Common Internet File System

Hari Muzumdar
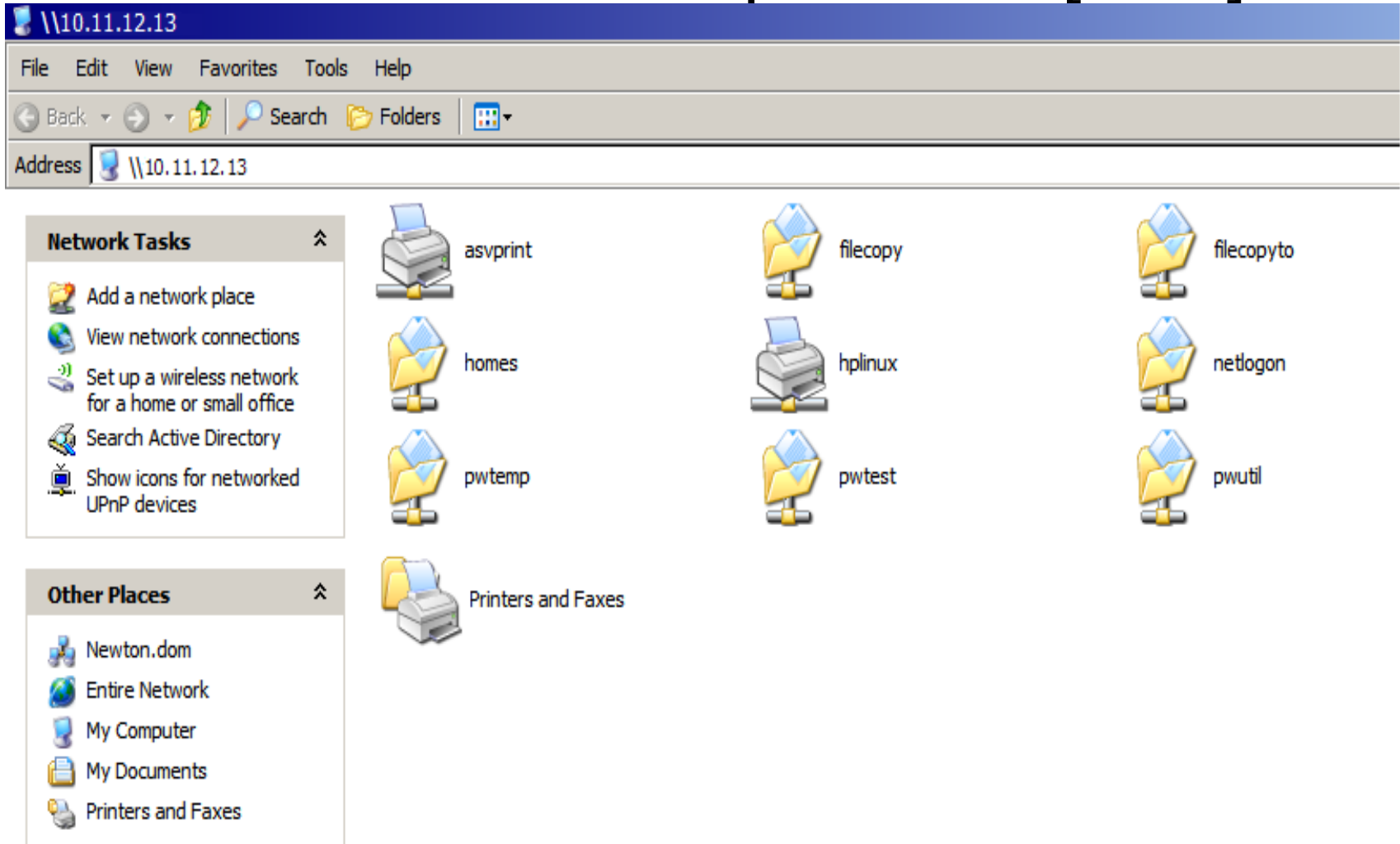
September, 2009

Technical Update Days, Germany, 2009

Windows folder or OpenVMS [.DIR]?

