

INTRODUCE IN-KERNEL SMB3 SERVER CALLED CIFSD

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About me

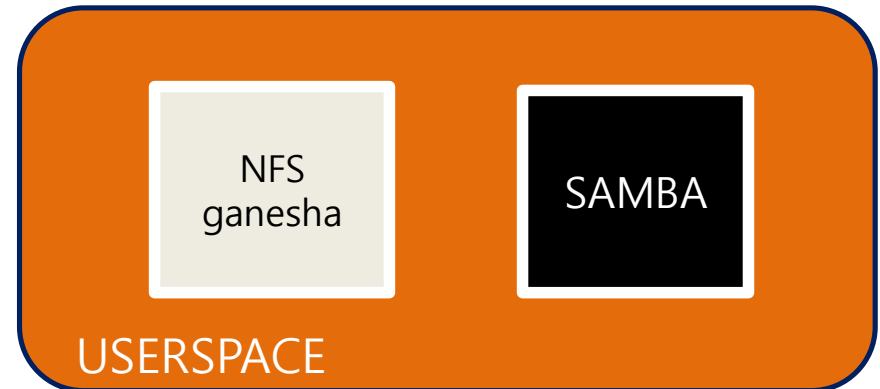
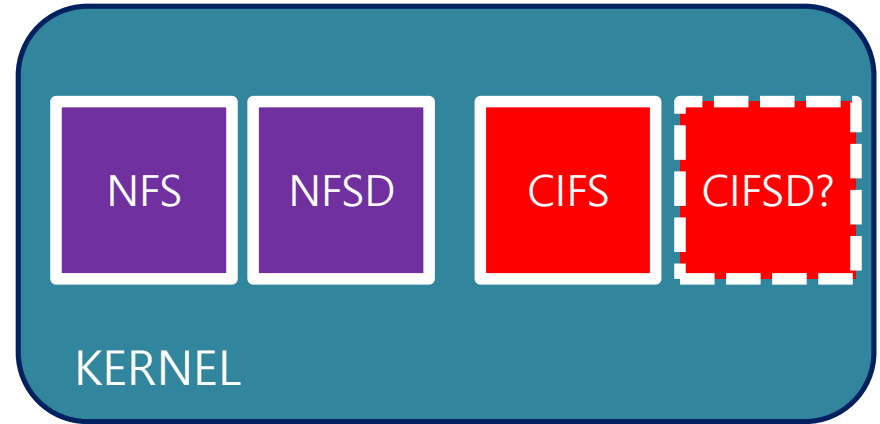
- **Linux kernel contributor since 2011**
- **Co-Creator of Samsung internal NTFS Filesystem**
- **Introduce collapse and insert range syscall**
- **Creator and maintainer of linux-cifs project**

Topic

- **Introduction**
- **Architecture**
- **Components**
- **Performance/Stability/Compatibility**
- **Plan**
- **Proposal**

What is cifsd ?

- **SMB Server for Linux kernel**
- **Kernel and Userspace daemons**
- **All SMB Ver. (SMB1 ~ SMB3.1.1)**
- **Authentication**
 - NTLM
 - NTLMv2
- **Performance feature**
 - Oplock/lease
 - compound request
 - Copy offload
- **Security feature**
 - Signing
 - encryption



linux-cifs project

- **Github Repo**

- <https://github.com/cifs-team/cifs>
- <https://github.com/cifs-team/cifs-tools>

- **Mailing-list**

- linux-cifs-devel@lists.sourceforge.net

- **5 active developers**

- SMB2 notify (In progress, Yunjae Lim)
- SMBDirect (In progress, Hyunchul Lee)

Key Concepts

- **Can gain the performance in kernel ?**
 - No system call (less TLB miss, less context switching)
 - Shorter path to use VFS and network functions in kernel
 - no duplicate memory allocation for inode and superblock

