Engineering Development Group

DarkSeaSkies 1.0
User Manual

Rev. New
26 January 2009

sonicscrewdriver+sonicscrewdriver+docs+DarkSeaSkies 1.0 User Manual_Rev New_2009-01-26.doc

```
CL BY: 2348366
CL REASON: 1.4(c)
DECL ON: 20331105
DRV FROM: COL S-06
```

Change Log

Doc Rev	Doc Date	Rev By	Change Description	Reference	Authority/ Approval Date
New	11/05/2008	TWC	Initial Release		

Table of Contents

List of Tables

1. Scope

This document establishes the User Manual for DarkSeaSkies 1.0.

1.1 System Overview and Description

DarkSeaSkies is an implant that persists in the EFI firmware of an Apple MacBook Air computer, installs a Mac OSX 10.5 kernel-space implant and executes a user-space implant.

DarkSeaSkies consists of three different tools:
1. **Dark**Matter: An EFI driver that persists in firmware and installs the other two tools.
2. **Sea**Pea: A Mac OSX kernel-space implant that executes, and provides stealth and privilege to user-space implants.
3. Night**Skies**: A Mac OSX user-space implant that beacons to a listening post and provides command and control.

This document describes the technical details DarkMatter, and that of SeaPea and NightSkies only where they differ from their documented user manuals. Refer to *SeaPea User Manual* for further information on SeaPea. Refer to *NightSkies User Guide* for further information on NightSkies.

1.2 Assumptions and Constraints

It is assumed that the target system is a MacBook Air version 1,1 running Mac OSX 10.5.2-10.5.x with firmware version MBA11.0088.B03.

It is assumed that an operator or asset has one-time physical access to the target system and can boot the target system to an external flash drive.

A constraint is that the DarkSeaSkies will not persist in the event of a firmware update.

1.3 Conventions (Not Applicable)

2. Applicable Documents

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this document, the contents of this document will be considered binding. The following documents may be found at S:\DO\IOC\EDG ALL\EDG AE\Projects\:
- SeaPea User Manual, Rev. 2.0, November 2008
- NightSkies User Guide, Rev. 1.2, November 2008

3. System Description

3.1 Technical References

The following items are either configured or randomly generated for each deployment. Therefore the values are delivered as files rather than updated in this document for each deployment.

- ➢ DarkSeaSkies Installer EFI file:
  - o Name: see file ***installer.name***.
  - o GUID: see file ***installer.guid***.
- ➢ DarkSeaSkies Implant:
  - o The EFI implant name is in the file ***loader.name***.
  - o The GUID is in the file ***loader.guid***.
  - o The XXTEA key used to encrypt both NightSkies and SeaPea is in the file ***xxtea.key***.
- ➢ NVRAM Variables:
  - o The NVRAM variables are obfuscated by using existing variable names and generating new random GUIDs for each delivery.
  - o We will refer to them as the conceptual *italicized* names (i.e. *Status*) in this documentation; however, their true names and GUIDs on the target are documented below.
  - o *Status* indicates the status of the payload from the previous boot.
    - ▪ The name of this variable is "SystemAudioVolume".
    - ▪ The GUID of this variable is in the file ***status.guid***.
    - ▪ *Status* has the following values.
      - • '\0' indicates an unknown status, for example the first boot after install
      - • '0' indicates that the user-space payload has been dropped
      - • '1' is reserved for future use
      - • '2' indicates that NightSkies has failed to execute properly.
      - • '3' indicates that the user-space payload executed successfully
      - • '4' indicates that the user-space payload encountered an error condition
      - • '5' indicates that DarkSeaSkies should uninstall itself and its payload
      - • Any other value is equivalent to '5'.
  - o *Count* maintains a counter used to track the number of cautious boots. A cautious boot is defined fully below. If *Count* does not exist then it is assumed to be zero.
    - ▪ The name of this variable is in the file ***warning_count.name***.
    - ▪ The GUID of this variable is in the file ***warning_count.guid***.
  - o *Limit* indicates the value of *Count* at which DarkSeaSkies will uninstall itself and its payload. If *Limit* does not exist then a pre-configured value will be used.
    - ▪ The name of this variable is in the file ***warning_threshold.name***.
    - ▪ The GUID of this variable is in the file ***warning_threshold.guid***.
    - ▪ The default value of *Limit* is in the file ***warning_threshold.value***.

o *Configuration* is the NVRAM variable that NightSkies uses to store its configuration.
- The name of this variable is in the file ***config.name***.
- The GUID of this variable is in the file ***config.guid***.
- The default configuration is described in the file ***config.plist***.

3.2   System Concepts and Capabilities

DarkSeaSkies is an EFI implanted beacon (NightSkies) that is run in coordination with the SeaPea root-kit. All files, network connections, and processes associated with the NightSkies beacon are hidden by the SeaPea root-kit. The beacon and root-kit remain persistent across OS reboots, upgrades, and reinstalls.   All files associated with DarkSeaSkies remain off disk with the following exception: during each boot NightSkies is written to disk in the */tmp* directory in order to be executed, it is then securely deleted. Beacon transmissions by NightSkies occur only when a configurable time has elapsed and the target user is browsing with Safari or Firefox. The command and control beacon data is encrypted in an HTTP GET/POST request or response.

3.3   Prerequisites

Refer to *NightSkies User Guide*.

3.4   Equipment Familiarization

Refer to *NightSkies User Guide*.