CIFS Agenda

- What is CIFS?
- CIFS Features
- Install, Configure, Start up
- Management
- ASV and CIFS: Comparison, Migration
- Next Release and Future Plans

What is CIFS?

- **C**ommon **I**nternet **F**ile **S**ystem for OpenVMS

- Provides Windows users with access to file and print services located on OpenVMS

- CIFS is based on Samba for Linux v3.0.28a code base

- Samba is Open Source

- Samba is freely available under the GNU General Public License

- Windows clients: Windows 2000, Windows XP, Windows Vista, Windows 2003 and Windows 2008

What is CIFS?
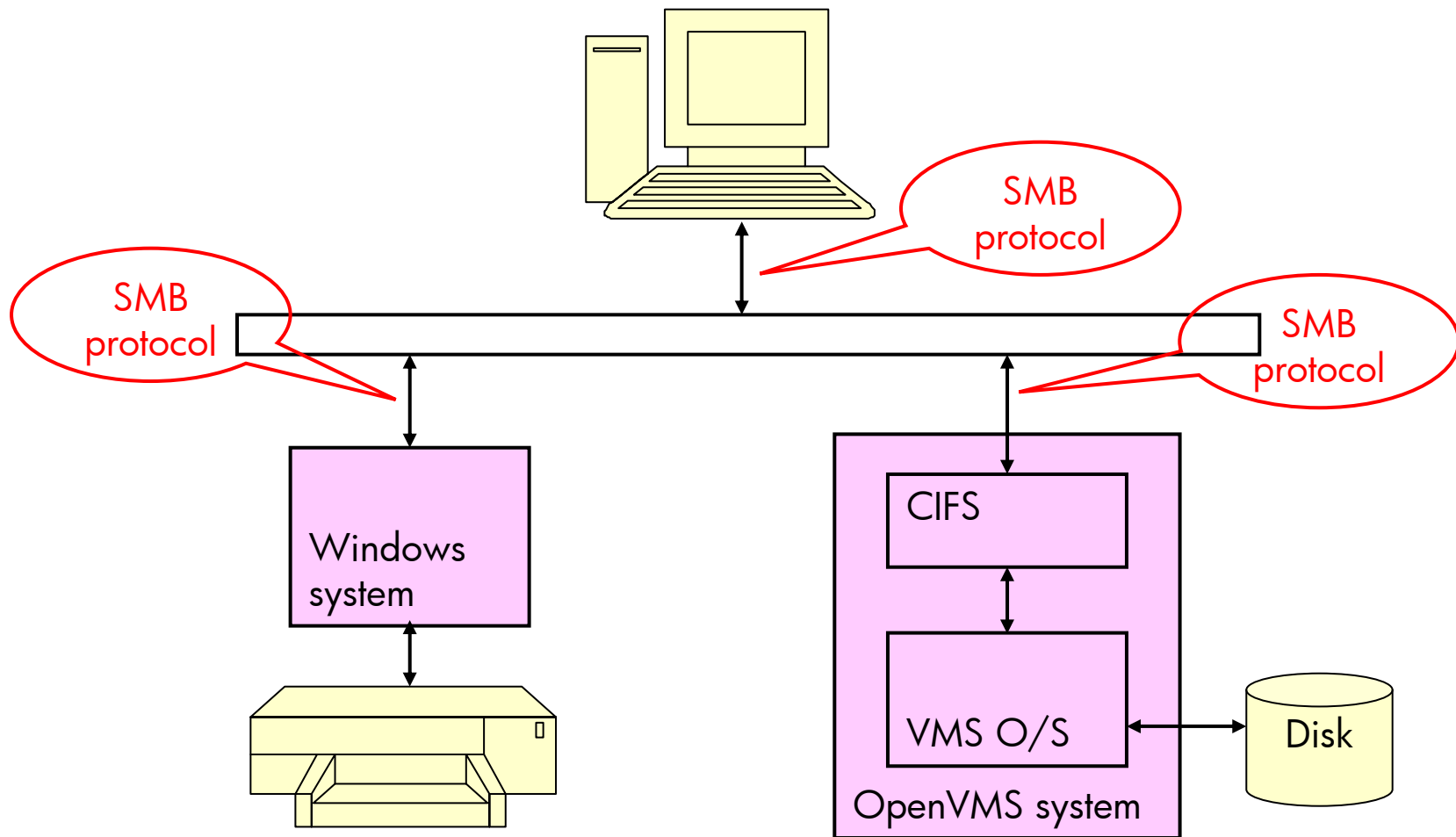
Why CIFS?