Key Concepts

- **Optimized SMB over RDMA support**



Key Concepts

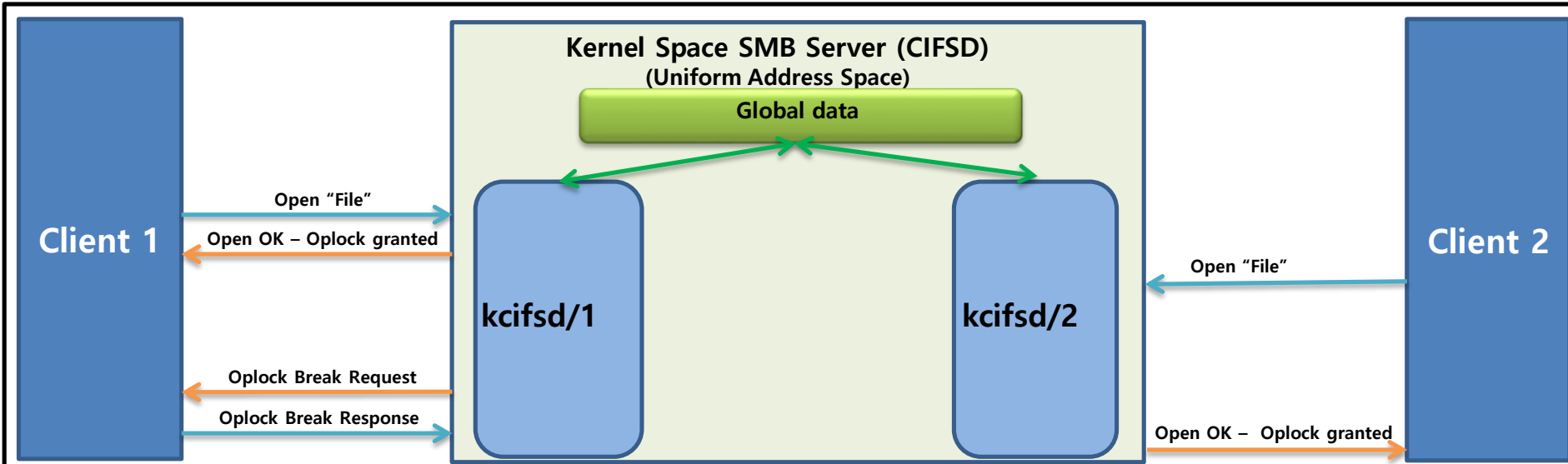
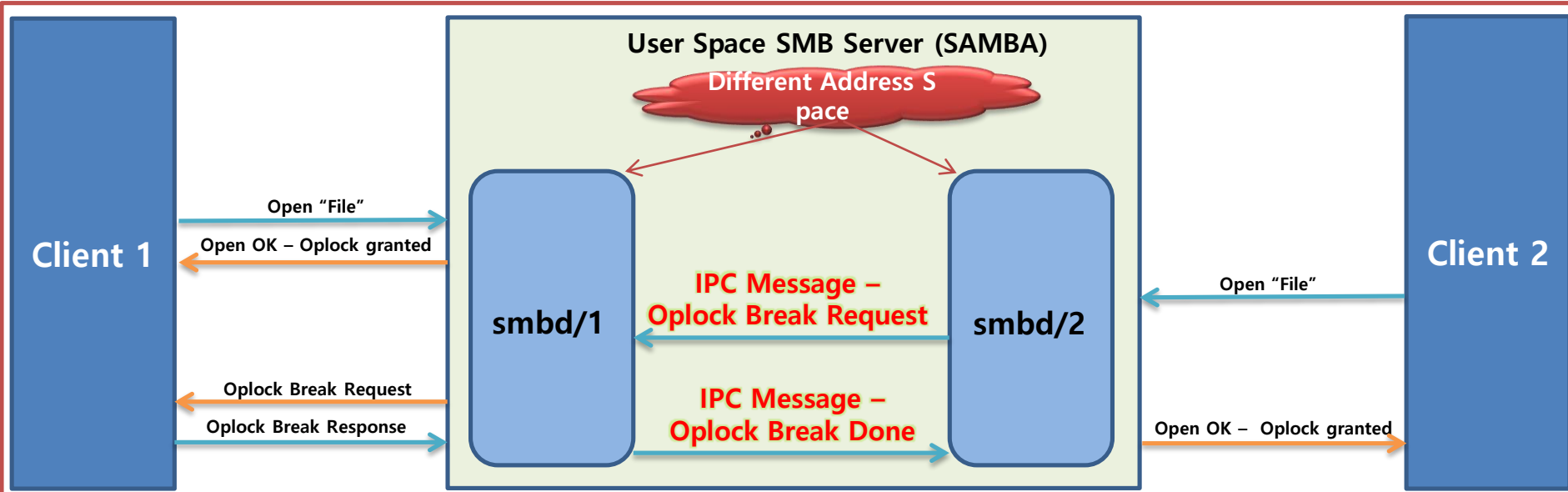
- **Simple/light file share for embedded device**

Reported by Andy Walsh(OpenWRT)

Binary Size	Main	Extra	Total
cifs	128KB(cifs kmod, tools)	61KB(crypto kmods) + 872KB(glib2)	1061KB
samba4	6MB(samba libs, server package)	64KB(libtirpc, etc)	6064KB

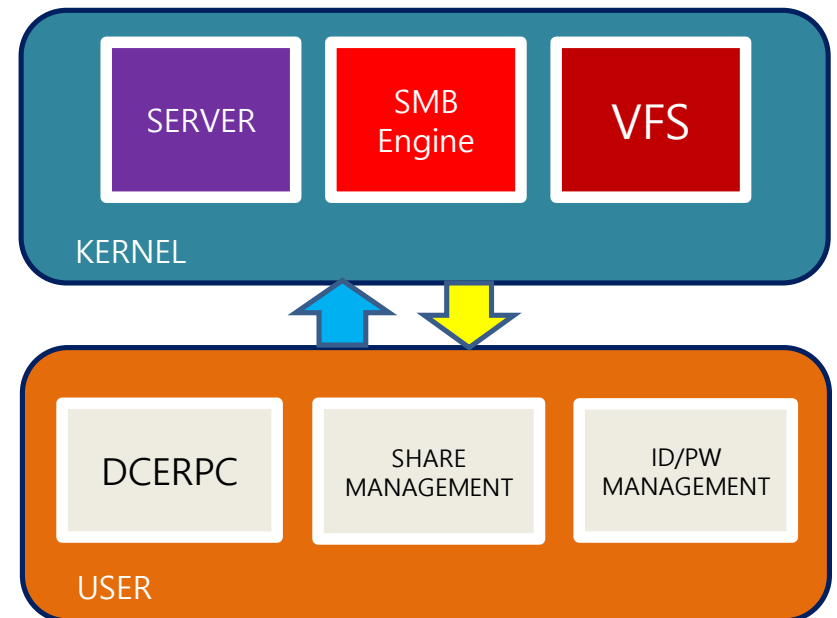
Key Concepts

- Oplock/lease better handling(page 20)



Architecture

- Separate kernel space and user space daemon
 - Works related to performance in kernel space
 - Works related to non-performance in user space
- Co-work cifs and kcsmbd in each space
 - When cifs is launched, kcsmbd is activated
 - They exchange information necessary for each other

