Samba Fileserving

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September 25, 2014

Samba File Serving Topics

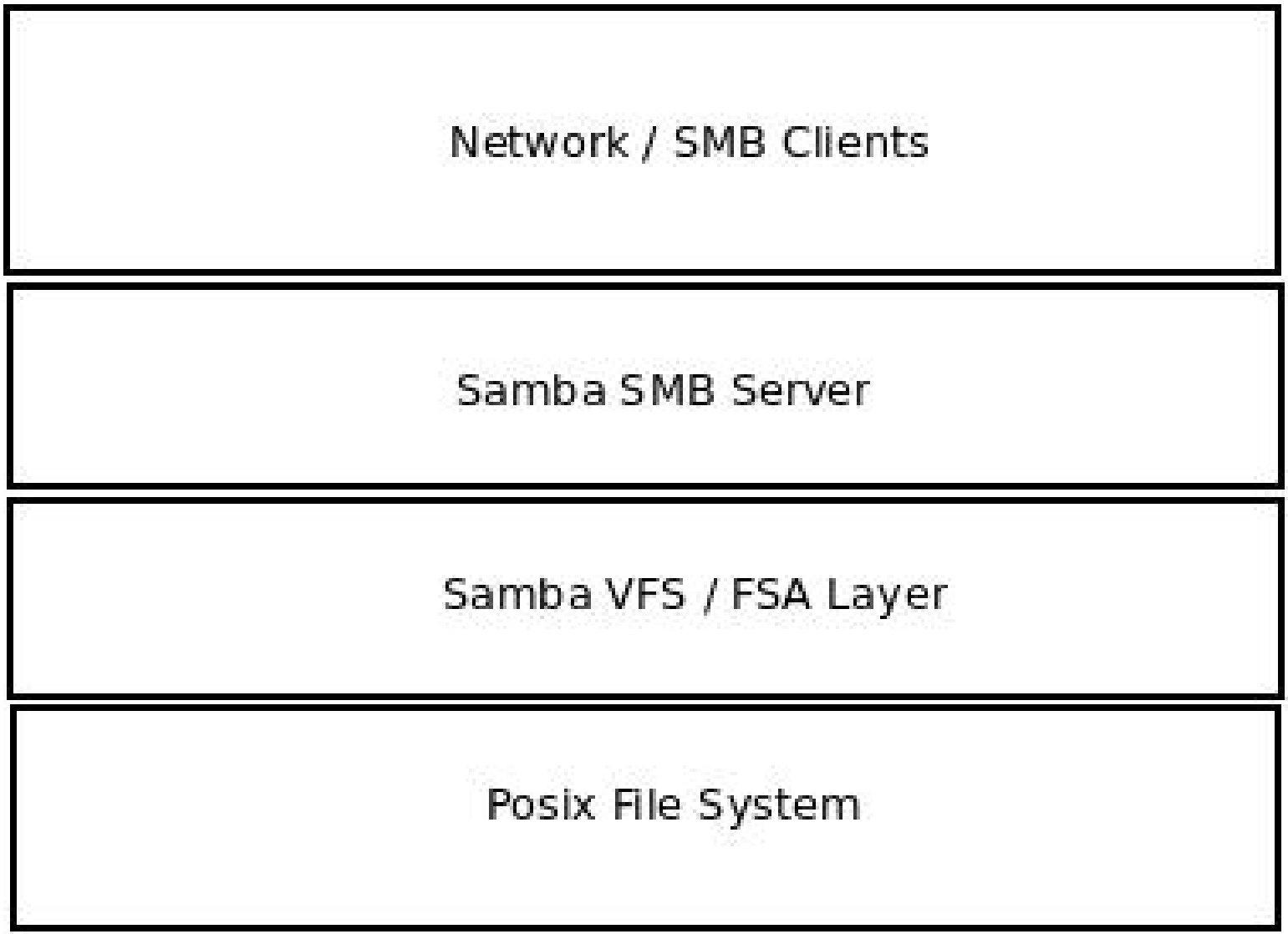
Core File Server:

- SMB features (SMB3...)
- Performance
- Interop (Protocols, NFS, AFP, ...)
- ...

Moreover:

- Auth/Domain Member
- RPC server
- ...