- Ease of sharing files and printers

- Complements other file sharing methods (NFS, DECdfs)

- Simplified management

  - Centralised account and security management

  - Administrators already familiar with Samba need much less training

  - Web interface available for management

Again, why CIFS?

- Open Source community
  - More features, more quickly adapted to new technology
  - Easier to keep pace with newer Windows releases
- Better uptime
  - CIFS runs almost completely in user mode
  - One process per session, one session's problems don't affect others
- Better security
  - Support for LDAP backend (e.g. HP Enterprise Directory)
  - Session security, NTLMSSP, NTLMV2

CIFS Homepage

http://h71000.www7.hp.com/network/cifs_for_samba.html

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CIFS Features

- File Sharing

- Security

- Printer Sharing

- Windows Clients

- Windows Domain Support

- Management Tools

CIFS Features: File Sharing

- Files on OpenVMS system shared with Windows clients
- ODS-2 and ODS-5 File System support
- Character Set support
  - ISO-8859-1 for European characters
  - VTF for Japanese characters
  - ASCII characters
- Supports different VMS File formats
  - All VMS file formats supported while reading files
  - Sequential Stream/Steam_LF/Fixed/Undefined format while writing
- VMS Cluster support
  - Cluster-unique, cluster-common
- NFS support
  - Access files on NFS-mounted disks

CIFS Features: Security

- File Security
  - Implemented using OpenVMS ACLs
  - Can use $ SET SECURITY or Windows security properties
  - POSIX ACLs and inheritance of parent ACEs by child objects
  - Levels of authorization (user, group)
  - File Access Auditing
- Authentication
  - Supports session security, NTLMSSP, NTLMV2
  - Can function as NT4 Member Server in any domain
  - Can function as NT4 domain PDC
  - Support for LDAP back end
  - Authentication via Kerberos (under development)
  - CIFS users/groups are mapped to VMS users/resource identifiers

CIFS Features: Printer sharing

- Provides access to printers connected to the OpenVMS system or via network

- Adding/deleting printers

- OpenVMS printer queue support

  - Print queues set up using DCPS, Telnetsym, LPD

- NT style printers supported

  - Printer driver uploading/downloading

CIFS Features: Clients

- Windows Vista

- Windows XP, Windows 2000, 2003, 2008

- Windows network browser support
  - Network Neighbourhood
  - My Network Places
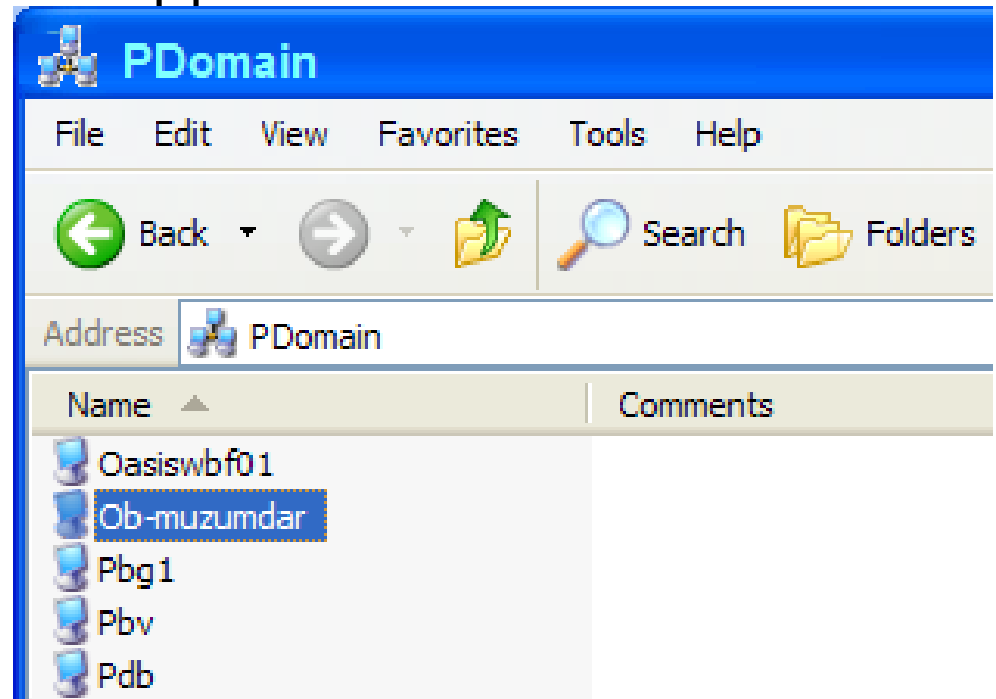
CIFS Features: Domain support

