Microsoft FileServer Protocol Test Suite

Overview and Updates

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Agenda

- FileServer Test Suite Overview

- Test Suite Open Source & Cross-Platform

- What's New

- Demo

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FileServer Test Suite

Overview

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What is a Windows Protocol Test Suite

Evaluates whether a protocol implementation meets certain interoperability requirements.

- Originally developed for in-house testing of Microsoft Open Specifications.
- Used to test/verify Windows behavior.
- Also used to test 3rd-party implementations.

Do not cover every protocol requirement, and do not certify an implementation, but can be a useful indication of interoperability.

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FileServer Test Suite Scope

Protocols

[**MS-SMB2**]:Server Message Block (SMB) Protocol Versions 2 and 3	[**MS-FSA**]: File System Algorithms
[**MS-SWN**]: Service Witness Protocol	[**MS-RSVD**]: Remote Shared Virtual Disk Protocol
[**MS-FSRVP**]: File Server Remote VSS Protocol	[**MS-SQOS**]: Storage Quality of Service Protocol
[**MS-DFSC**]: Distributed File System (DFS): Referral Protocol	[**MS-HVRS**]: Hyper-V Remote Storage Profile

Messages

Negotiate (Negotiate Contexts)	Session Setup
Tree Connect/Disconnect	Create/Close (Create Contexts)
IOCTL	Query Directory
Query Info/Set Info	...

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FileServer Test Suite Features

Negotiate	Session Mgmt.	Tree Mgmt.	Create/Close	IOCtl
Credit Mgmt.	Signing	Leasing/Oplock	Durable Handle	Multi Channel
Persistent Handle	Replay	App Instance Id	Encryption	Compression

Dialect 2.002 Dialect 2.1 Dialect 3.0 Dialect 3.02 Dialect 3.11

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FileServer Test Suite Approach

- Traditional Test
  - Covers basic functionalities and scenarios

- Model-based Test
  - 2K+ test cases generated by 13 models
  - Better coverage on
    - Parameter combination
    - Message sequence
    - Negative tests

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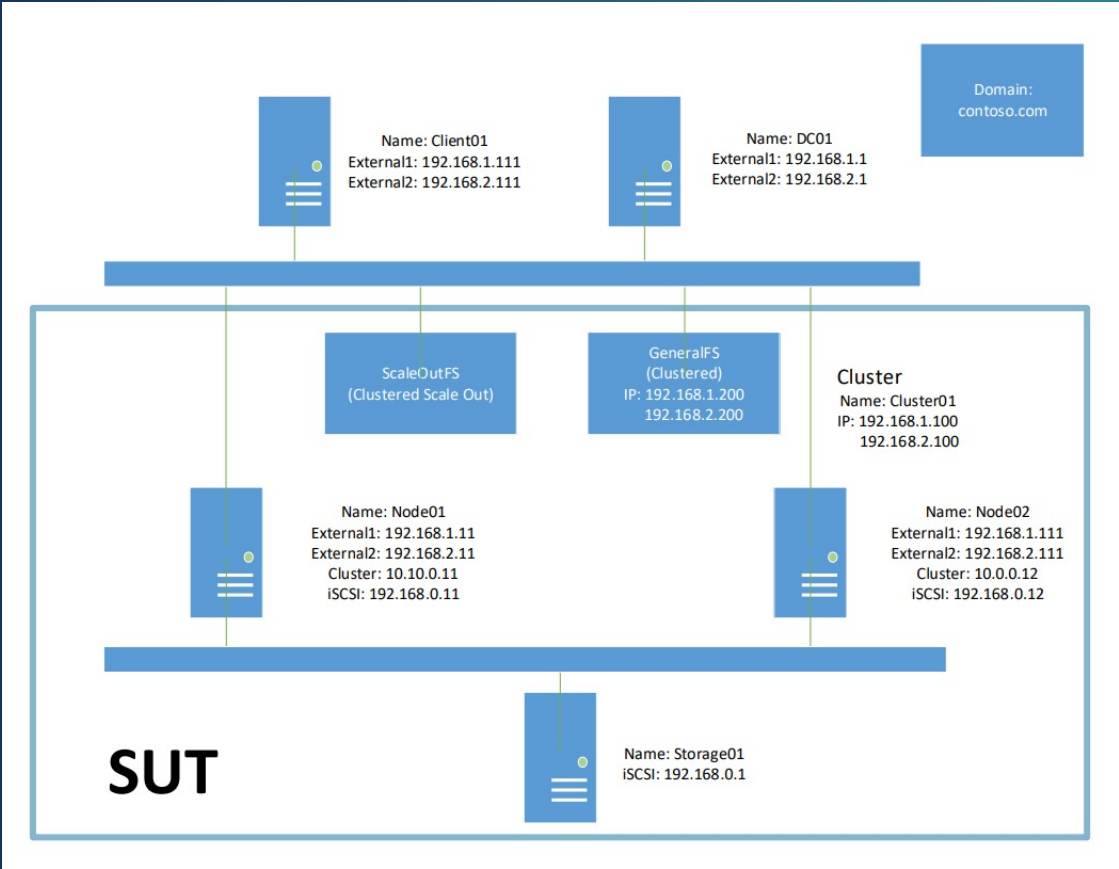SD CEMEA