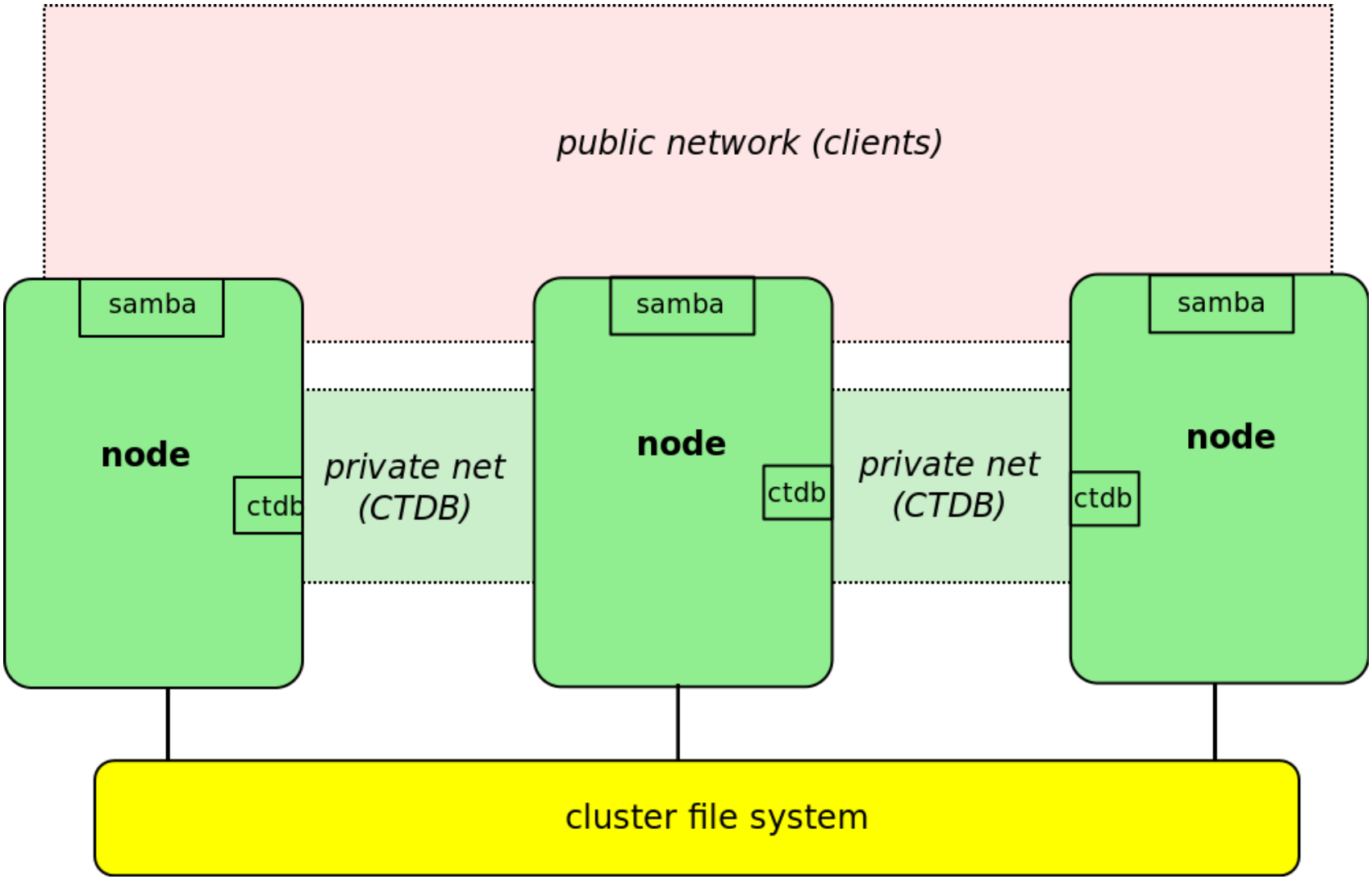
File Server Layout/Scope



SMB Features

- SMB 2.0:
  - durable file handles [4.0]
- SMB 2.1:
  - multi-credit / large mtu [4.0]
  - dynamic reauthentication [4.0]
  - leasing [WIP++]
  - resilient file handles [ever?]
- SMB 3.0:
  - new crypto (sign/encrypt) [4.0]
  - secure negotiation [4.0]
  - durable handles v2 [4.0]
  - persistent file handles [planning]
  - multi-channel [WIP+]
  - SMB direct [designed/starting]
  - cluster features [designing]
    - witness [WIP]
  - storage features [WIP]
- SMB 3.1: [WIP]

Clusterd Samba / CTDB (SOFS since 2007)



Technical Details...