- CIFS can participate as NT4 Member Server when
  - Windows 2000, 2003, NT server is PDC
  - Advanced Server for OpenVMS (Alpha) is PDC
- Support for Microsoft Active Directory
  - NTLMV2, NTLMSSP
  - ADS (Kerberos) under development
- CIFS can function as the PDC or BDC
  - When only CIFS is the BDC or PDC respectively
  - Trust Relationship support
- Stand-alone server

CIFS Features: Management tools

- Command line
  - Editing the Configuration File (SMB.CONF)
  - Samba style CLI commands (smbcontrol, …)
  - Support UNIX style CLI options, VMS style qualifiers
- Web based tool SWAT
- Tools to help migrate from ASV to CIFS

CIFS Features: Current V1.1 ECO 1

- CONTROL flag support with ACLs
- Administrators can modify owner of file/folder by changing the ownership to either a Windows domain-user/-group or CIFS-user/-group
- Support for reading sequential files with record formats of Fixed Length, Undefined, as also Indexed files
- Support for migration of Advanced Server for OpenVMS PDC to HP CIFS for OpenVMS using the net rpc vampire utility
- Windows 2008 Server support

CIFS Versions

- CIFS V1.2 under development
- Current ECO is CIFS V1.1 ECO 1
  - Based on Samba V3.0.28a
- Current Patch Set is PS006

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CIFS Web download
http://h71000.www7.hp.com/network/cifs_download.html

CIFS Download

- Web

  http://h71000.www7.hp.com/network/cifs_download.html

- FTP (current version CIFS V1.1 ECO1)

  $ ftp hprc.external.hp.com

  Username and password can be obtained from Services

CIFS Installation

- Pre-installation
  - Integrity (V8.2-1 and later)
  - Alpha (V8.2 and later)
  - Latest C RTL ECO
  - HP TCP/IP, Multinet, TCPware
- Installation
  - Obtain the PCSI package
  - Log in to a privileged account
  - Install the PCSI kit
    - **$ PRODUCT INSTALL [/DESTINATION]**
    - **Choose default answers**

CIFS Configuration

- Set up SMBD service in TCPIP and configure clients

```
$ @samba$root:[bin]samba$config.com
```

- Set up SMB.CONF (in SAMBA$ROOT:[LIB])
  - Like a Windows *.ini* file
  - Plain-text file, can be edited with any text editor
  - Consists of "sections" [global], [homes], [<share>]
  - [<share>] describes a file or printer share
  - Sample in the next slide

Sample SMB.CONF

```
[global]  - - - - - - - - - - - - - - -  →  Special "global" Section
    security = user
    passdb backend = tdbsam
    domain master = yes
    domain logons = yes                       Section Parameters
    max log size = 1000
    read only = yes
[homes]
    browsable = no
    map archive = yes
[hplaser]
    printable = yes  - - - - - - - - →  Printer Share
    path = /samba$root/var/spool
    min print space = 2000
[user1]
    browsable = yes  - - - - - - - - →  File Share
    path = /DKA0/users/user1
    read only = no
```