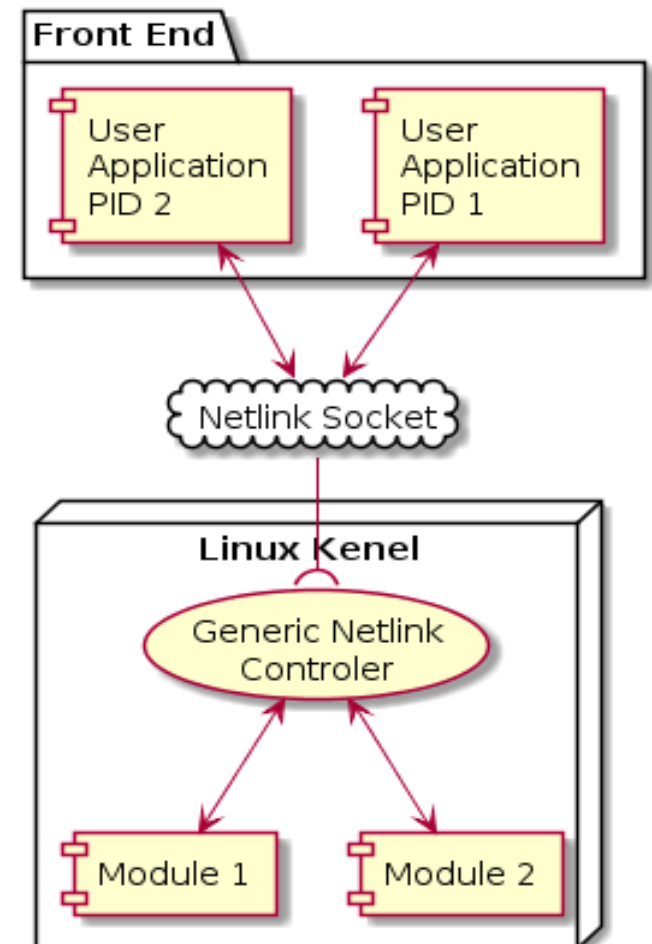


Architecture

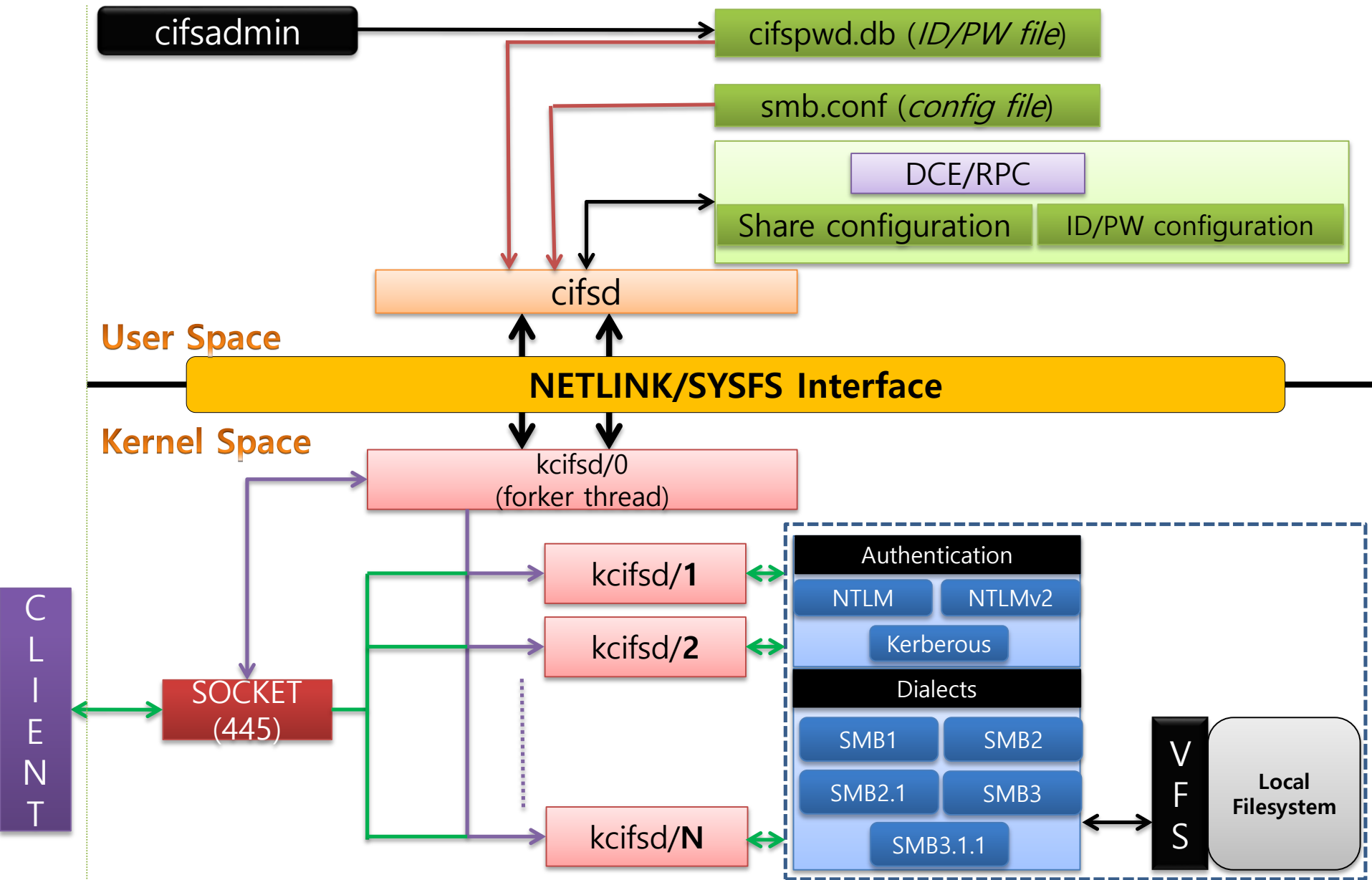
- How to communicate between kernel and userspace
 - Use Netlink interface
 - Specify a few commands