FileServer Test Suite Infrastructure
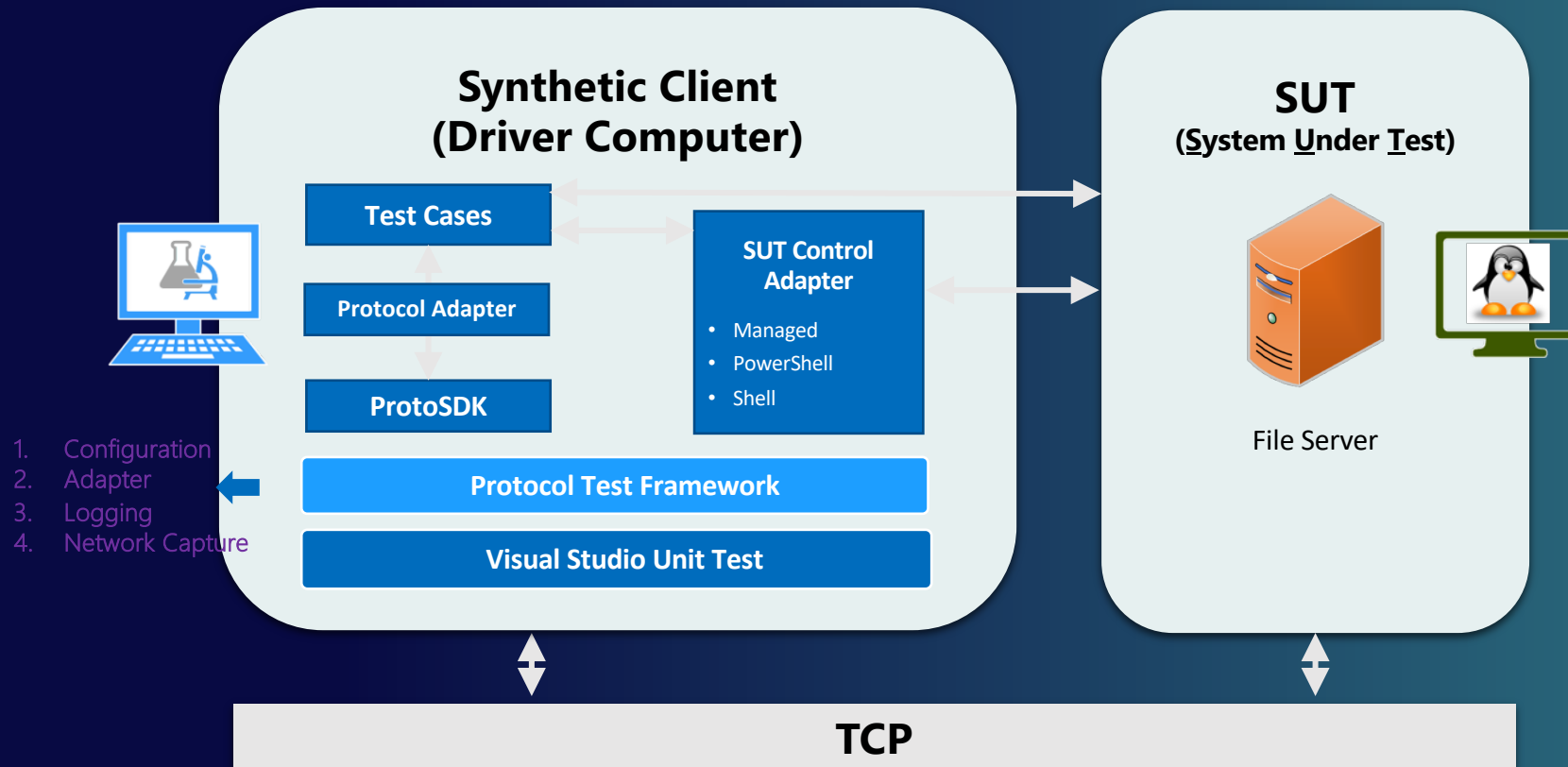
FileServer Test Suite Environment

