
Quick Erase	Performs a single pass writing all zeroes.

5.3.2 Customizable Settings

Some Erase Modes require several of the following settings to be configured a certain way as part of their standard. In these cases, the settings cannot be modified.

- **HPA/DCO Handling:** Sets how erase actions using the specified erase mode should handle HPAs and DCOs. It can indicate in the log that there is an HPA (host protected area) or DCO (device configuration overlay) present, temporarily bypass the HPA, permanently unhide the HPA, or permanently unhide both the HPA and DCO.
- **Verify:** This is a planned feature that is not currently implemented. The "Verify" drop-down box will allow you to verify the erased disk after it has been fully erased. If "Quick" is selected, the beginning, middle, and end of the disk will be read to ensure that the last pattern was actually written. If "Full" is selected, the entire disk will be read to ensure that the last pattern was actually written. If "None" is selected, no verification will be performed.
- **Format After Erase:** Check this box to format the disk with the default format. The default format can be set in the "System" tab on the "Configure" screen (see Section 5.1).

5.4 NETWORK CAPTURE

The "Network Capture" tab allows you to view and customize the following settings for all network capture actions. When you are finished, click the **Commit Changes** button to save the changes.

5.4.1 Network Capture Settings

- **Image File Count:** Specifies the maximum number of image files that are created on the destination disk. When the number is reached, the Ditto Shark will begin overwriting the oldest file on the disk for each new file that is created. Set this to '0' to fill the disk until it reaches capacity.
- **Image File Segment Size:** Allows you to specify the size in bytes that each image file should be. The minimum size is 1M (megabyte). The maximum size is limited by the target file system. If this field is left blank, the maximum size will be used. When the specified size is reached, a new image file is created. Click the ⓘ **Information icon** for more information.

- **Snap Size:** Allows you to capture up to the specified amount of bytes of each packet of data.
- **Dropped Pkt Log Interval:** Allows you to specify the time interval in minutes of how often the Ditto Shark writes its accumulated dropped packet information to the Action log. Setting this value to ‘0’ disables packet loss reporting.

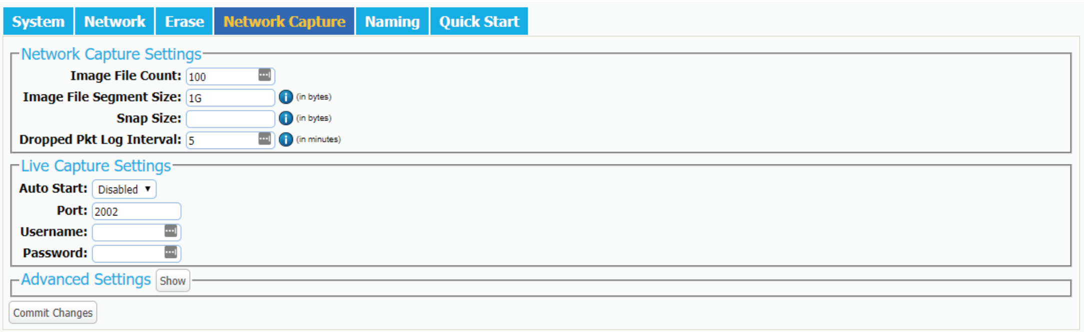
5.4.2 Live Capture Settings

When enabled, this service runs continuously in the background and streams captured data in realtime over the network to a remote monitor using the third-party Wireshark network protocol analyzer. See Section 4.1.1 for more information.

- **Auto Start:** Set this value to ‘Enabled’ to turn on live capture as soon as the Ditto Shark is powered on. Set this value to ‘Disabled’ if you want the user to choose when to start the live capture service in the Browser Interface.
- **Port:** This is the port that the Ditto Shark uses to talk to the third-party network protocol analyzer software. The default port is 2002.
- **Username:** The username used by the third-party network protocol analyzer software.
- **Password:** The password used by the third-party network protocol analyzer software.

5.4.3 Advanced Settings

- **Buffer Size:** Sets the the buffer size used by the Ditto Shark during a network capture action. The minimum size is 512K (kilobytes). The default size of 16M (megabyte) works best for most use cases.
- **MTU:** If you are using the Ditto Shark on a network that’s configured to a non-standard maximum transmission unit size (e.g. it uses jumbo frames), then set this field to match that value. Most Ethernet LANs will use the standard MTU of 1500. The commonly accepted range for a valid MTU is 68 to 65,535 as defined in RFC 791.
- **Link Speed:** Allows you to set the Ethernet connection speed throughput. In most cases, ‘Auto Negotiate’ will work. If you experience problems staying connected, you may need to change the speed to match what your network’s capabilities are.



Network Capture Settings

Image File Count: 100

Image File Segment Size: 1G (in bytes)

Snap Size: (in bytes)

Dropped Pkt Log Interval: 5 (in minutes)

Live Capture Settings

Auto Start: Disabled ▾

Port: 2002

Username:

Password:

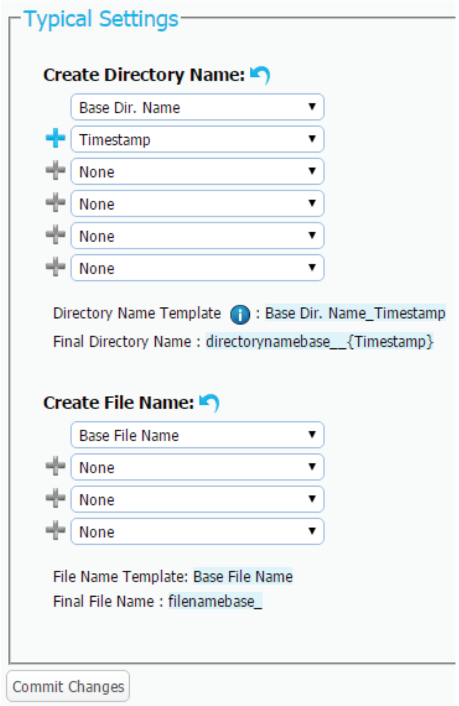
Advanced Settings

Figure 20. The “Network Capture” tab on the “Configure” screen.

5.5 NAMING

The “Naming” tab allows you to customize how the Ditto Shark names directories and files during imaging actions. When you are finished, click the **Commit Changes button** to save the changes.