Name	Purpose
CIFSD_EVENT_HEARTBEAT_REQUEST	Monitor cifsd is alive
CIFSD_EVENT_STARTING_UP CIFSD_EVENT_SHUTTING_DOWN	Transfer the initial information necessary for the start and shutdown
CIFSD_EVENT_LOGIN_REQUEST CIFSD_EVENT_LOGIN_RESPONSE	Transfer the user account / password information necessary for login
CIFSD_EVENT_SHARE_CONFIG_REQUEST CIFSD_EVENT_SHARE_CONFIG_RESPONSE	Transfer the share configuration
CIFSD_EVENT_TREE_CONNECT_RESPONSE CIFSD_EVENT_TREE_DISCONNECT_REQUEST	Transfer the tree connect info
CIFSD_EVENT_RPC_REQUEST CIFSD_EVENT_RPC_RESPONSE	Transfer DCERPC requests

Generic Netlink Socket Usecase

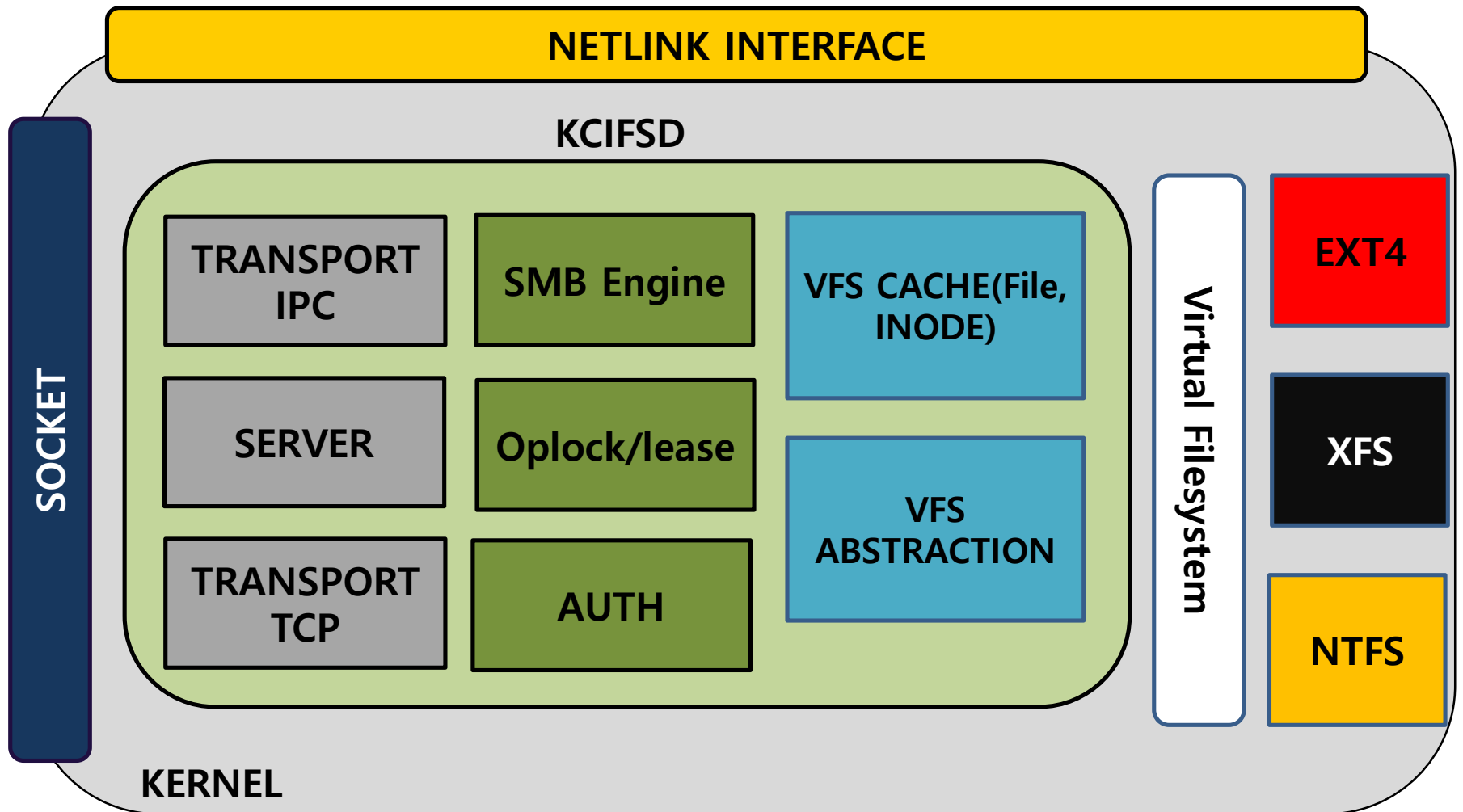


