

# Introduction

Learn about how respawn improved client-side cheat detection in Apex Legends.

- [Specification](#)
- [Obfuscation: Constant \(C-String\)](#)

# Specification

# Obfuscation: Constant (C-String)

R5AC uses a simple XOR algorithm where the decryption key length and encrypted content length are identical.

## Referenced & encoded C-Strings Analysis

### DLL Related

```
“ 0x20ea35 KERNEL32.dll
  0x3a3e51 ntdll.dll
  0x54ee61 ADVAPI32.dll
  0x542551 steamnetworksockets.dll
  0x542691 steam_api64.dll
  0x2f1cc2 EOSSDK-Win64-Shipping.dll
  0x54ee31 EasyAntiCheat_EOS
  0x3a3e81 wine_get_version
```

### API Related

```
“ 0x20ea60 K32GetMappedFileNameA
  0x20ee00 VirtualQuery
  0x20f160 GetLastError
  0x7df831 VirtualProtect
  0x54ee91 OpenSCManagerA
  0x54eec1 OpenServiceA
  0x54eef1 QueryServiceStatusEx
```

**0x54ef21 CloseServiceHandle**  
**0x543471 WideCharToMultiByte**  
**0x541fc0 RtlCaptureStackBackTrace**

## Control Flow Analysis / Game Functions

“ **0x20e9f0 CS\_CEngineClient::Engine\_SetViewAngles**  
**0x26c540 CS\_CNetChan::SetTimeout**  
**0x26dfe0 CS\_CNetChan::SendReliableMessages**  
**0x270511 CS\_CNetChan::SendDatagram**  
**0x2744c1 CS\_CNetChan::SendNetMessage**  
**0x275210 CS\_CNetChan::SendData**  
**0x3ae540 CS\_Playlist\_GetPlaylistVar**  
**0x7cf601 CS\_C\_BaseEntity::CalcAbsoluteVelocity**  
**0x878620 CS\_CViewRender::GetMostRecentClipTransform**  
**0x951be1 CS\_CInput::Input\_CreateMove**  
**0x952811 VTP\_CInput::Input\_CreateMove**  
**0x59ebd0 CS\_CCommandBuffer::AddText**  
**0x69b830 CS\_UTIL\_TraceRay\_Client**  
**0xa58200 CS\_C\_BaseEntity::GetEntityNameAsCStr**  
**0xab800 CS\_C\_MoveData::MoveData\_Init**  
**0xcc4e10 CS\_Pak\_RequireSignedPaks**  
**0xcc8c51 CS\_Pak\_ValidateSignatureForCurrentReadingFile**  
**0xcd89a1 CS\_WrappedFileSystem\_Open**

## Virtual Method Table Analysis

“ **0x22ee01 VTP\_GetEngineTraceClient**  
**0x22f271 VTP\_GetEngineTraceClientDecals**  
**0x479351 VTP\_GetFileSystemInterface**  
**0x817371 VTP\_C\_Player::Spawn**  
**0x865491 VTP\_GetEntityList**  
**0x9f13b1 VTP\_GetViewRenderInstance**

# Miscellaneous

```
0x20f0f0 BA:0x%lX AB:0x%lX RS:0x%lX AP:0x%lX PR:0x%lX TY:0x%lX
0x5427e0 Callstack Init Failed
0x543821 os_version
0x543a12 gpu_vendor
0x543c91 render_device_driver_version
0x543e81 cpu_brand
0x544042 windows_install_date
0x544205 is_wine
0x544231 0
0x544260 1
0x544780 language
0x544a40 HWID_%02X-%02X
0x544ab0 %02X
0x544db1 HWID_%02X-FAILURE
0x54a0b1 %u:%u:%X:%lX:%lX:%lX
0x54fa91 Startup
0x7dfb91 remove permissions
```