



SMB3 Multi-Channel in Samba

sambaXP 2015

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SMB3 features in Samba

- 1 SMB 3.0 (Win8 / 2012):
 - new crypto (sign/encrypt) [4.0]
 - secure negotiation [4.0]
 - durable handles v2 [4.0]
 - persistent file handles [WIP/tracer]
 - **Multi-Channel** [WIP+]
 - SMB direct [designing/starting]
 - cluster features [designing]
 - witness [WIP+]
 - storage features [WIP]
- 2 SMB 3.0.2 (Win8.1 / 2012R2):
[master]
- 3 SMB 3.1.1 (Win10 / 2014):
 - negotiate contexts, preauth: [master]



SMB 3.1

implemented

- 3.1.1 dialect
- negotiate contexts
- preauthentication integrity
- encryption improvements (choose cipher)
AES-128-CCM → AES-128-GCM

not implemented

- cluster dialect fencing
- cluster client failover v2 (client)

The background consists of numerous thin, light gray lines that flow and curve across the page, creating a sense of motion and depth. These lines overlap and intersect, forming a complex, organic pattern that resembles a multi-channel signal or a series of overlapping waves. The overall effect is a dynamic and textured visual field.

Multi-Channel

Multi-Channel - General

- bind multiple transport connections to one session
- increase throughput and fault tolerance

Multi-Channel - Windows/Protocol

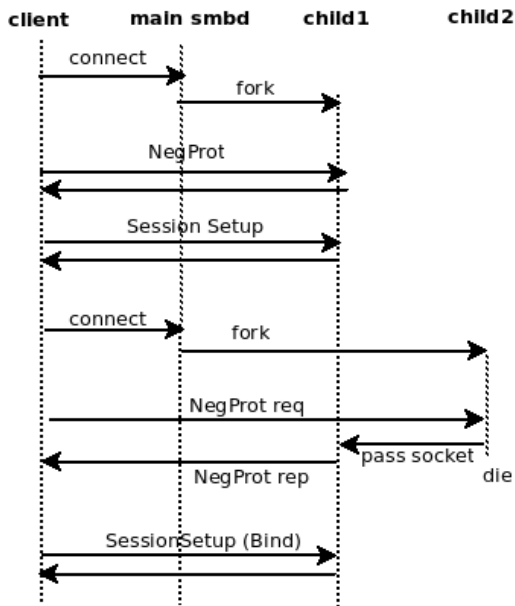
- 1 establish initial session on TCP connection
- 2 find interfaces with interface discovery:
FSCTL_QUERY_NETWORK_INTERFACE_INFO
- 3 bind additional TCP (or RDMA) connection (channel) to established SMB3 session (session bind)
- 4 windows: uses connections of same (and best quality)
- 5 windows: binds only to a single node
- 6 replay / retry mechanisms, epoch numbers

Multi-Channel - Samba

samba/smbd: multi-process

- **Currently:** process \Leftrightarrow TCP connection
- **Idea:** transfer new TPC connection to existing smbd
- **How?** \Rightarrow use fd-passing (sendmsg/recvmmsg)
- **When?** as early as possible, based on client GUID
 \Rightarrow per client GUID single process model

Multi-Channel - Samba



Multi-Channel - Samba

- 1 preparation:
messaging rewrite using unix dgm sockets with sendmsg [DONE,4.2]
- 2 add fd-passing to messaging [DONE,4.2]
- 3 preparations in internal structures [ess.DONE]
- 4 implement smbd message to pass a tcp connection [ess.DONE]
- 5 transfer connection already in negprot (ClientGUID) [largely DONE]
- 6 implement session bind [ess.DONE]
- 7 implement channel epoch numbers [WIP]
- 8 implement interface discovery [WIP]
- 9 implement test case [WIP]

MSG_SMBXSRV_CONNECTION_PASS

from smbXsrv.idl

```
typedef struct {  
    NTTIME                initial_connect_time;  
    GUID                  client_guid;  
    hyper                 seq_low;  
    DATA_BLOB            negotiate_request;  
} smbXsrv_connection_pass0;
```

Internal Structures (smbXsrv)

before

```
smbXsrv_session -> smbXsrv_connection
```

after

```
smbXsrv_session -> smbXsrv_client -> smbXsrv_connection
```



shell breakout to browse code/diff

The background consists of numerous overlapping, wavy lines in various shades of gray, creating a complex, layered effect. The lines flow across the frame, with some appearing more prominent than others, creating a sense of depth and movement.

Multi-Channel Demo

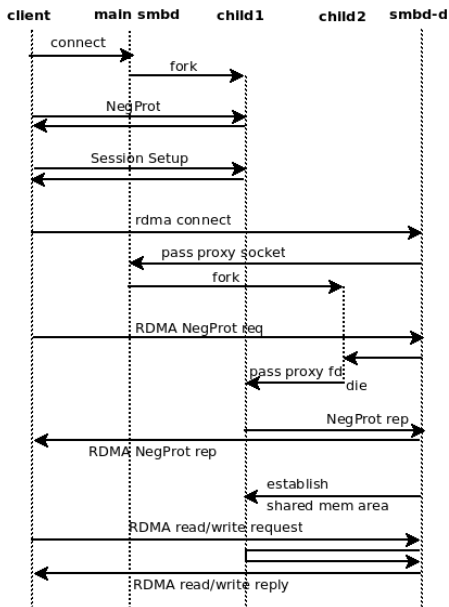


Outlook: SMB Direct

SMB Direct (RDMA)

- windows:
 - requires multi-channel
 - start with TCP, bind an RDMA channel
 - reads and writes use RDMA write/read
 - protocol/metadata via send/receive
- wireshark dissector: [DONE]
- samba (TODO):
 - prereq: multi-channel / fd-passing
 - buffer / transport abstractions [TODO]
 - **problem**: libraries: not fork safe and no fd-passing
⇒ central daemon (or kernel module) to serve as RDMA "proxy"

SMB Direct (RDMA) - Plan



SMB features in Samba

<https://wiki.samba.org/index.php/Samba3/SMB3>

Thanks for your attention!

Questions?

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