Cluster configuration note

- CIFS as a <u>distinct entity</u> on each cluster node (separate configuration, as if on non-clustered systems)

- CIFS as <u>one unit</u> on all nodes (common configuration)

- Requirements for distinct identity configurations
  - Should not share the same installation directory
  - Should not allow access to the same share via multiple cluster members

- Requirements for common identity configurations
  - OpenVMS V8.3 and later (for byte range locking)
  - Must share common installation directory, SYSUAF, RIGHTLIST

CIFS Startup

- $ @SYS$STARTUP:CIFS$STARTUP
  (OR $ smbstart ! UNIX style alternative)

- On start-up, the NMBD process is created:

Pid	Process Name	State	Pri	I/O	CPU	Page flts	Pages
2040090E	NMBD	LEF	6	1884	0 00:00:02.71	576	841

- On receipt of client connections, SMBDs are created:

Pid	Process Name	State	Pri	I/O	CPU	Page flts	Pages	
000049EE	SMBD445_BG22221	LEF	7	1291	0 00:00:00.53	1791	1591	N
000049F1	SMBD445_BG22235	LEF	8	2455	0 00:00:00.79	2093	1512	N

CIFS Startup

Logical names defined by startup procedure

```
$ show log SAMBA*

(LNM$SYSTEM_TABLE)

  "SAMBA$EXE" = "SAMBA$ROOT:[BIN.IA64]"

  "SAMBA$LOG" = "SYDNEY$DKA0:[SYS0.SYSCOMMON.SAMBA.VAR]"

  "SAMBA$ROOT" = "SYDNEY$DKA0:[SYS0.SYSCOMMON.SAMBA.]"

  "SAMBA$SHR" = "SAMBA$ROOT:[BIN.IA64]SAMBA$SHR.EXE"

  "SAMBA$TMPDIR" = "SAMBA$ROOT:[TMP]"
```

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Management: Modifying SMB.CONF

- Use your preferred text editor

- Always run TESTPARM to validate after modifying

  ```
  $ TESTPARM :==“$ SAMBA_ROOT:[BIN.IA64]TESTPARM.EXE”
  ```

- TESTPARM parses SMB.CONF, reports unknown parameters and incorrect syntax

- CIFS restart recommended after edit

- Refer to the CIFS Administrator's Guide

Management: SMB.CONF Example

- Specify admin users

```
[global]
     admin users = mydom\admin, system, cifsadmin
```

- Add, modify and delete shares by editing SMB.CONF file
- Share Security can be set from Windows using Computer Management applet
- File/directory permissions
  - Can be set from Windows
  - Can be set from VMS using $ SET SECURITY

Management: SWAT

- SWAT – Samba Web Administration Tool
  - Web browser based GUI tool
  - With CIFS V1.1 onwards
- Change global parameters
- Add / remove share definitions
- Wizards for role configuration
  - Standalone or Member server, WINS client set up
- View server status
  - Active connections, active shares, and open files
- Change CIFS or Windows password (on any server)
- Warning!
  - SWAT rewrites SMB.CONF, rearranges entries, deletes comments

Connecting to SWAT

- Connect to http://<server>:901
- Log in using OpenVMS account (i.e., SYSTEM)

SWAT: Screenshot

Management: Command Line

- Foreign commands, defined by:

  ```
  $ @samba$root:[bin]samba$define_commands
  ```

  - .EXEs in SAMBA$ROOT:[BIN.<arch>]

- Use "-h" to get help OR use /HELP qualifier

- SMBVER – Display CIFS image versions

- SMBSHOW – Display CIFS processes

- SMBCLIENT – Access SMB/CIFS resources (ftp-style)

- SMBSTATUS – Display CIFS status information

- SMBCONTROL – Send signals to nmbd and smbd

- SMBCACLS – View or set file permissions

Management: Command Line

- NMBLOOKUP – Test NetBIOS name resolution

- TDBDUMP – Dump contents of a .TDB file

- TDBBACKUP – Make backup copies of .TDB files

- TDBTOOL – Manage contents of a TDB file

- NET TIME – View or set time information

- NET LOOKUP – Look up host name or IP address

- NET STATUS – Show server status

- NET RPC <COMMAND> – Run RPC commands
  - net rpc info – Show basic info about domain
  - net rpc join – Join a domain
  - net rpc vampire – Synch NT domain users into local passdb

Management: Backend database

- Samba terminology for the security database

- Backend database for CIFS is TDBSAM

- TDBSAM can be specified in the SMB.CONF file by setting the parameter:

```
[global]

passdb backend = tdbsam
```

- By default it stores the information in SAMBA$ROOT:[PRIVATE]PASSDB.TDB

- The contents can be viewed using "pdbedit" or "tdbdump" utility.