4. Operation

4.1   Configuration

DarkSeaSkies has the following configuration parameters. The values for a deployment are in the file ***config.plist*** unless specified otherwise.
- NightSkies encryption pass phrase. This value is saved in ***lp.password***.
- Enable date: date after which implant is enabled.
- Default caution *Limit*: maximum number of cautious boots before uninstall.
- Beacon URL: This is the URL the beacon will attempt to download.
- Client ID: this is a unique identifier for the implant.
- "Magic Link" String: as part of beaconing, the implant will look for this string in the php file in order to retrieve tasking.
- Uninstall Interval: Time interval since last successful LP communication before uninstall.
- Minimum Delay between beacons in seconds.
- Failsafe attempt: beacon with out network checks.
- Maximum Delay: if failsafe is enabled, this is the maximum amount of time in seconds we wait before attempting a failsafe beacon.
- Applications used to detect activity.

4.2 Installation and Setup

DarkSeaSkies is installed from a bootable flash drive. The following instructions detail how to make the installation flash drive from any Apple computer running Mac OSX 10.5 (Leopard).

1. Format flash drive:
   Open DiskUtility; select the flash drive; click on the "Partition" tab; select "1 Partition" under "Volume Scheme"; click "Options" button; select "GUID Partition Table" radio button; edit "Name" field appropriately; select "Mac OS Extended (journaled)" as the "Format"; click "Apply".
2. Copy Installer EFI file to the flash drive.
   ```
   > cp I.efi /Volumes/I/I.efi
   ```
3. Bless the Installer EFI file on the flash drive.
   ```
   > sudo bless –-folder /Volumes/I/ –-file
   /Volumes/I/I.efi --bootinfo
   ```
   The following message is expected and not an error.
   ```
   Can't load /Volues/I//usr/standalone/ppc/bootx.bootinfo
   ```
4. Eject the flash drive.
   ```
   > diskutil eject /Volumes/I
   ```
5. Insert the flash drive into the target.
6. Boot the target system while holding the "option" key until the screen displays a boot drive selection menu. Select the flash drive. Once the DarkSeaSkies installer has started the screen will blank and a ':' will appear in the upper left corner of the screen. Once the ':' has appeared the flash drive may be removed and the laptop's lid closed. On a successful installation a ')' will follow the ':'. On an unsuccessful installation a '(' will follow the ':'. Once installation is complete the laptop will shutdown. If DarkSeaSkies has already been installed on the target with the same implant GUID then the implant will be updated.

For installation and setup of the NightSkies LP refer to *NightSkies User Guide*.

4.3 Initiating a Session

Refer to *NightSkies User Guide*.

4.4 Stopping and Suspending Work

Refer to *NightSkies User Guide*.

4.5 Contingencies and Alternate States and Modes of Operation

DarkSeaSkies status may be queried by checking the value of the *Status* variable. This can be done with the nvram command line utility as follows: **> nvram $(cat status.guid):$(cat status.name)**, where **status.guid** is the GUID of the *Status* variable and **status.name** is the name of the *Status* variable as defined in section 3.1. Valid values of the *Status* variable and their meanings are also described in section 3.1.

The *Count* variable may be queried to determine the number of continuous cautious boots that DarkSeaSkies has encountered. The *Count* variable is incremented during a boot in

which the *Status* variable does not exist or it exists but is not '3'. The *Count* variable is independently incremented in the case of a kernel panic. Therefore, if *Status* is not '3' and a kernel panic is detected, then the *Count* variable is increased by 2. Otherwise the *Count* variable is deleted. A non-existent *Count* variable is considered to have the value zero. The *Status* variable will not exist in the case that the target was booted to an OS other than Mac OSX 10.5 or to an EFI application such as Refit.

The *Limit* variable may be set to override the limit on continuous cautious boots as follows: **> nvram $(cat limit.guid):$(cat limit.name)=%xx%xx%xx %xx**, where **limit.guid** is the GUID of the *Limit* variable and **limit.name** is the name of the *Limit* variable as defined in section 3.1 and the value **%xx%xx%xx%xx** is a four byte hexadecimal number in little-endian byte order with the **%** character before each byte. For instance **%02%00%00%00** is the value **2**.

DarkSeaSkies is uninstalled during a boot in which the *Count* variable is greater than or equal to the *Limit* variable. DarkSeaSkies may be explicitly uninstalled by setting the *Status* variable to '5' as follows: **> nvram $(cat status.guid):$(cat status.name)=5**, where **status.guid** is the GUID of the *Status* variable and **$status.name** is the name of the *Status* variable as defined in section 3.1. The system must then be cleanly shutdown (not a kernel panic and not holding the power button down for ten seconds) so that the *Status* is written to NVRAM. On the next boot DarkSeaSkies will be un-installed.

4.6   Assistance and Problem Reporting

Contact NCS/IOC/EDG/AED/UDB for assistance.

5.   Additional Operational Procedures (Not Applicable)

6.   System Backup and Restore (Not Applicable)

7.   Troubleshooting

In the event that the *Configuration* NVRAM variable becomes corrupted it can be deleted so that DarkSeaSkies will generate the default configuration. Delete the *Configuration* variable with the following command:
> sudo nvram –d $(cat config.guid):$(cat config.name).
This should be followed by a reboot.

8.   Error Messages

The only error message available in DarkSeaSkies is the *Status* NVRAM variable. See section 3.1 for more information.

9. Notes

9.1   Acronyms/Abbreviations

The Acronyms/Abbreviations used in this document are shown in Table 9.1 -1.

Table 9.1-1 Acronyms/Abbreviations

Acronym/Abbreviation	Term
EFI	Extensible Firmware Interface
GUID	Globally Unique Identifier
LP	Listening Post
NVRAM	Non-Volatile Random Access Memory

9.2   Definitions

Definitions of common terms used within this document may be found in the Engineering Development Group Program Management Lexicon.

The terms and definitions unique to this document are shown in Table 9.2 -2.

Table 9.2-2 Definitions

Term	Definition