As shown in Figure 21, the file directory used in network capture actions can be a name that contains up to six user-selectable fields, and the file name used in network capture actions can contain up to four user-selectable fields. As you customize these fields, the “Directory Name Template”, “Final Directory Name”, “File Name Template”, and “Final File Name” fields will update. The template fields show the order of variables that will appear in the name, whereas the final name fields display the directory or file name using the actual information from the “Investigation Info” panel on the “Home” screen and the source disk.



Typical Settings

Create Directory Name:

Base Dir. Name
Timestamp
None
None
None
None

Directory Name Template : Base Dir. Name_Timestamp
Final Directory Name : directorynamebase__{Timestamp}

Create File Name:

Base File Name
None
None
None

File Name Template: Base File Name
Final File Name : filenamebase_

Figure 21. The “Naming” tab on the “Configure” screen.

5.9.1 Variables

To modify the any of the user-customizable variables, navigate to the “Investigation Info” panel on the “Home” screen (see Section 4.2).

- **Timestamp/{Timestamp}:** Displays the timestamp. The timestamp is required to be included in all directory names, but it is optional for file names.
- **Base Filename:** Displays the base file name. This option is the default first variable for file names, but may be changed. User customizable.
- **Case Number:** Displays the case number. User customizable.
- **Description:** Displays the description field. User customizable.
- **Evidence Number:** Displays the evidence number. User customizable.
- **Investigator:** Displays the investigator. User customizable.

5.6 QUICK START

The “Quick Start” tab allows you to customize the quick start mode that appears on the LCD of the Ditto Shark when the “Quick Start” option is enabled in the “System” tab. Many of the settings on the next page are visible only when certain types of actions are selected in the “Action to perform” drop-down box.

5.6.1 Quick Start Settings

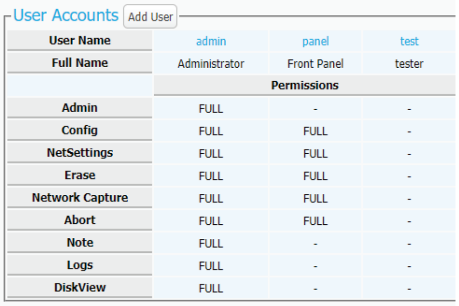
- **Action to perform:** Sets the action that is performed by the quick start mode.
- **Action Target:** For the “Erase Destination Disk” action only. Specifies which target volume will be erased.

6 ADMIN SCREEN

The “Admin” screen allows the administrator to manage user accounts and assign permission levels for each user. Click on the **Admin tab** to access the “Admin” screen from the Browser Interface.

6.1 USER ACCOUNTS

The Ditto Shark contains two permanent accounts; “admin” and “panel”. The “admin” account is the Administrator account, and only the Full Name and password may be modified. The “panel” account is the Front Panel account, and modifies access permissions for functionality that can be accessed through the LCD screen and navigation buttons on the Ditto Shark.



User Name	admin	panel	test
Full Name	Administrator	Front Panel	tester
	Permissions		
Admin	FULL	-	-
Config	FULL	FULL	-
NetSettings	FULL	FULL	-
Erase	FULL	FULL	-
Network Capture	FULL	FULL	-
Abort	FULL	FULL	-
Note	FULL	-	-
Logs	FULL	-	-
DiskView	FULL	-	-

Figure 22. The “Admin” screen.

6.2 PERMISSIONS

6.2.1 Permission Levels

Permission levels on the Browser Interface are displayed as “FULL”, “AUTH”, or as a hyphen, and when editing or creating a user they are displayed as “Full Access, “Must Authenticate”, and “None”, respectively. “FULL” and “Full Access” indicate that the user has complete access to the features governed by that permission and is not required to enter a password. “AUTH” and “Must Authenticate” indicate that the user must authenticate his credentials with a password in order to change a setting or perform an action that that permission governs. A hyphen or “None” indicates that the user does not have access to the features governed by that permission.

6.2.2 Configurable Permissions

The following list of permissions specifies what each controls, and can be configured when adding or editing a user account. Some permissions for the Administrator and Front Panel accounts will be greyed out by default.

- **Admin:** “None” allows access to modify the User Name and Full Name of the Administrator, Front Panel, and the user’s own account, and allows the user to change his or her own password, but blocks the user from viewing any account’s permission levels. “Modify Users” enables the user to be able to modify user accounts, passwords, and permissions (except for the “Admin” permission). “Full Access” additionally enables the ability to create and delete users and assign the “Admin” permission.
- **Config:** Governs all non-network configuration settings, including those found in the “System Settings” panel on the “Home” screen and on all tabs on the “Configure” screen.
- **NetSettings:** Controls access to the network settings on the “Configure” screen.
- **Erase:** Controls access to the “Erase Destination Disk” action.
- **Network Capture:** Controls access to the “Network Capture” action.
- **Abort:** Controls access to the ability to abort actions in progress.
- **Note:** Controls access to the “Comment” buttons in the “Action” and “System Log” panels on the “Home” screen.

- **Logs:** Controls the ability to delete log files from the “Logs” screen.
- **DiskView:** Controls the ability to HexView and Snapshot media via the “Disks” panel on the “Home” screen.

6.3 ADDING A NEW USER

To add a new user, click the **Add User button**, enter the user’s information, and set the permission levels. When finished, click on the **Commit Add button**.

6.4 EDITING AN EXISTING USER

To update a user’s name, password, or permissions, click on the user account under the “User Name” column, update the information, and then click the **Commit Edits button**.

6.5 DELETING A USER

To delete a user, click on the user account under the “User Name” column and click on the **Delete User button**. Do not click this button unless you are absolutely certain you wish to delete the account.

7 LOGS SCREEN

The “Logs” screen provides information about the Ditto Shark’s actions. Click on the **Logs tab** to access the “Logs” screen from the Browser Interface.