Management: TDBTOOL Example

```
$ tdbtool
tdb> open temp.tdb
tdb> info
1 records totalling 46 bytes
tdb> keys
key 10 bytes: GID 20000
data 46 bytes
[000] 53 2D 31 2D 35 2D 32 31   2D 32 32 35 39 38 34 33    S-1-5-21 -2259843
[010] 37 37 33 2D 31 31 39 39   38 39 34 32 30 31 2D 34    773-1199 894201-4
[020] 30 33 32 33 37 31 35 32   34 2D 35 31 33 00          03237152 4-513

tdb> delete GID\ 20000\0

tdb> insert GID\ 20000\0 S-1-5-21-2259843773-1199894201-4032371524-513\0
tdb> show GID\ 20000\0
key 10 bytes
GID 20000
data 46 bytes
[000] 53 2D 31 2D 35 2D 32 31   2D 32 32 35 39 38 34 33    S-1-5-21 -2259843
[010] 37 37 33 2D 31 31 39 39   38 39 34 32 30 31 2D 34    773-1199 894201-4
[020] 30 33 32 33 37 31 35 32   34 2D 35 31 33 00          03237152 4-513
tdb>
```

TDB> OPEN TEMP.TDB

TDB> KEYS

TDB> DELETE GID\ 20000\0

TDB> INSERT GID\ 20000\0

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Comparison: CIFS and ASV

Most ASV features are available with CIFS

In addition, CIFS offers:

- Session security, NTLMSSP and 128bit encryption
- Support for new printer drivers
- Web based configuration management utility
- Support for file size greater than 4GB
- SMBCLIENT – FTP like utility to interact with other CIFS servers
- Support for LDAP backend
- Kerberos support (Under development)
- Support for port 445
- Support for Windows 2008 server
- Disk quotas based on user account

Comparison: CIFS and ASV

Support, Future

- CIFS
  - OpenVMS Alpha and Integrity
  - Future development will be on CIFS
  - Advantages of Open Source community
  - No licence needed
- ASV
  - OpenVMS Alpha only
  - Support mode
  - Licensed

Comparison: CIFS and ASV
Management

- CIFS
    - Use your favourite editor to modify SMB.CONF
    - SWAT
    - Consolidate multiple servers into one (NetBIOS ALIAS)
    - Command line SMBClient, SMBStatus, SMBControl, …
- ASV
    - Config utility guides administrator through set-up
    - Admin Utility
    - RegUtil
    - pwmonitor to view clients

Comparison: CIFS and ASV

Performance

CIFS

- Lower risk of system crashes – user mode code
- Improved service uptime – process-per-session
- Provides OpLocks on share level basis
- Support for OpLocks Level1 and Level2
- Continuing Engineering focus on performance

ASV

- Has privileged code
- OpLocks are Server-wide
- Support for OpLocks Level1

CIFS Performance Focus

- ASV did file caching. CIFS does almost none.
  - Some caching being added with CIFS V1.2
- I/O to be optimised
  - Lots of I/O done to read attributes, ACL, …
- TDB files heavily used for all operations
  - Optimised FDL files for TDB being worked out
- Process creation

ASV to CIFS migration

- Migration procedure provided with CIFS
- Three stages in migration:
  - Generating reports on ASV
  - Transferring the reports to CIFS
  - Populating CIFS using the reports
- Migration Guide

  http://h71000.www7.hp.com/network/pdf/cifs_migration.pdf

ASV to CIFS migration

The following can be migrated from ASV to CIFS

- User and Group accounts
- Host Mappings
- Shares
- Files and Folders
- Security