FileServer Standard
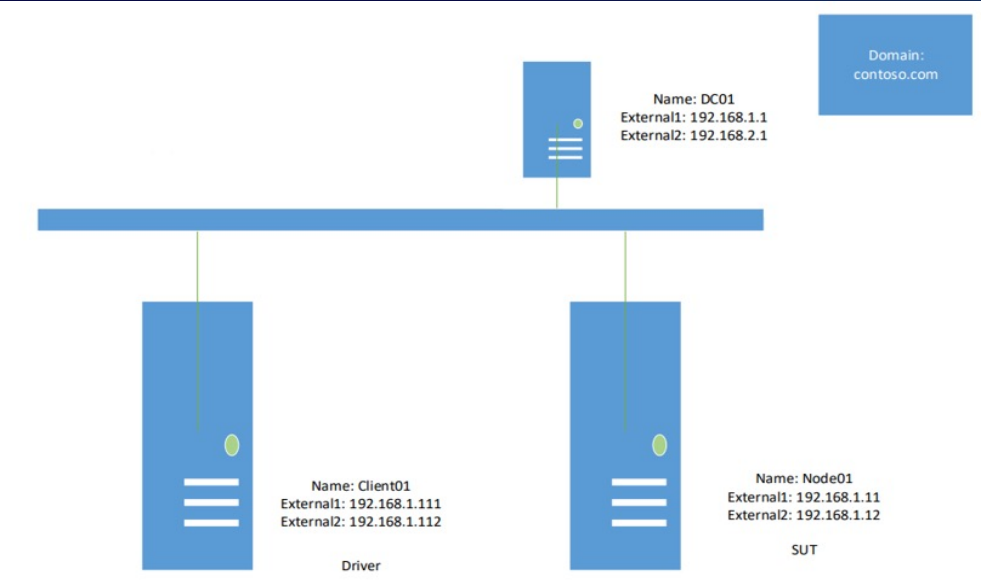
FileServer Cluster

Windows Protocol Test Suite

Open Source & Cross-Platform

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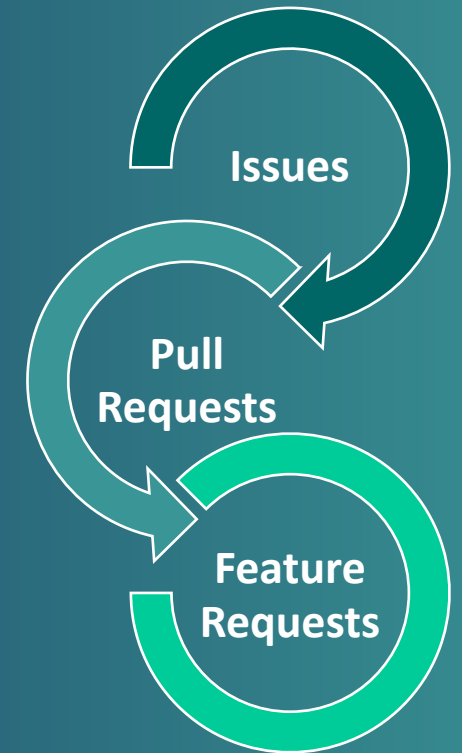SD^C EMEA