Architecture



Architecture

■ KCIFSD Components



Architecture

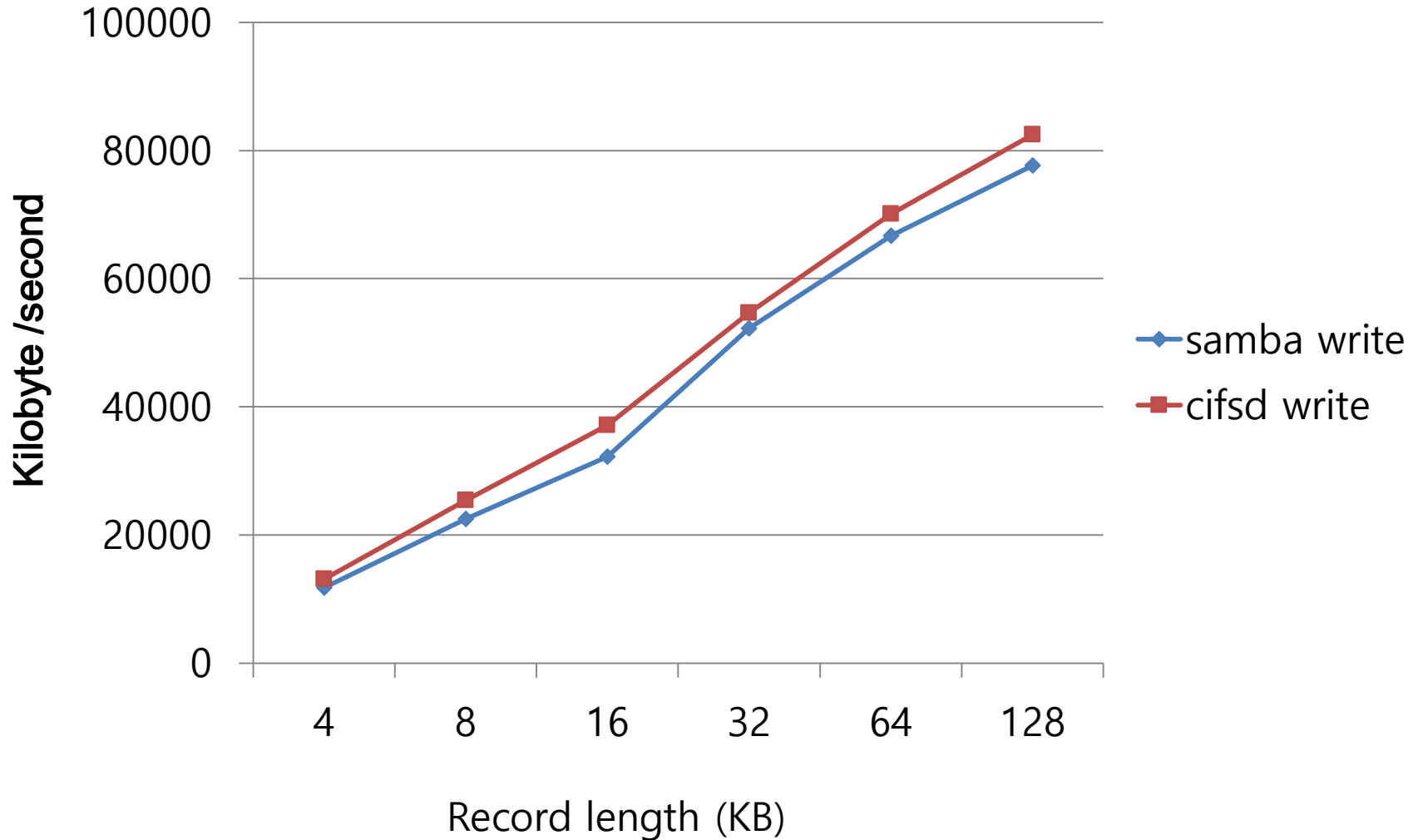
- **Minimum DCERPC implementation**
- **The parameter format of smb.conf**
 - compatible with samba's one
 - Minimum implementation
 - List up of supported parameters in smb.conf.example
- **SMB1 is disable at default**
 - Smart phone apps(ES File Explorer) support only SMB1
 - Can easily remove it when merging into mainline

Performance comparison

- **Tool : lozone, fileop, bench-oplock(smbtorture)**
- **Mount share tmpfs**
- **Direct connection on two PC**
- **Oplock / lease is disable**
- **SMB client is a kernel cifs**