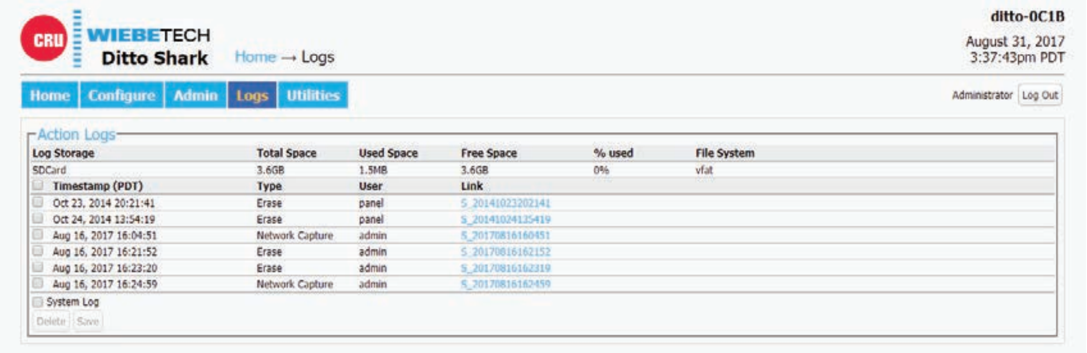
Action logs show the timestamp, the type of action performed, the user who performed the action, and a link to the “Action Log” screen that provides more information about the performed action. Click on that link to view that information.

7.1 DELETE LOG

Check the box next to each log file you wish to delete. To delete the system log, check the box next to “System Log” at the bottom of the Logs tab. Then click the **Delete button**. Finally click the **Yes button** on the dialog box that pops up to delete the checked logs.

7.2 SAVE LOG

Check the box next to each log file you wish to save to your local computer system. To save the system log, check the box next to “System Log” at the bottom of the Logs tab. Then click the **Save button**. The “Save



Log Storage	Total Space	Used Space	Free Space	% used	File System
SDCard	3.6GB	1.5MB	3.6GB	0%	vfat

□ Timestamp (PDT)	Type	User	Link
□ Oct 23, 2014 20:21:41	Erase	panel	S_20141023202141
□ Oct 24, 2014 13:54:19	Erase	panel	S_20141024135419
□ Aug 16, 2017 16:04:51	Network Capture	admin	S_20170816160451
□ Aug 16, 2017 16:21:52	Erase	admin	S_20170816162152
□ Aug 16, 2017 16:23:20	Erase	admin	S_20170816162319
□ Aug 16, 2017 16:24:59	Network Capture	admin	S_20170816162459

□ System Log

Figure 23. The “Logs” screen.

Logs" dialog box will pop up. Name the log file and choose whether to save it in XML or HTML format. Then click the **Submit button**. The "Save As" dialog box will pop up. Choose where on your system to save the file, then click **Save**.

8 UTILITIES SCREEN

The "Utilities" screen allows you to perform various miscellaneous functions, including the ability to upgrade firmware, remotely reboot the Ditto Shark, modify date and time settings, perform a factory reset, and import customized configurations. Click on the **Utilities tab** to access the "Utilities" screen from the Browser Interface.

8.1 SYSTEM MAINTENANCE

8.1.1 Firmware Upgrade

For information on how to upgrade the firmware, see Section 12.

8.1.2 Configuration

You can save and load configurations for the Ditto Shark. The file generated saves a copy of every customizable setting for the unit.

Save Configuration

To save a configuration, click on the **Save Config button**. Name the file, and then click **Continue** to open a Save As dialog box and save the file to your computer.

Load Configuration

a. Click on the **Load Config button**, browse to the XML configuration file you want to load, highlight it, and click **Open**.

b. The "Confirm Import" window will open. Place a check next to each setting you want to load, and then click **Continue**. By selecting these settings, you will be overwriting the existing settings, so be sure to save the current configuration first.

c. The Ditto Shark will import the configuration settings. Click **OK** when it's finished.

8.1.3 Other Buttons

- **Reboot:** Opens a confirmation to reboot the Ditto Shark.
- **Date & Time:** Allows you to set the current date, time, and timezone. Click the **Synchronize button** to sync these settings with your browser's operating system.

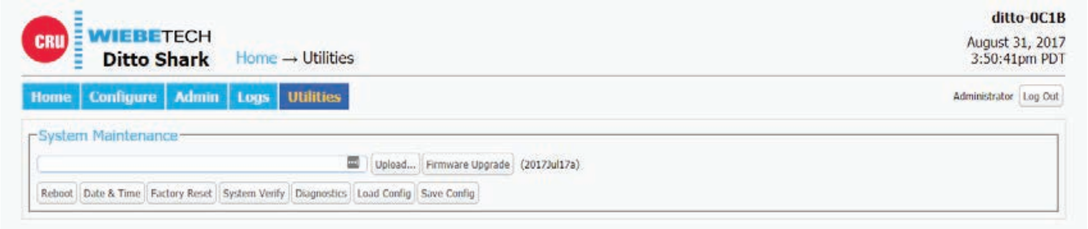


Figure 24. The "Utilities" screen.

- **Factory Reset:** Opens a confirmation dialog to return the Ditto Shark to factory settings. Check the **Purge Ditto SD card log files** box to remove all log files from the SD card in the unit. You can also use the Front Panel to perform a factory reset. See Section 9.3.
- **System Verify:** Verifies that the Ditto Shark's operating system files have not been modified and places a statement in the system log. If the verification fails, the details can be viewed by exporting the System Diagnostics.
- **Diagnostics:** Exports a diagnostics log file in HTML format. The diagnostics log contains information about the Ditto Shark's current configuration, including user accounts, kernel messages, logs, process information, connected disks, PHP errors, and system verify results.

8.2 UPGRADE LOG MESSAGES

This section displays the status log of firmware upgrades and is only visible after a firmware upgrade has been performed.

8.3 IMPORT LOG MESSAGES

This section displays the status log of configuration file exports and imports and is only visible after a configuration file has been loaded.

9 USING THE FRONT PANEL INTERFACE IN STANDALONE MODE

The Ditto Shark can work as a standalone device with no additional computer required, which can be useful when targeting network traffic in the field.

The Front Panel interface allows you to perform a network capture or erase a disk. You can also adjust settings, view information about attached media, or check on the Ditto Shark's operational status. The administrator account can assign access permissions to the Front Panel's actions and settings using the Browser Interface.

9.1 HOW TO NAVIGATE

9.1.1 Using the Navigation Buttons

The navigation buttons on the front of the Ditto Shark allow you to navigate through the menu. **Up** and **Down** allow you to scroll through the available options on the Front Panel, while **Enter** selects the option and **Back** goes back to the previous screen. If Quick Start Mode is enabled, press **Back** to exit it.