Windows Protocol Test Suite Cross Platform

Windows Protocol Test Suite Open Source
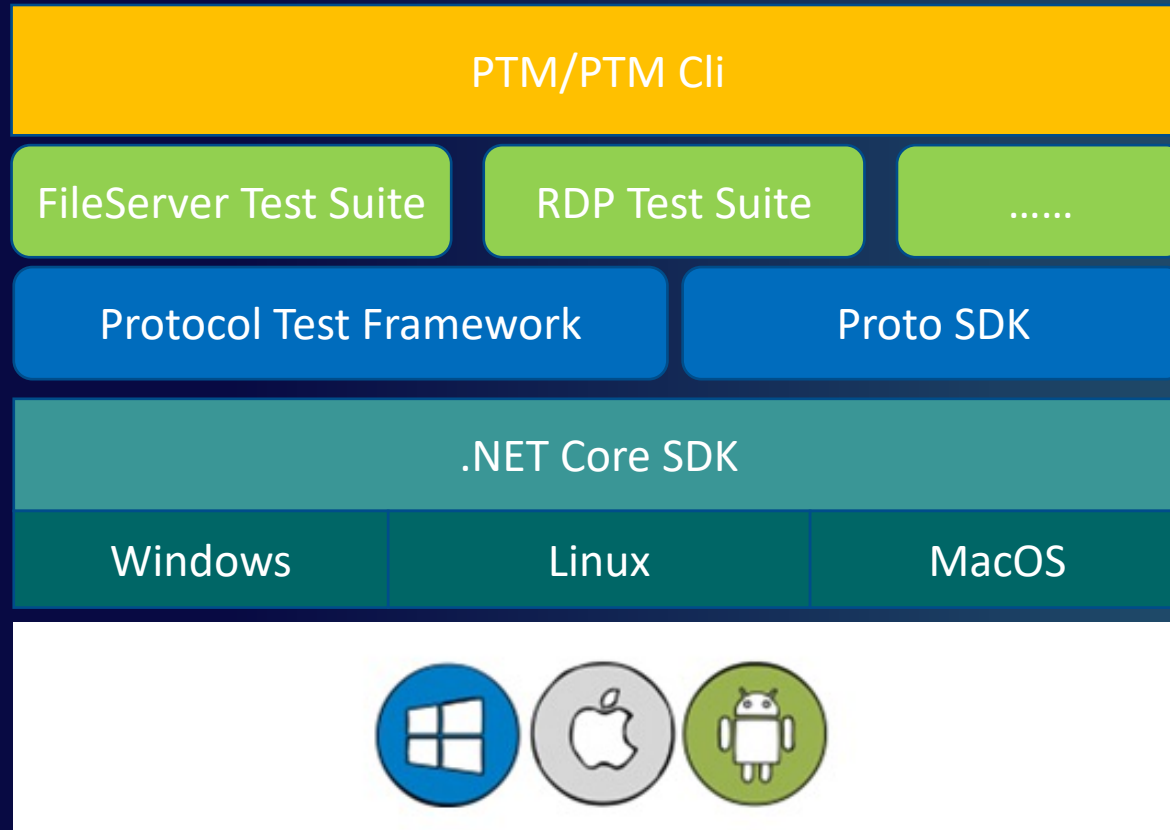
Open sourced on GitHub since 2016
https://github.com/Microsoft/WindowsProtocolTestSuites
https://github.com/Microsoft/ProtocolTestFramework