ASV to CIFS migration: Requirements

- ASV V7.3B with latest patches on the ASV system
- CIFS V1.1 ECO 1 with latest patches on CIFS
- Source ASV and target CIFS must have similar configuration
  - If ASV is a Member Server, then CIFS will also be come a Member Server

ASV to CIFS migration

- Backup the ASV data
  - PWRK$ROOT:
  - Shares
  - User data
- Download migration saveset (OpenVMS zipfile)
- Unpack the saveset

```
$ BACKUP ASV_MIGRATION.BCK/SAVE MYDEV:[ASV_MIGRATION]
```

- Invoke the utility – menu-driven

```
$ @PWRK$CIFS_MIGRATION.COM
```

- Options presented depend on ASV's current configuration
- Detailed instructions are in the Migration Guide

ASV to CIFS migration: Logon
Menu options when ASV is a Member Server

```
Advanced Server for OpenVMS to HP OpenVMS CIFS migration utility


    Welcome to Advanced Server to CIFS migration utility


The migration procedures require administrator privileges
on the Advanced Server member server. Therefore, you must
logon using an account that is a member of the local
Administrators group on the Advanced Server. This can be any of the below:


  - Domain account
  - An Account in a Trusted domain
  - Local Member Server account


Logon Menu:
          1 - Domain Logon
          2 - Trusted Domain Logon
          3 - Local Member Server logon
        [E] - Exit
Enter your option:
```

ASV to CIFS migration: Generate reports

- The menu eventually creates reports in the saveset file:

    `MYDEV:[ASV_MIGRATION]AS2CIFS_MIGRATION_REPORTS.BCK`

```
Advanced Server to CIFS Migration utility comprises the options:
    1 - Display reports to be generated
    2 - Generate Individual reports
    3 - Generate all reports
    4 - Display reports
    5 - Edit File and Print share report
    6 - Backup reports
   [E] - Exit


Enter your option:
```

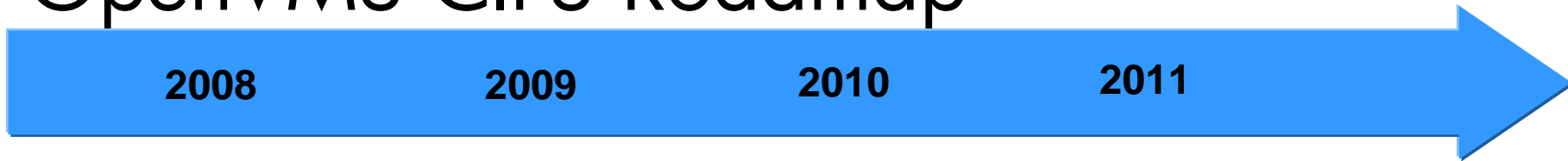- Refer to the Migration Guide for the complete procedure

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OpenVMS CIFS Roadmap

2008   **2009**   **2010**   **2011**

CIFS V1.1 production release Q3 2008 Performance, Compatibility with Vista, bug fix & added features

CIFS V1.1 ECO 1 Feb-2009

CIFS V1.2 H2 2010 – Performance, Windows 2008 support, Kerberos, Security

Port Samba 3.X, Windows 7 support, Performance, Continued development

Subject to change without notice

With Next CIFS Release

- Kerberos authentication when CIFS is member server in an Active Directory domain

- Installation Improvements
  - Configuration automation
  - Single samba$vmsshr for handling all VMS file formats

- Performance enhancements
  - Storing file size in an ACE for non-stream format files
  - Creation of TDB files using optimized FDL files
  - Avoiding multiple levels of file conversions in ODS2
  - Open-file caching

With Next CIFS Release

- Better security
  - No BYPASS to members of built-in admin group
  - Retain VMS ACE ordering when setting permissions from Windows
  - "Security = ADS" parameter for CIFS as member server in Active Directory domain
- Migration tool retains share level security

Future Plans

- Performance improvements
- Synchronising with Samba V3.X
- Windows 7 support
- Continued development

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