9.1.2 Using a Keyboard

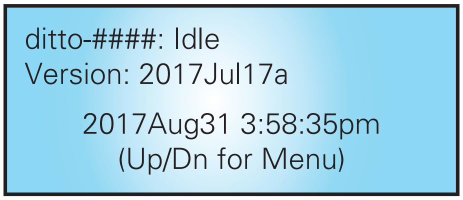
Plug a PC USB keyboard into a USB port on the "NetTap Interface" side of the Ditto Shark. You can navigate using the arrow keys. Press **Enter arrow keys** to select a menu option. Press **the Left Arrow key** to back out of a menu or setting. If Quick Start Mode is enabled, you can press the **Escape key** to exit it.

9.2 MENU SCREENS

The Ditto Shark menu consists of the following screens:

9.2.1 Status

The status screen is the default screen. It shows the progress of any current processes. When the Ditto Shark is "Idle", the current firmware of the unit is also listed on this screen. An example of a status screen is shown in Figure 25.



ditto-####: Idle
Version: 2017Jul17a
2017Aug31 3:58:35pm
(Up/Dn for Menu)

Figure 25. The "Status" screen on the Front Panel LCD.

9.2.2 Perform Action

After you adjust settings to your specifications, you are ready to put the Ditto Shark to work. The "Perform Action" screen lets you start or abort any of the Ditto Shark's actions using the current settings.

a. On the "Perform Action" screen, use the **Up** and **Down** buttons to cycle through the available actions. Press **Enter** to select the one you want.

b. Cycle through the available settings for the action. Press **Enter** if you wish to modify them.

c. When you are finished modifying settings, scroll down to option that asks you to start the action (ex. "Start Network Capture?". Press **Enter** to begin.

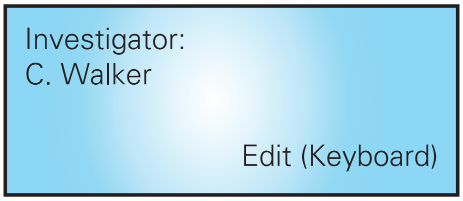
The status and remaining time will be displayed on the LCD screen as the Ditto Shark performs the action. To abort an action, press **Back**. The LCD screen will ask if you wish to abort the action. Press **Enter** to confirm, or **Back** to cancel the abort request.

9.2.3 Investigation Info

The "Investigation Info" lists the current settings that can be modified in the "Investigation Info" section on the "Home" screen of the Browser Interface. To modify these settings from the Browser Interface, see Section 4.2.

Editing Fields With A Keyboard

On the "Investigation Info" menu, an "Edit (Keyboard)" menu item will appear when a keyboard is detected (see Figure 26). You can edit the field currently displayed on the LCD by pressing the **Enter button** on the face of the Ditto Shark or by pressing **Enter or the Right Arrow keys** on the keyboard, and then using the keys to type.



Investigator:
C. Walker

Edit (Keyboard)

Figure 26. The "Investigator" field in the "Investigation Info" menu on the Front Panel LCD, when a USB keyboard is attached to the Ditto Shark.

STOP! Using apostrophes (') in the name fields will cause an error when the file or folder name is created. They should not be used in the Investigation Info fields.

NOTE Text strings longer than 20 characters are displayed with an ellipses character (...) at the right side of the string.

NOTE The Ditto Shark can handle multiple USB devices through a USB hub attached to the USB port on the "NetTap Interface" side of the Ditto Shark. However, if multiple keyboards are connected, keystrokes from all keyboards are processed.

Here is a table of the most common keyboard commands:

KEY	COMMAND
Escape	Cancels an edit.
Enter	Begins an edit on a user-editable string or selects the currently-visible menu option. When pressed while editing a string, it confirms the edit.
Home/End	When editing a string, these keys move the cursor to the beginning/end of the string, respectively.
Up/Down	Moves through the menu options. When editing a string, they move the cursor to the beginning/end of the string, respectively.
Delete	Deletes the character currently highlighted by the cursor.

More commands are detailed on the next page.

Keyboard Commands, continued...

KEY	COMMAND
Backspace	Deletes the character immediately behind the cursor.
NumLock	Forces the numbered arrow keys to type numbers when pressed.
CapsLock	Forces all letter keys to type capital letters.
Tab/Shift+Tab/Page Up/ Page Down/Function/Alt/ Windows/Control/Insert	Not handled.

9.2.4 Settings

The “Settings” screen allows you to view and customize the following settings, which are grouped into three subsections. These settings will be the default settings used in any actions performed.

NOTE The System Settings below cannot be modified if the Front Panel user account does not have full access to the “Config” permission, and the Dst Network Settings cannot be modified if the Front Panel user account does not have access to the “NetSettings” permission. See Section 6 for information on how to customize the Front Panel user account.

System Settings

- **Default Format:** Sets the default format for the “Erase Destination Disk” action. The available format types are ext2, ext3, ext4, XFS, HFS+, FAT32, and NTFS.
- **Hash Type:** Sets the default hash algorithm that will be used for PCAP file verification. The available algorithms are None, MD5, and SHA-1.
- **Erase Mode:** Sets the default erase mode for the “Erase Destination Disk” action. The available options are “Clear Part..ion Table” (Clear Partition Table) and Quick Erase.
- **Quick Start:** Enables the “Quick Start” screen on the LCD that appears after you boot or reboot the Ditto Shark. The settings for this mode may be modified in the “Quick Start” tab on the “Configure” Screen within the Browser Interface. See Section 5.6.
- **Prompt Invest. Info:** This opens a “Configure Investigation Info” window within the Browser Interface after the user has begun an action from the Browser Interface. This allows the user to customize the Investigator, Case Number, Evidence Number, Description, Notes, Base Directory Name, and the Base File Name information prior to performing the requested action.
- **Prompt Case:** Four options may be chosen to modify the case number specified in the “Investigation Info” section of the “Home” screen in the Browser Interface. The case number is included in the log for the requested action. “Disabled” leaves the case number as it is. “Inc/Dec” allows you to manually increment the case number up or down using the navigation buttons on the face of the Ditto Shark. “AutoInc” automatically increments the case number, and “AutoInc/Pause” automatically increments the case number, but displays a confirmation prompt the LCD screen before beginning the requested action. These options require a number to be present on the end of the Case Number specified in the “Investigation Info” section of the “Home” screen within the Browser Interface.
- **Prompt Evidence:** Four options may be chosen to modify the evidence number specified in the “Investigation Info” section of the “Home” screen. The evidence number is included in the

log for the requested action. “Disabled” leaves the evidence number as it is. “Inc/Dec” allows you to manually increment the evidence number up or down using the navigation buttons on the face of the Ditto Shark. “AutoInc” automatically increments the evidence number, and “AutoInc/Pause” automatically increments the evidence number, but displays a confirmation prompt the LCD screen before beginning the requested action. These options require a number to be present on the end of the Evidence Number specified in the “Investigation Info” section of the “Home” screen within the Browser Interface.