Category	Test Suite Name	Protocols
File Sharing	FileServer	MS-SMB2, MS-FSRVP, MS-SWN, MS-DFSC, MS-RSVD, MS-SQOS, MS-FSA, MS-HVRS
	MS-SMB	MS-SMB
	MS-SMBD	MS-SMBD
	BranchCache	MS-PCCRC, MS-PCCRR, MS-PCCRTP, MS-PCHC, MS-CCROD
Security	Kerberos	MS-KILE, MS-KKDCP, MS-PAC
	MS-AZOD	MS-AZOD
Active Directory	ADFamily	MS-ADTS-LDAP, MS-ADTS-PublishDC, MS-ADTS-Schema, MS-ADTS-Security, MS-APDS, MS-DRSR, MS-FRS2, MS-LSAD, MS-LSAT, MS-NRPC, MS-SAMR
	MS-ADOD	MS-ADOD
Remote Desktop	RDP Client/RDP Server	MS-RDPBCGR, MS-RDPEDISP, MS-RDPEDYC, MS-RDPEGFX, MS-RDPEGT, MS-RDPEI, MS-RDPEMT, MS-RDPEUDP, MS-RDPEUSB, MS-RDPEVOR, MS-RDPRFX, MS-RDPELE
BYOD	MS-ADFSPIP	MS-ADFSPIP

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Windows Protocol Test Suites Updates

Windows Protocol Test Suites Release v4.21.5.0
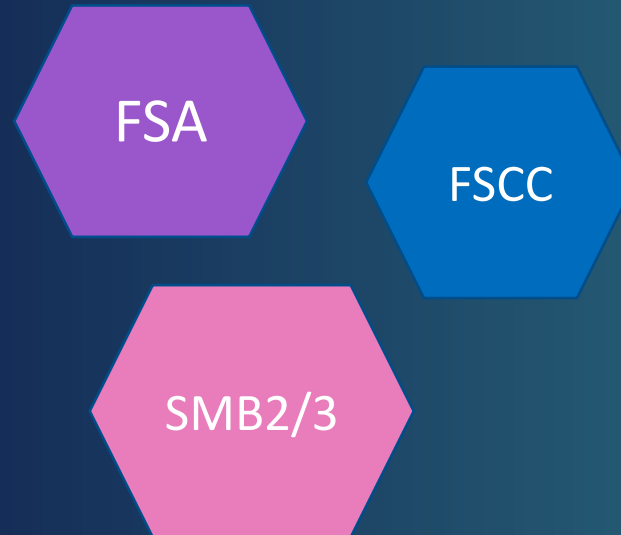https://github.com/Microsoft/WindowsProtocolTestSuites/releases/tag/4.21.5.0

File Server Test Suites
- Migrated to .NET 5
- Added new tests
- Bug fixes

Protocol Test Manager
- Protocol Test Manager Command Line Interface (PTMCli) migrated to .NET 5
- PTMTestLogger removed from PTMCli
- Bug fixes

FSA

FSCC

SMB2/3

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File Server Test Suite Updates

New test cases

- Check query normalized file name
- Check colon and back slash contained in file name