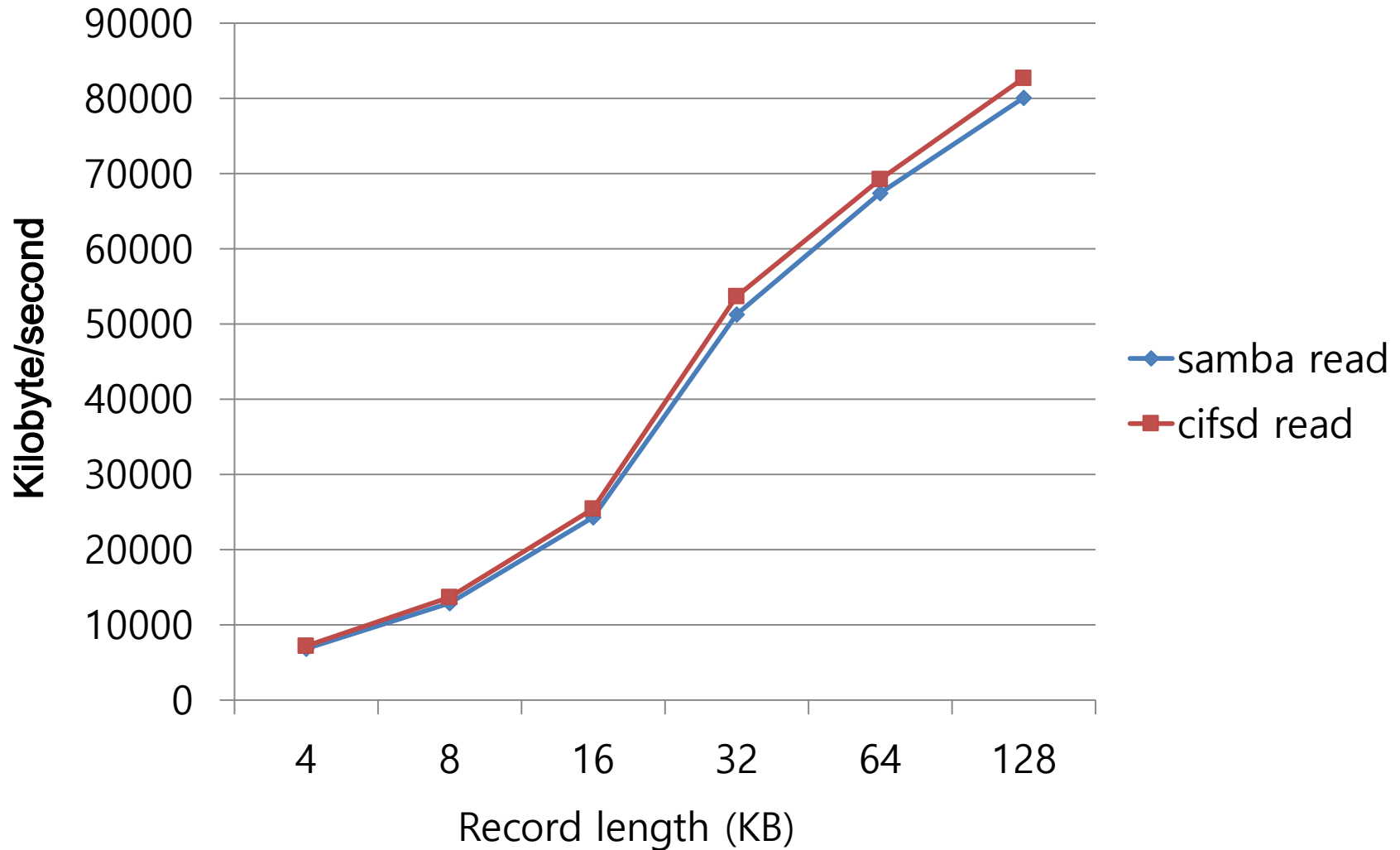
Performance comparison

Single Writer lozone Throught

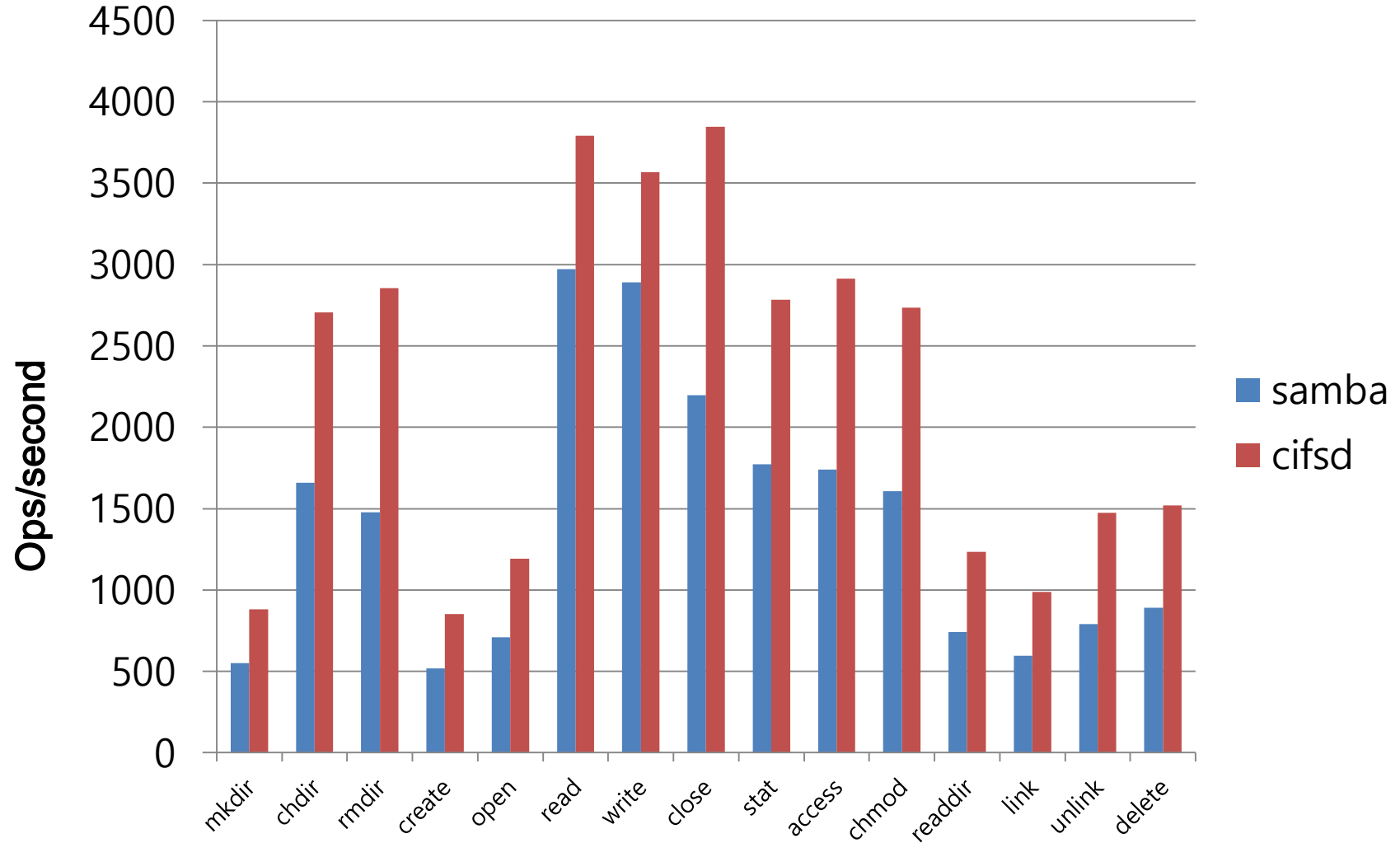


Performance comparison

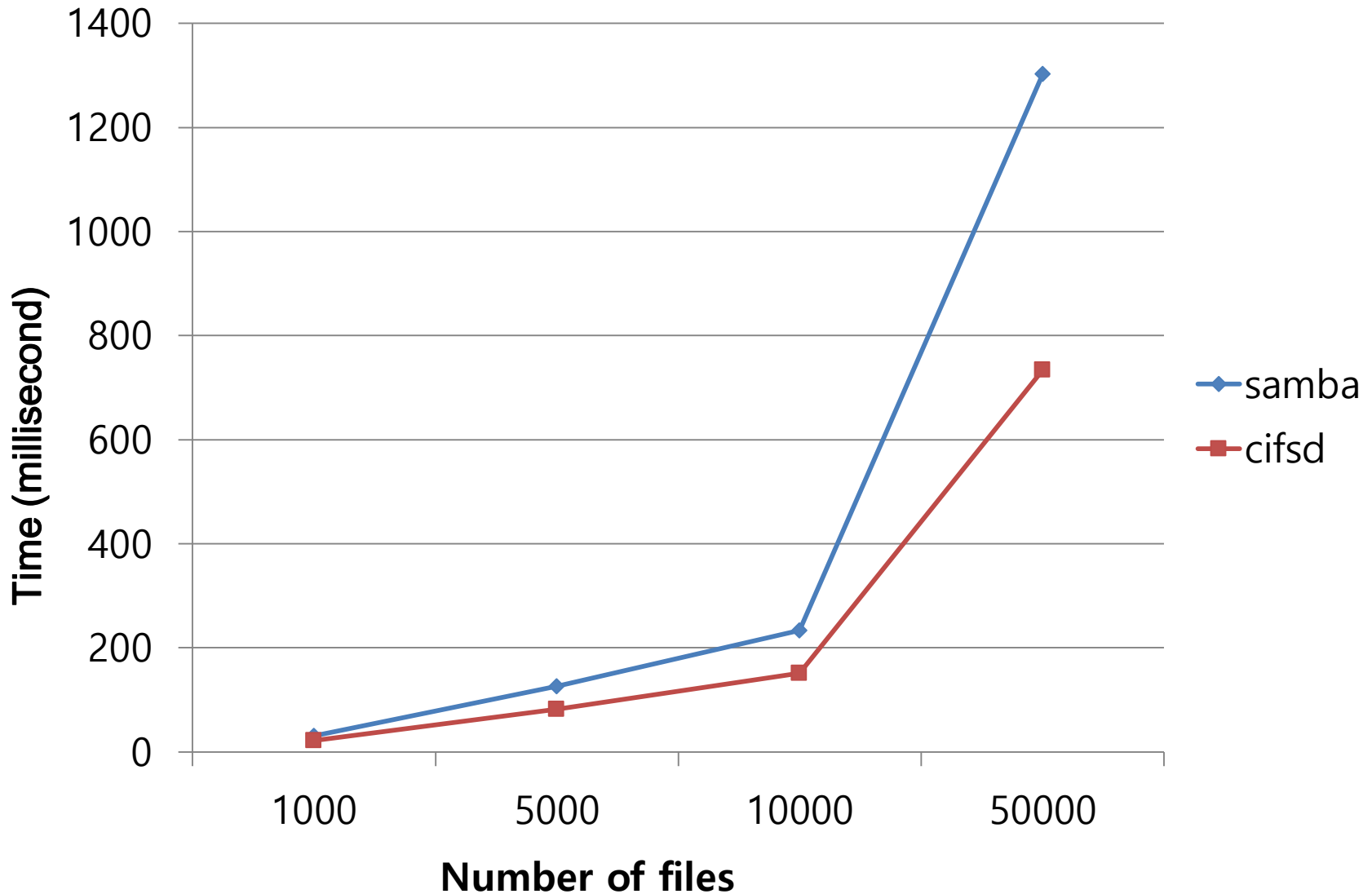
Single Reader I/Ozone Throught



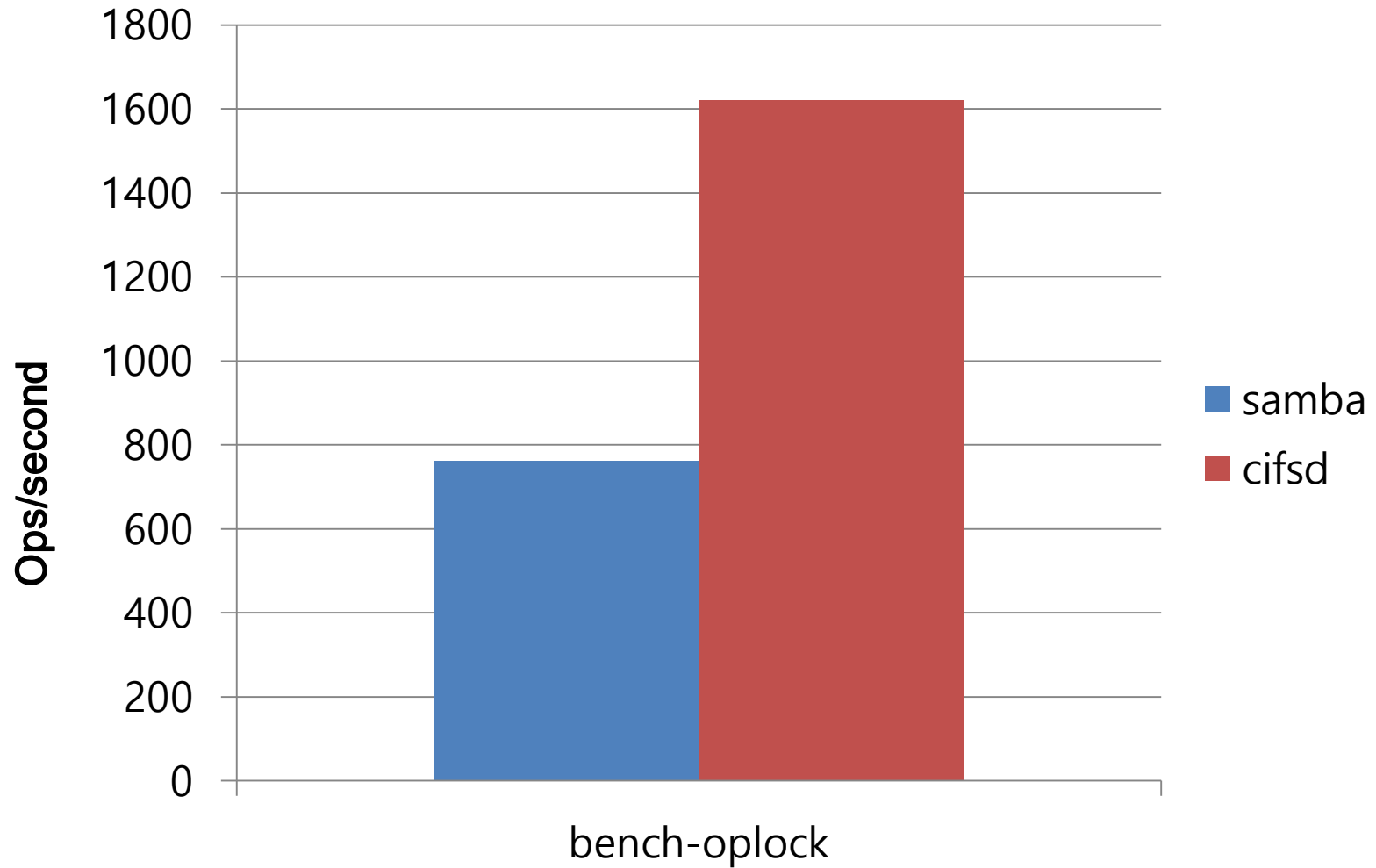
Fileops Result



File lookup Performance(Is -l)



Bench oplock

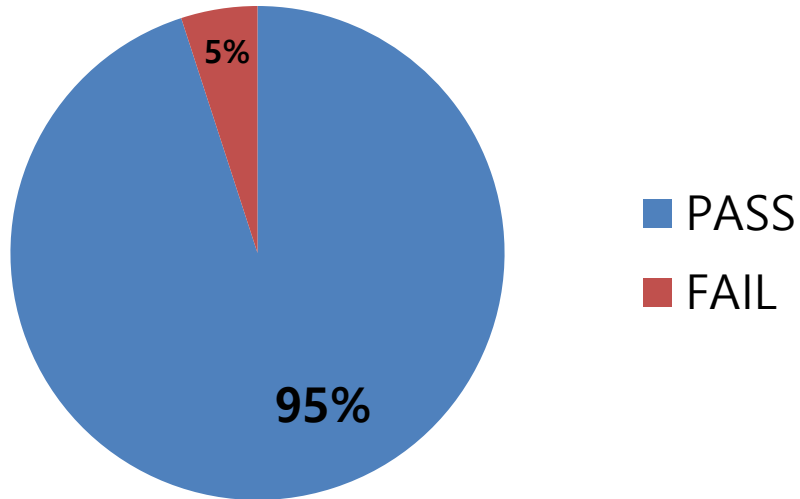