- **LCD/LED Brightness:** Sets the relative brightness of the LCDs and LEDs on the face of the Ditto Shark on a scale of 0 to 6. Setting a value of “0” will turn off all LCDs and LEDs on the unit.
- **Buzzer:** Alerts the user to various actions that occur when using the Ditto Shark.
- **Dual Destinations:** Enables software mirroring mode to write the same data to two destinations at the same time.
- **Log Disk Info:** Determines whether S.M.A.R.T. and hdparm disk information is logged before running an action, after running an action, both, or not at all. CRU recommends that you log disk information before and after an action.
- **HTML Logging:** Logs are always saved in XML format. This option causes the Ditto Shark to save logs in HTML format as well.
- **DiskView Logging:** Logs any action to preview a disk (i.e. creating a disk snapshot, starting or finishing a HexView action).
- **Force SSL:** When enabled, this setting forces any browser to use HTTPS to access the Ditto Shark Browser Interface.
- Stealth Mode: Turns off all LEDs and LCDs on the Ditto Shark. The physical “Stealth Mode” Switch serves the same purpose (see Section #.#). If Stealth Mode is enabled from the Browser Interface, the physical switch cannot override it.
- **PM Mirror Override:** Overrides the Ditto Shark’s check that tells you whether two devices attached to the Ditto Shark can be mirrored. In some cases, attached devices may not appear as mirrorable to the Ditto Shark because of the way their firmware implements RAID or port-multiplication (PM). This option gives you the ability to mirror any two devices you attach regardless of these implementations. However, the attached devices must still be empty, so use the “Erase Destination Disk” action from the “Home” screen if the devices are not empty (see Section 4.1.6) before attempting to mirror them.

NetCap Settings

This section allows you to modify the settings that govern network capture actions.

- **NetCap Filter:** Sets the default network capture filter for the “Network Capture” action. The available filters are All, HTTP, E-Mail, SSH, or any available custom filter that you have saved onto the currently installed SD card. To create your own custom filter, see Section 11.3.
- **NetCap File Count:** Specifies the maximum number of image files (based on image file segment size, see Section 5.4.1) that are created on the destination disk. When the number is

reached, the Ditto Shark will begin overwriting the oldest file on the disk for each new file that is created. Set this to '**0**' to fill the disk until it reaches capacity.

- **NetCap Snap Size:** Allows you to capture up to the specified amount of bytes of each packet of data.
- **NetCap Pkt Log Inter:** Allows you to specify the time interval in minutes of how often the Ditto Shark writes its accumulated dropped packet information to the Action log. Setting this value to '0' disables packet loss reporting.
- **Live Capture:** This service runs continuously in the background and streams captured data in realtime over the network to a remote monitor using the third-party Wireshark network protocol analyzer. See Section 4.1.1 for more information.
- **LiveCap Auto Start:** Set this value to 'Enabled' to turn on live capture as soon as the Ditto Shark is powered on. Set this value to 'Disabled' if you want the user to choose when to start the live capture service in the Browser Interface.
- **NetCap MTU:** If you are using the Ditto Shark on a network that's configured to a non-standard maximum transmission unit size (e.g. it uses jumbo frames), then set this field to match that value. Most Ethernet LANs will use the standard MTU of 1500. The commonly accepted range for a valid MTU is 68 to 65,535 as defined in RFC 791.
- **NetCap Link Speed:** Allows you to set the Ethernet connection speed throughput. In most cases, 'Auto Negotiate' will work. If you experience problems staying connected, you may need to change the speed to match what your network's capabilities are.

Dst (Destination) Network Settings

This section allows you to modify the settings for the network connection on the "Destination Interface" side of the Ditto Shark, which is used to connect to the Browser Interface.

- **Dst Network:** Enable or disable the destination network Ethernet connection.
- **Dst MAC Address:** Displays the destination Ethernet port's MAC address.
- **Dst Network Mode:** Displays the destination Ethernet port's networking mode. The available options are Server, Client (DHCP), or Client (Static IP). "Server" allows you to connect the Ditto Shark directly to a computer without the use of an intermediary network. The network mode can be further configured in the Browser Interface (see Section 5.2.2).
- **Dst IP Address:** Displays the IP address assigned to the destination Ethernet port.
- **Dst Subnet Mask:** Displays the subnet mask address assigned to the destination Ethernet port. It is only visible if "Dst Network Mode" is set to "Client (Static IP)" or "Server".

Date & Time

- **Date:** Displays the date.
- **Time:** Displays the time.
- **Timezone:** Displays the time zone.

9.2.5 Disk Info

The "Disk Info" screen (Figure 27) shows all available disks attached to either the source or destination ports. Ports are shown only if a disk is connected there. Press **Enter** and then **Up** or **Down** to scroll through the following information about each connected disk:

- Connected port on the Ditto Shark
- Used disk capacity
- Available disk capacity
- File system

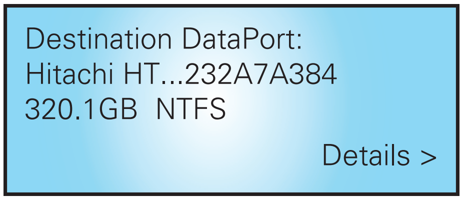

Destination DataPort:
Hitachi HT...232A7A384
320.1GB NTFS
Details >

Figure 27. The "Disk Info" screen on the Front Panel LCD.