- Added more query info cases
- Check file basic information attributes are supported
- Check file modification algorithm
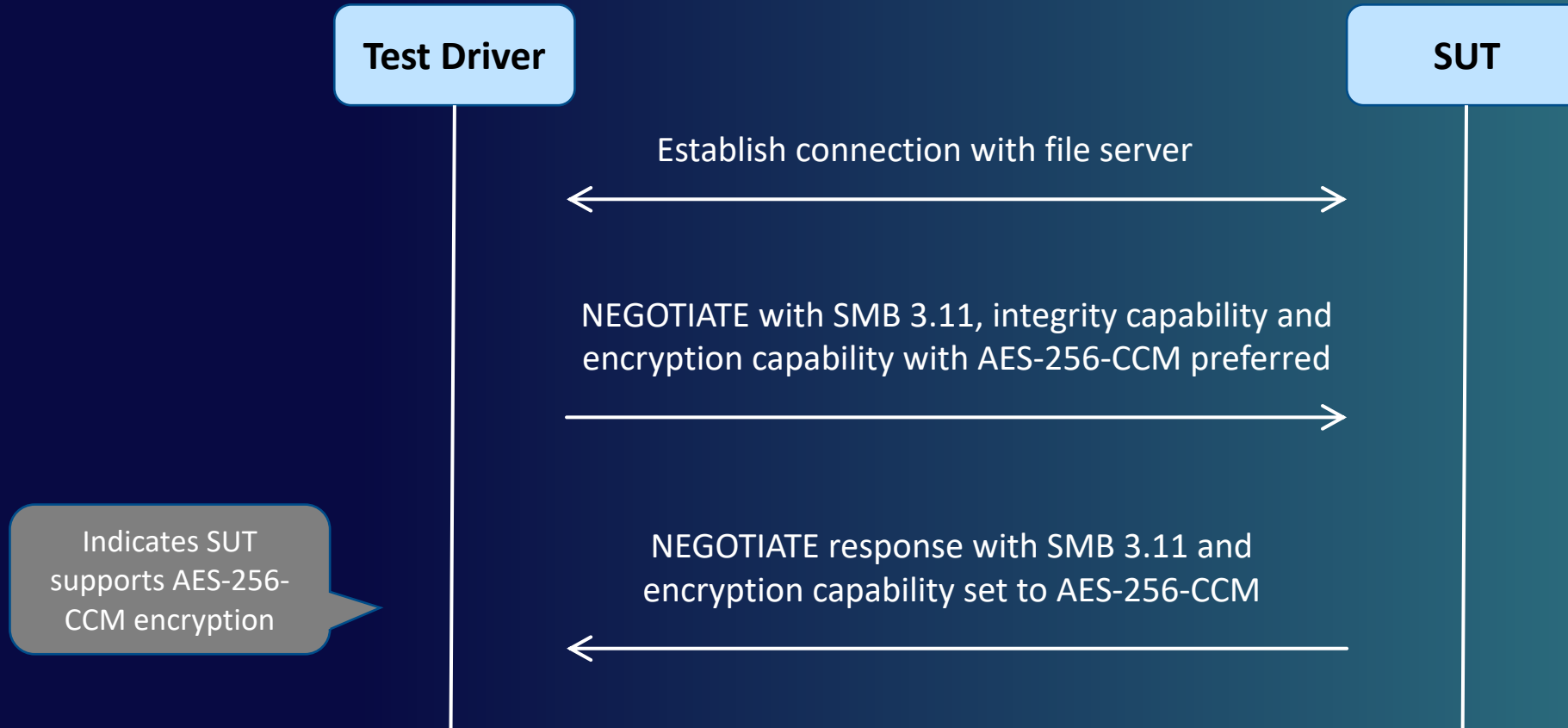- Check creation, access and write times

- Check oplock keys comparison
- Confirm server can handle two lease requests with the same lease key
- AES-256-CCM and AES-256-GCM encryption

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New Tests for AES-256 Encryption

- AES-256-CCM and AES-256-GCM feature for Windows 21H1
  - Detailed description available in [MS-SMB2] v20210407
    https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-smb2

- Negotiation

- Encryption

AES-256 Negotiation test example

BVT_Negotiate_SMB311_Preauthentication_Encryption_AES_256_CCM

Test Driver

SUT

Establish connection with file server

NEGOTIATE with SMB 3.11, integrity capability and encryption capability with AES-256-CCM preferred