Multi-Channel - Windows/Protocol

- find interfaces with interface discovery: `FSCTL_QUERY_NETWORK_INTERFACE_INFO`
- bind additional TCP (or RDMA) connection (channel) to established SMB3 session (session bind)
- bind (TCP) connections of same quality
- bind only to a single node
- replay / retry mechanisms, epoch numbers

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Multi-Channel - Samba

- samba/smbd: multi-process
  - process $\Leftrightarrow$ tcp connection
  - $\Rightarrow$ transfer new connection to existing smbd
  - use fd-passing (sendmsg/recvmsg)

- preparation: messaging rewrite using unix dgm sockets with sendmsg [DONE,Volker]
- add fd-passing [WIP]
- transfer connection already in negprot (ClientGUID) [TODO]
- implement channel epoch numbers [started]
- implemnt interface discovery [TODO]

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SMB Direct (RDMA)

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

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SMB Direct (RDMA) - Plan

- smbd-d (?) listens for RDMA connection
- main smbd listens for TCP connection
- main smbd listens (for RDMA) via unix socket connect to smbd-d
- client connects via TCP $\rightarrow$ smbd forks child smbd (c1)
- client connects via RDMA to smbd-d
- smbd-d notifies main smbd and transfers connection info
- smbd forks child (c2) that inherits connection to smbd-d
- c2 smbd passes [connection to smbd-d] to c1 (via ClientGUID) and exits
- c1 establishes mmap area with smbd-d
- client does rdma calls to smbd-d
  - metadata and protocol calls are transferred via socket to tcp-smbd
  - rdma read/write directly to tcp-smbd via mmap area

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Clustering Concepts (Windows)

- Cluster:
  - ("traditional") failover cluster (active-passive)
  - protocol: `SMB2_SHARE_CAP_CLUSTER`
  - Windows:
    - runs off a cluster (failover) volume
    - offers the Witness service
- Scale-Out (SOFS):
  - scale-out cluster (all-active!)
  - protocol: `SMB2_SHARE_CAP_SCALEOUT`
  - no client caching
  - Windows: runs off a cluster shared volume (implies cluster)
- Continuous Availability (CA):
  - transparent failover, persistent handles
  - protocol: `SMB2_SHARE_CAP_CONTINUOUS_AVAILABILITY`
  - can independently turned on on any cluster share (failover or scale-out)
  - $\Rightarrow$ changed client retry behaviour!
- `SMB2_SHARE_CAP_CLUSTER`:
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Clustering – Client Behaviour (Win8)

- SMB2_SHARE_CAP_CLUSTER:
  - clients happily work if witness is not available
- SMB2_SHARE_CAP_SCALEOUT:
  - clients happily connect if CLUSTER is not set.
  - clients DO request oplocks/leases/durable handles
  - clients are not confused if they get these
- SMB2_SHARE_CAP_CONTINUOUS_AVAILABILITY:
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Clustering with Samba/CTDB

- all-active SMB-cluster with Samba and CTDB...
  ...since 2007! ☺
- transparent for the client
  - CTDB:
    - metadata and messaging engine for Samba in a cluster
    - plus cluster resource manager (IPs, services...)
  - client only sees one "big" SMB server
  - we could not change the client!...
  - works "well enough"
- challenge:
  - how to integrate SMB3 clustering with Samba/CTDB
  - good: rather orthogonal
  - ctdb-clustering transparent mostly due to management

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  - monitoring of availability of resources (shares, NICs)
  - server asks client to move to another resource
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- status in Samba [WIP (Metze, Gregor Beck)]:
  - async RPC: WIP, good progress ($\Rightarrow$ Metze's talk)
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  - client: in `rpcclient` - done
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Questions?

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