9.3 FACTORY RESET

To reset the Ditto Shark's settings back to their factory defaults, press and hold the **Up**, **Enter**, and **Down** navigation buttons while powering the unit on. The Ditto Shark will start up and then display the text, "Initializing... Prep Factory Reset" (see Figure 28).

You will then be prompted to confirm your choice to reset the Ditto Shark. Press **Enter** to continue or **Back** to cancel.

You can also use the Browser Interface to perform a factory reset. See Section 8.1.3.

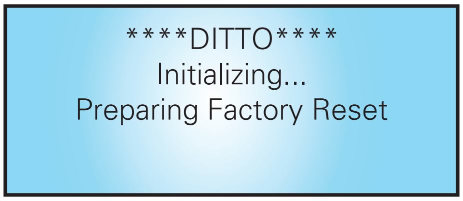

****DITTO****
Initializing...
Preparing Factory Reset

Figure 28. The "Preparing Factory Reset" screen on the Front Panel LCD.

10 STEALTH MODE

Stealth Mode turns off all LEDs and LCDs on the Ditto Shark. You can enable Stealth Mode by flipping the physical **Stealth Mode switch** on the "Destination Interface" side of the Ditto Shark (see Section 1.2).

You can also enable it from the Browser Interface. Click on the **Configure tab**, and then under the "System" tab change the "Stealth Mode" drop-down box to **Enabled**. Then click **Commit Changes**.

NOTE If Stealth Mode is enabled from the Browser Interface, the physical switch cannot override it.

11 ADVANCED FEATURES AND FUNCTIONS

11.1 USING ISCSI DEVICES

11.1.1 Remotely Access an iSCSI Device

To connect to an iSCSI device that exists on your network, follow these directions.

a. Ensure that the Ethernet port through which the Ditto Shark is connected to your network is properly configured for use with your network (see Section 5.2). Unless you have manually configured the Ditto Shark's network settings before, you most likely do not have to change anything. If you are directly connecting the iSCSI device to the Ditto Shark, then see Section 11.1.2.

b. On the "Home" Screen, navigate down to the bottom of the "Disks" panel.

c. Click the **Destination Network** button to attach the iSCSI device as a read/write-enabled destination.

d. Click on the **iSCSI tab** if it is not already selected.

e. Type the iSCSI device's IP address into the "Target Host" text field.

f. Type in the port number of the target iSCSI volume into the “Port” text field if the number is different than the default value of ‘3260’. If you don’t know the port number, leave it as the default value.

g. Click the **Discover button**. The Ditto Shark will detect any IQNs (iSCSI Qualified Names) attached to the IP address.

h. Select the IQN you wish to attach to the Ditto Shark from the drop-down box.

i. If authentication is required to connect to the IQN, click the **Advanced... button** and input the appropriate credentials, including the user name, password, and domain. Otherwise, continue to Step J.

j. Click the **Add button**. The IQN will now appear in the list below.

k. Repeat steps **E** through **J** to add more IQNs. When you are finished, click **Close**.

The iSCSI disk(s) have now been added to the list of Disks, allowing you to perform actions on them like you would any other disk.

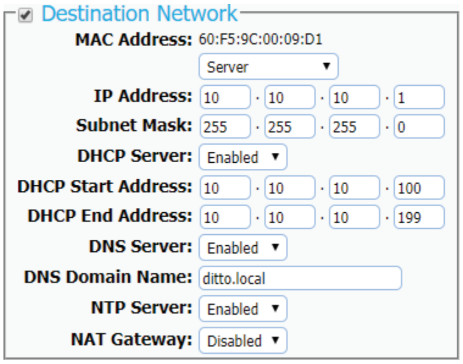
11.1.2 Directly Connect an iSCSI Device to the Ditto Shark

First, ensure that the destination Ethernet port is configured to act as a server. If it already is, begin at Step D.

a. Click on the **Configure tab** at the top of the page, and then select the **Network tab**.

b. In the “Destination Network” section, select **Server** from the drop-down box underneath the MAC address. Do not customize the default server configuration unless directed to do so by your network administrator.

c. Click **Commit Changes**.



☑ Destination Network

MAC Address: 60:F5:9C:00:09:D1

Server ▼

IP Address: 10 · 10 · 10 · 1

Subnet Mask: 255 · 255 · 255 · 0

DHCP Server: Enabled ▼

DHCP Start Address: 10 · 10 · 10 · 100

DHCP End Address: 10 · 10 · 10 · 199

DNS Server: Enabled ▼

DNS Domain Name: ditto.local

NTP Server: Enabled ▼

NAT Gateway: Disabled ▼

Figure 29. The “Destination Network” section on the “Configure” screen’s “Network” tab.

d. Now connect the iSCSI Device to the Ethernet port on the “Destination Interface” side of the Ditto Shark. The iSCSI device will be assigned a new IP address if the iSCSI device is configured to obtain a new IP address from DHCP, which will the case for most devices. If no IP address is assigned, you will need to configure the iSCSI device to use DHCP. If that is not possible, contact your network administrator.

e. Go back to the “Home” Screen and click the **Destination Network button** at the bottom of the “Disks” panel.

f. On the window that pops up, click on the **iSCSI tab** if it is not already selected.

g. Type the iSCSI device’s IP address into the “Target Host” text field.

h. Type in the port number of the target iSCSI volume into the “Port” text field if the number is different than the default value of ‘3260’. If you don’t know the port number, leave it as the default value.

i. Click the **Discover button**. The Ditto Shark will detect any IQNs (iSCSI Qualified Names) attached to the IP address.

j. Select the IQN you wish to attach to the Ditto Shark from the drop-down box.

k. If authentication is required to connect to the IQN, click the **Advanced... button** and input the appropriate credentials, including the user name, password, and domain. Otherwise, continue to the next step.

l. Click the **Add button**. The IQN will now appear in the list below.

m. Repeat steps G through L to add more IQNs. When you are finished, click **Close**.

The iSCSI disk(s) have now been added to the list of Disks, allowing you to use the Ditto Shark to perform actions on them like you would any other disk.

