SMB Analyzer
(Server Message Block)

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It was only SMB1 and architected in a hybrid Binpac/C++ style.
Server Message Block

From Wikipedia, the free encyclopedia

In computer networking, Server Message Block (SMB), one version of which was also known as Common Internet File System (CIFS, /sifs/),\(^1\)\(^2\) operates as an application-layer network protocol\(^3\) mainly used for providing shared access to files, printers, and serial ports and miscellaneous communications between nodes on a network. It also provides an authenticated inter-process communication mechanism.
How many versions?!  

Fortunately everything after 2.0 is small revisions on the same thing!

Wikipedia forgot about the SMB 1.0 protocol?!

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Business Happens Over SMB.

We’ll come back to this in a minute!
There was some pain...
type SMB1_read_andx_response(header: SMB_Header, offset: uint16) = record {
    word_count : uint8;
    andx : SMB_andx;
    available : uint16;
    data_compact_mode : uint16;
    reserved1 : uint16;
    data_len_low : uint16;
    data_offset : uint16;
    data_len_high : uint16;
    reserved2 : uint64;
    byte_count : uint16;
    pad : padding to data_offset - SMB_Header_length;
    data : bytestring &length=data_len;
    extra_byte_parameters : bytestring &transient &length=(andx.offset == 0 || offset+offsetof(extra_byte_parameters))+2) ? 0 : (andx.offset-(offset+offsetof(extra_byte_parameters)))+2
    andx_command : SMB_andx_command(header, 0, offset+offsetof(andx_command))
} &let {
    is_pipe : bool = $context.connection.get_tree_is_pipe(header.tid);
    pipe_proc : bool = $context.connection.forward_dce_rpc(data, 0, false,
    padding_len : uint8 = (header.unicode == 1) ? 1 : 0;
    data_len : uint32 = (data_len_high << 16) + data_len_low;
    proc : bool = $context.connection.proc_smb1_read_andx_response(header, offset, len, false,
} &byteorder=littleendian;
is_pipe: bool = $context.connection.get_tree_is_pipe(header.tree_id);
pipe_proc : bool = $context.connection.forward_dce_rpc(data, file_id.persistent+file_id._volatile, true) 
&if(is_pipe);

proc : bool = $context.connection.proc_smb2_write_request(header, this);
There was one huge question…

What do we log?!
Raw materials for new logs (events!)

**SMB1**
- smb1_check_directory_request, smb1_check_directory_response, smb1_close_request, smb1_create_directory_request, smb1_create_directory_response, smb1_echo_request, smb1_echo_response, smb1_logoff_andx, smb1_negotiate_request, smb1_negotiate_response, smb1_nt_cancel_request, smb1_nt_create_andx_request, smb1_nt_create_andx_response, smb1_open_andx_request, smb1_open_andx_response, smb1_query_information_request, smb1_read_andx_request, smb1_read_andx_response, smb1_session_setup_andx_request, smb1_session_setup_andx_response, smb1_transaction_request, smb1_transaction2_request, smb1_trans2_find_first2_request, smb1_trans2_query_path_info_request, smb1_trans2_get_dfs_referral_request, smb1_transaction2_response, smb1_tree_connect_andx_request, smb1_tree_connect_andx_response, smb1_tree_disconnect, smb1_write_andx_request, smb1_write_andx_response, smb1_message, smb1_empty_response, smb1_error

**SMB2**
- smb2_close_request, smb2_close_response, smb2_create_request, smb2_create_response, smb2_negotiate_request, smb2_negotiate_response, smb2_read_request, smb2_session_setup_request, smb2_session_setup_response, smb2_set_info_request, smb2_file_rename, smb2_file_delete, smb2_tree_connect_request, smb2_tree_connect_response, smb2_write_request, smb2_message

**Other**
- ntlm_negotiate, ntlm_challenge, ntlm_authenticate, gssapi_neg_result, dce_rpc_message, dce_rpc_bind, dce_rpc_bind_ack, dce_rpc_request, dce_rpc_response
Logs!

- **smb_mapping.log**
  - When a client maps a drive share, that mapping is documented here.

- **smb_files.log**
  - When an action on file is seen on a share, it’s presence is documented along with timestamps. The user can customize what actions to log. This is where things like renames and deletes will go (SMB2 only for now!). Files that are actually transferred will be logged in *files.log*

- **dce_rpc.log**
  - Remote procedure calls. Watch for remote admin!

- **ntlm.log**
  - Authentication using NTLM. This is only integrated into the SMB analyzer right now, but later will be integrated in other places.
Multiplexing pain! These were over the same TCP connection.
smb_files.log

**Fields**

- ts
- uid
- id
- fuid
- action
- path
- name
- size
- prev_name
- times
dce_rpc.log

Fields

ts, uid, id, rtt, named_pipe, endpoint, operation

```
0.009484  \pipe\lsass  lsarpc  LsarOpenPolicy2
0.008416  \pipe\lsass  lsarpc  LsarLookupNames
0.009191  \PIPE\srvsvc  srvsvc  NetrShareGetInfo
0.010550  \pipe\lsass  samr  SamrConnect5
0.010242  \pipe\lsass  samr  SamrOpenUser
```
## ntlm.log

### Fields
```
ts, uid, id, username, hostname, domainname, success, status
```

<table>
<thead>
<tr>
<th>Name</th>
<th>Username</th>
<th>ID</th>
<th>Domain</th>
<th>Success</th>
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<tbody>
<tr>
<td>alice</td>
<td>BR0-X1225</td>
<td>ADS T</td>
<td>SUCCESS</td>
<td></td>
</tr>
<tr>
<td>bob</td>
<td>BR0-R105</td>
<td>ADS T</td>
<td>SUCCESS</td>
<td></td>
</tr>
<tr>
<td>caroline</td>
<td>BR0-D1225</td>
<td>ADS T</td>
<td>SUCCESS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARG-5655</td>
<td>– F</td>
<td>ACCESS_DENIED</td>
<td></td>
</tr>
<tr>
<td>david</td>
<td>BR0-E1105</td>
<td>ADS T</td>
<td>SUCCESS</td>
<td></td>
</tr>
</tbody>
</table>
Back to “Business Runs on SMB”

action: SMB::FILE_RENAME
path: -
name: BUDGET\XXXXXXXXXXX\SALARY POOL\3.5% Increases\2017.xlsx
size: 522901
prev_name: BUDGET\XXXXXXXXXXX\SALARY POOL\3.5% Increases\6A498300
times.modified: 1457402865.456526
times.accessed: 1457402865.222149
times.created: 1457402865.222149
times.changed: 1457402865.456526

Uhhhhhh…..
More ideas

- Look for servers and clients using and looking at those files.
- Create HoneyPot directories that would match those and watch for access to them.
- Analyze GPO policies (they’re just files!)
- Bitlocker recovery keys being stored as PDFs.
- Ransomware detection!
- File hash detection with Intel framework already works.
Using it today

- If you want to use it today, install git master, the 2.5 Beta, or the 2.5 release when it’s available.

- Add "@load protocols/smb" to local.bro

- We decided to leave it disabled by default in 2.5 because it’s a lot of new code and everyone may not be ready for it.
@load protocols/smb

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