Compatibility

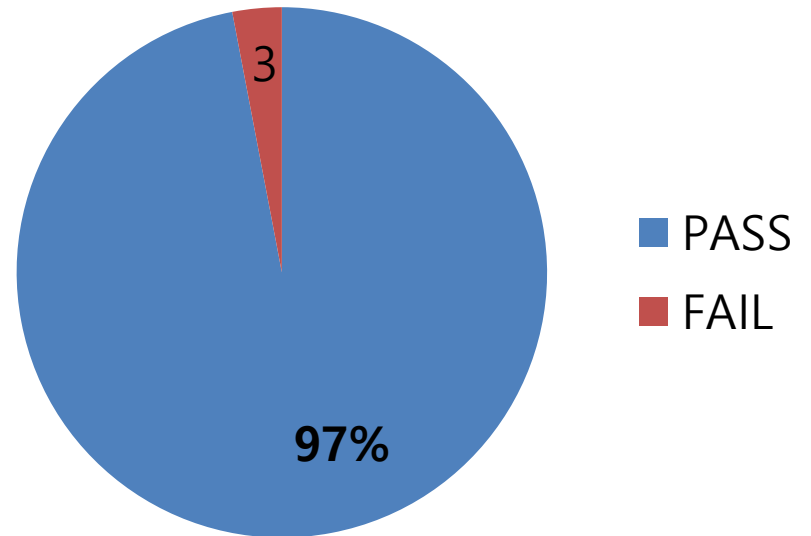
SMB CLIENT VERSIONS	CIFS SUPPORTED
Windows XP (SMB 1.0)	✓
Windows Vista (SMB 2 .0)	✓
Windows 7 (SMB 2.1)	✓
Windows 8 (SMB 3.0)	✓
Windows 10 (SMB 3.1.1)	✓
MacOS(~ High Sierra)	✓
Ubuntu File Explorer	✓
Linux CIFS Client(linux 4.16)	✓

Stability

SMB TORTURE(SMB2/3)



XFSTESTS(SMB2/3)



Plan

- **SMB Direct Support (~ Sep)**
 - Writing by Hyunchul Lee(LGE)
 - Share the status at SDC 2019
- **Oplock/Lease is enable at default**
- **Send the patch-set to LKML(~ Sep)**

Proposal

- **How about make kcfisd & samba running together ?**



Proposal

- **Define new parameter in smb.conf**
- **Kcifsd can be a kernel helper of samba**
- **Use SMBDirect in kcifsd through ioctl or netlink**

Thank you!