11.1.2 Properly Remove an iSCSI Device

This process prevents timeout issues where the Ditto Shark will attempt to connect to iSCSI volumes that no longer are connected to it. On the "Home" Screen, navigate down to the bottom of the "Disks" panel.

a. Click the **Destination Network** button.

b. Click on the **iSCSI tab** if it is not already selected.

c. Under the "iSCSI Source Connections" or the "iSCSI Destination Connections" section, check the boxes next to the IQN(s) you want to remove and click the **Remove button**.

d. Physically disconnect the iSCSI device from the Ditto Shark.

11.2 USING NFS AND SMB (SAMBA) SHARES

11.2.1 Connect to NFS and SMB Shares

a. Connect the Ditto Shark to the network that your NFS or SMB share exists on through the "Destination Interface" side of the Ditto Shark.

b. On the "Home" Screen, click the **Destination Network button** at the bottom of the "Disks" panel.

c. Click on the **NFS tab** or the **SMB tab**, depending on which type of share you are connecting to.

d. Type the server name into the Server text field.

e. If you are connecting to an SMB share, select the appropriate protocol from the "Protocol" drop-down box. If you don't know the correct protocol, leave it as the default value of 'SMBv1'.

f. Click the **Show Shares button**. The Ditto Shark will detect any shares attached to the server.

g. Select the share you wish to attach to the Ditto Shark from the drop-down box.

h. If you are connecting to an SMB share and authentication is required, click the **Advanced... button** and input the appropriate credentials, including the user name, password, and domain. If the SMB share does not require authentication or you are connecting to an NFS share, continue to the next step.

i. Click the **Add button**. The share will now appear in the list below.

j. Repeat steps C through I to add more shares. When you are finished, click **Close**.

The share(s) have now been added to the list of Disks, allowing you to perform actions on them like you would any other disk.

11.2.2 Remove an NFS or SMB (Samba) Share

a. On the “Home” Screen, click the **Destination Network button** at the bottom of the “Disks” panel.

b. Click on the **NFS tab** or **SMB tab**, depending on the which type of share you are removing.

c. Check the boxes next to the share(s) you want to remove and then click the **Remove button**.

11.3 USING AND CONFIGURING NETWORK CAPTURE FILTERS

Insert the SD Card containing your network capture filter(s) into the Ditto Shark and your custom network capture filters will become available in the “Network Capture Filter” drop-down box when configuring a “Network Capture” action. You may also add subdirectories that contain one or more network capture filter XML files to the DittoNetCapFilter directory.

To add or edit your own network capture filter, choose the way that works best for your usage scenario.

11.3.1 Filter Creation Via Web Browser

a. Insert the SD Card into the SDCard slot on the rear of the Ditto Shark.

b. Using the Browser Interface, select **Network Capture** from the “Action to Perform” drop-down box.

c. If you are editing an existing network capture filter that you created, select it from the “Network Capture Filter” drop-down box.

d. Type in the ports you wish to capture in your network capture filter in the text box directly below the “Network Capture Filter” drop-down box (see Figure 30). Use the word ‘or’ to separate each port.

e. Click the **Save button**. The “Save Network Capture Filter” dialog box will pop up (see Figure 31).

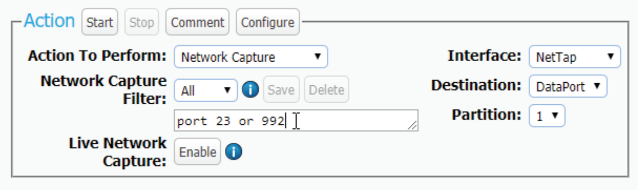
f. Use the “Select Filter...” drop-down box and select **New Filter...** to create a new filter or select an existing filter to overwrite it.

g. Use the “Select File...” drop-down box and select **New File...** to create a new XML file, or select an existing file to add your network capture filter to the file.

h. Type the desired filename into the “File Name” text box.

i. Type the desired name of the filter into the “Filter Name” text box.

j. Click the **Save button** to save the filter.



Action To Perform: Network Capture

Network Capture Filter: All

port 23 or 992

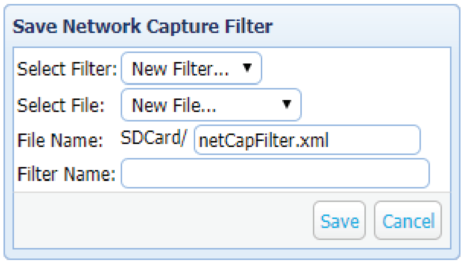
Live Network Capture:

Interface: NetTap

Destination: DataPort

Partition: 1

Figure 30. The “Action” screen, showing where to type in the ports that you wish to capture with the “Network Capture” action.



Save Network Capture Filter

Select Filter: New Filter...

Select File: New File...

File Name: SDCard/ netCapFilter.xml

Filter Name:

Figure 31. The “Save Network Capture Filter” dialog box lets you save custom network capture filters.

11.3.2 Manual Filter Creation

To manually create a network capture filter on an SD Card, you must manually create a **DittoNetCapFilter** directory on your SDCard first. Then you can add one or more network capture filter XML files to that directory.

Create an XML file using the following structure and place it within the DittoNetCapFilter directory on your SDCard:

```
<?xml version=”1.0” encoding=”UTF-8”?>
<!-- All attributes must be in single quotes if they contain double quotes.
-->
<dittoNetCapFilter
  xmlns:xsi=”http://www.w3.org/2001/XMLSchema-instance”
  xsi:noNamespaceSchemaLocation=”netCapFilter.xsd”
>
  <filter title=”All”>insert port numbers here, separated by the word‘or’</
filter>
</dittoNetCapFilter>
```

The name of the network capture filter XML file can be any legal file name with an XML file extension. Each XML file may contain one or more <filter title=”...”> blocks. The filter block’s title will appear at the bottom of the “Network Capture Filter” selection list prepended with “SDCard/” followed by the subdirectory’s name, if any.

NOTE You cannot remove existing selections from the Network Capture Filter list.

To download an XML Schema that can be used to validate your network capture filter XML file, type the following into the address bar of an Internet browser, where <IP Address> is the IP address of your Ditto Shark: http://<IP Address>/data/DittoNetCapFilter/netCapFilter.xsd

Click the ⓘ **Information icon** for a link to a site that describes the syntax supported by network capture filters.

12 UPGRADING FIRMWARE

There are three methods to upgrade your Ditto Shark’s firmware. Firmware upgrades are made available on CRU’s website at www.cru-inc.com/support/software-downloads/Ditto-Shark-firmware-updates/.