NEGOTIATE response with SMB 3.11 and encryption capability set to AES-256-CCM

Indicates SUT supports AES-256-CCM encryption

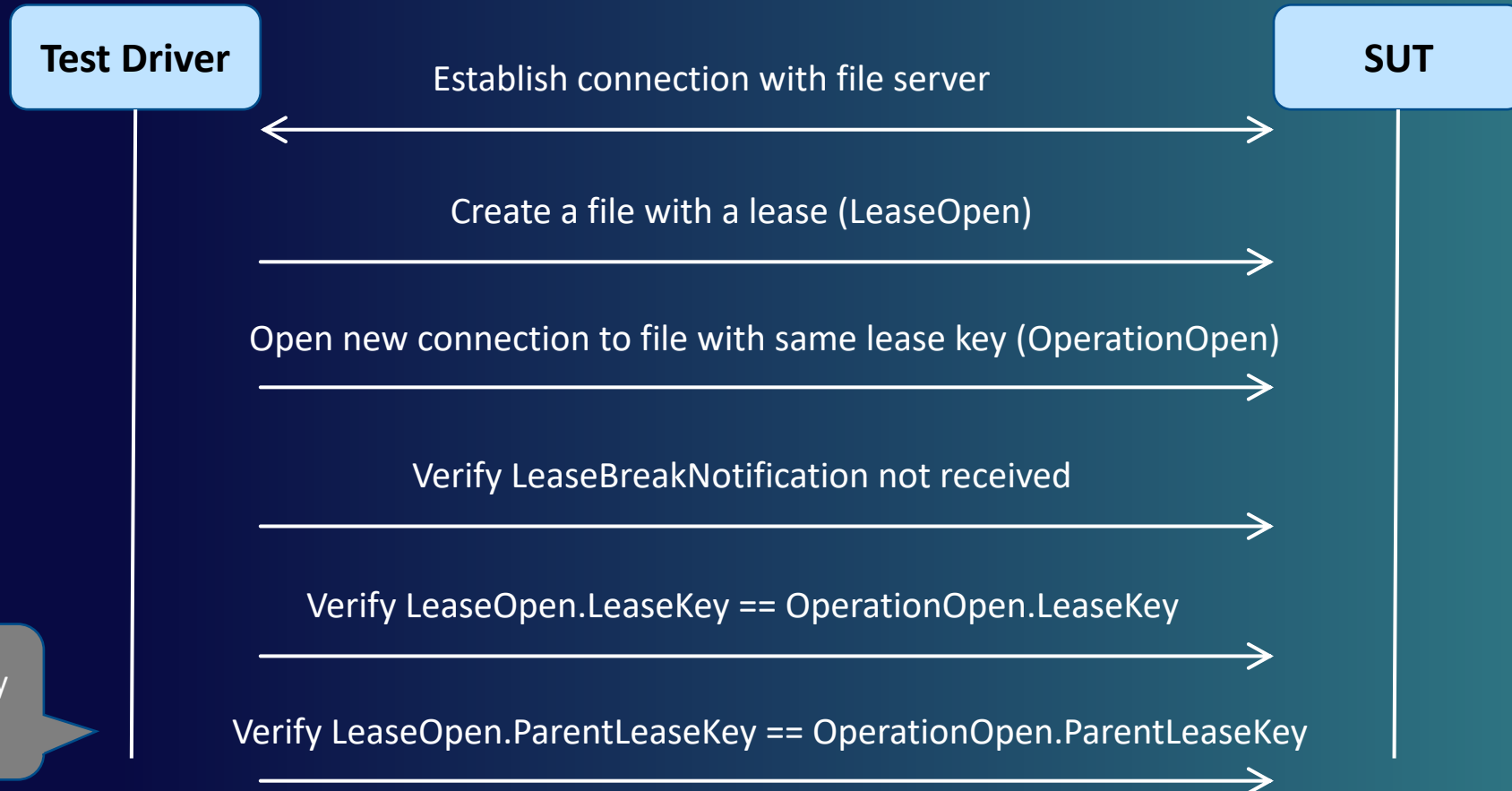STORAGE DEVELOPER CONFERENCE
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New Tests for Oplock Lease Keys

- ## Algorithm to compare Oplock Keys
    - Detailed description available in [MS-FSA] v20210407
    https://docs.microsoft.com/en-us/openspecs/windows_protocols/ms-fsa

- ## 7 new tests

- ## Files and Directories

- ## Supports SMB 2.1 and greater

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Oplock Keys test example

Comparing_Same_LeaseKeysV2

Test Driver

SUT

Establish connection with file server

Create a file with a lease (LeaseOpen)

Open new connection to file with same lease key (OperationOpen)

Verify LeaseBreakNotification not received

Verify LeaseOpen.LeaseKey == OperationOpen.LeaseKey

Algorithm correctly implemented

Verify LeaseOpen.ParentLeaseKey == OperationOpen.ParentLeaseKey

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Demo

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