METHOD 1: COPY AND PASTE A LINK

a. Ensure that the Ditto Shark is connected to a network with Internet access.

b. Go to the firmware updates webpage and scroll down to the “Ditto Shark Firmware Links” section. Copy the URL of the firmware you wish to use to upgrade.

c. Log into your Ditto Shark’s Browser Interface and navigate to the “Utilities” screen.

d. Paste the link into the top text field and click the **Firmware Upgrade button**.

e. When it asks you to confirm the retrieval of the upgrade file, click **Continue**.

f. The Ditto Shark will download the file to itself. Once downloaded, it will ask you to confirm the upgrade. Click **Continue**. After the upgrade is finished, click **OK**.

g. The LCD panel of the Ditto Shark will ask you to reboot. Press the **Enter button** on the face of the unit to reboot, or click on the **Reboot button** on the "Utilities" screen.

METHOD 2: DOWNLOAD TO YOUR COMPUTER

a. Go to the firmware updates webpage and scroll down to the "Ditto Shark Firmware Links" section.

b. Click on the firmware you wish to use to upgrade to download the file. Save the file in a convenient location.

c. Log into your Ditto Shark's Browser Interface, navigate to the "Utilities" screen, and click on the top **Upload... button**.

d. Locate the firmware file you just downloaded, select it, and click **Open**.

e. Click on the **Firmware Upgrade button**.

f. The Ditto Shark will upload the file to itself. Once uploaded, it will ask you to confirm the upgrade. Click **Continue**. After the upgrade is finished, cick **OK**.

g. The LCD panel of the Ditto Shark will ask you to reboot. Press the **Enter button** on the face of the unit to reboot, or click on the **Reboot button** on the "Utilities" screen.

METHOD 3: UPLOAD VIA A USB THUMB DRIVE

a. Go to the firmware updates webspage and scroll down to the "Ditto Shark Firmware Links" section.

b. Click on the firmware you wish to use to upgrade to download the file. Save the file to a USB thumb drive.

c. Insert the thumb drive into the "NetTap Interface" side USB port of the Ditto Shark.

d. The Ditto Shark will immediately scan the thumb drive and display a list on the LCD screen of all firmware files found on the drive. Use the navigation buttons on the face of the unit to move the blinking cursor to the firmware that you wish to use to upgrade, and then press **Enter**.

e. The Ditto Shark's firmware will be upgraded. The LCD panel of the Ditto Shark will ask you to reboot. Press **Enter** to reboot.

13 TECHNICAL SPECIFICATIONS

Product Name	Ditto Shark
Data Interface Types & Speeds	1000BASE-T EtherNet: up to 1 Gbps DataPort DP20: up to 6 Gbps eSATA: up to 6 Gbps UHS-III SD Card: up to 624 MB/s USB 2.0: up to 480 Mbps
Supported Drive Types	2.5 and 3.5-inch SATA HDDs and SSDs
DataPort DP20 Drive Support	2.5-inch SATA HDDs and SSDs
SD Card Slot Support	MMC, SD, SDHC, SDXC, UHS-I, UHS-II, UHS-III (mini- and micro- card types are compatible with adapters)
Wifi USB Adapter Support	Wifi adapters with Atheros chipsets, and some Realtek chipsets
DP20 Carrier Torque	2.5-inch drives, M3 screws: 4 inch-pounds max.
Data Connectors	Two (2) eSATA ports Three (3) 1000BASE-T Ethernet connectors One (1) USB 2.0 connectors One (1) SD Card slot
Supported File Systems	ext2, ext3, ext4, FAT32, HFS+, NTFS, XFS
User Interface	Four-line LCD controlled with four soft-touch menu navigation buttons or USB keyboard Browser-based Ditto interface allows for direct operation, remote operation, and administration
Stealth Mode	Turns off all lights (LEDs/LCD)
Browser Compatibility	Chrome, Edge, Firefox, Opera, Safari
Hash Modes	None, MD5, SHA-1
Erase Modes	Clear Partition Table, Quick Erase
External material	All-metal construction
Operating Humidity	5% to 95%, non-condensing
Power Switch	2 position: On / Off
Power Input	40W 12V 3.33A DC barrel connector (center pin positive)
Power over Ethernet	PoE+ (30W)
Compliance	EMI Standard: FCC Part 15 Class A EMC Standard: EN55024, EN55032 CE, RoHS
Product Weight	Unpopulated: 2.91 pounds (1.32 kg) Populated: 3.16 pounds (1.43 kg)
Product Dimensions	5.63in W x 9.00in L x 1.62in H (143mm W x 229mm L x 41mm H)
Technical Support	Your investment in CRU products is backed up by our free technical support for the lifetime of the product. Contact us through our website, www.cru-inc.com/support or call us at 1-800-260-9800 or +1-360-816-1800.

Use of the full Ditto Shark product is subject to all of the terms and conditions of this User Manual and the above referenced License.

Product Warranty
CRU warrants this product to be free of significant defects in material and workmanship for a period of three years from the original date of purchase. CRU's warranty is nontransferable and is limited to the original purchaser.

Limitation of Liability
The warranties set forth in this agreement replace all other warranties. CRU expressly disclaims all other warranties, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose and non-infringement of third-party rights with respect to the documentation and hardware. No CRU dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty. In no event will CRU or its suppliers be liable for any costs of procurement of substitute products or services, lost profits, loss of information or data, computer malfunction, or any other special, indirect, consequential, or incidental damages arising in any way out of the sale of, use of, or inability to use any CRU product or service, even if CRU has been advised of the possibility of such damages. In no case shall CRU's liability exceed the actual money paid for the products at issue. CRU reserves the right to make modifications and additions to this product without notice or taking on additional liability.

FCC Compliance Statement: "This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at this own expense.

In the event that you experience Radio Frequency Interference, you should take the following steps to resolve the problem:

1) Ensure that the case of your attached drive is grounded.
2) Use a data cable with RFI reducing ferrites on each end.
3) Use a power supply with an RFI reducing ferrite approximately 5 inches from the DC plug.
4) Reorient or relocate the receiving antenna.

CRU

Protecting Your Digital Assets™

For more information,
visit the CRU web site.

www.cru-inc.com

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