Are We There Yet?
The Long and Winding Road To SMB/CIFS Specifications

Christopher R. Hertel
José Rivera
ubiqx Consulting, Inc.
Introductions
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If you don't know us by now...

...you're new here, aren't you?
Introductions

Christopher R. Hertel
SMB/CIFS Geek since 1989.

For good or ill, I have become the primary source of published SMB/CIFS documentation.

José Angel Rivera
Roa Perez Amezaga

You may not know me yet...but you will.

Somehow, I have become a “leading SMB/CIFS expert.”

(Help!)
Introductions

Route Map:

- **SMB/CIFS Specifications**
  - Where we are & how we got here.

- **The Path Ahead**
  - Where do you need to be tomorrow?

- **Pit-stops and Signposts**
  - Tools to guide you along the way.
SMB/CIFS Specifications

(If you've heard this before, feel free to take a snooze.)
If you are new to SMB/CIFS, there are a couple of things you should know:
Thing #1: CIFS is Dead
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CIFS is Dead

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The current dialect of SMB/CIFS is NT LM 0.12. It was introduced with Windows NT...in 1993!

New dialects of SMB/CIFS (SMB1) are unlikely.
SMB/CIFS is still the most widely used network file system on the planet.

It is still supported in Microsoft Windows.
Thing #1: CIFS is Undead

CIFS is Dead like COBOL
Thing #2: CIFS is Documented

SMB/CIFS is, at long last, Documented
CIFS (that is, the "NT LM 0.12" dialect of SMB) has Finally Been Documented

Until last year, there were only incomplete attempts

- Leaked MS-Internal Drafts
- The 1996/97 IETF Drafts
- The 2001 SNIA CIFS Technical Reference

Specifications for earlier dialects

Implementing CIFS (ahem...)

Microsoft released [MS-CIFS] and a revised [MS-SMB] in 2009.
Thing #2: CIFS is Documented

Sidebar: Terminology

Reality:

**SMB = Server Message Block**
A stateful network file system protocol originally created by IBM in the early 1980s for use with the PC-DOS operating system.

**CIFS = Common Internet File System**
A name given to the suite of protocols that include NT LM 0.12 SMB and related supporting protocols. This name was coined in the mid 1990's.

Legality:

**SMB = SMB v1**
The SMB file sharing protocol as implemented in Windows starting with Windows 2000, up to and including current versions of Windows.

**CIFS = Pre-W2K**
**NT LM 0.12**
The SMB file sharing protocol as implemented in Windows NT 3.51, NT 4, and in Windows 9x clients.
Thus, SMB/CIFS is covered in two documents:

**[MS-CIFS]**
- Provides the base specification for the NT LM 0.12 dialect of SMB.
- A “snapshot in time”.
- Most of this stuff is still in current Windows versions. Really.

**[MS-SMB] (revised)**
- “Extends” [MS-CIFS].
- Documents the changes made to SMB starting in Windows 2000.

Unfortunately, the terminology changes depending upon who you talk to, when you talk with them, and the context of the conversation.
CIFS is Documented, but that is not enough.
CIFS is Documented, but that is not enough. You also need:

- NBT
- DDNS
- NTLMSSP
- EXTENDED SECURITY
- SPNEGO
- CLDAP
- RAP
- gssapi
- Mailslots
- MS-RPC
- NetLogon
- Etc.
The Path Ahead
The Path Ahead

Whither SMB2?
The Path Ahead

SMB2

- Jettisons the DOS and OS/2 semantics still supported in SMB1.
- Reduces the number of commands from 75 to 19.
  - Not counting sub-commands.
- Improves performance over high-latency links by:
  - Reducing protocol chattiness
  - Making use of longer command chains
- Was Introduced in Windows Vista.

If you haven’t started implementing SMB2 in your product, you'll need to run to catch up.
The Path Ahead

SMB2

SMB2 provides improved performance, particularly over high-latency connections such as Wide Area Network links.

- WAN Acceleration has become a major market.
- CIFS Acceleration is a key component—and it's tough!
- SMB2 is easier to accelerate, if needed.

Improved WAN performance is not the only reason to support SMB2, but it is an important feature to consider.
So, let's consider SMB2 ... and Microsoft's BranchCache™.

BranchCache™ further enhances WAN performance by caching data on client machines.

Microsoft's SMB2 implementation supports BranchCache™ (in Windows 7 and Windows Server 2008 R2).

Microsoft's BITS protocol now also supports BranchCache™.

BITS can, in theory, be used to pre-load remote caches.

BITS also works over SMB.
The Path Ahead

SMB2 and MS BranchCache™

SMB2 ➔ BranchCache™ ➔ BITS ➔ SMB

The list of needed documentation includes:

[MC-BUP] [MS-BPCR] [MS-SMB2]
[MS-PCCRR] [MS-PCCRD]
[MS-SMB] [MS-CIFS]

Plus any other documentation you might find on Microsoft's Website.
Pit-Stops
Signposts
2 miles
Implementing CIFS

- Written from a developer's point of view.
- Gives an understanding of the CIFS suite of protocols: SMB, NBT, Browser, etc.
- Includes an appendix on making a good cup of tea.

(Note: This slide was José's idea. :)
Pit Stops and Signposts

Start with [MS-CIFS] and [MS-SMB]:
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- In each, Section 1.4: “Relationship to Other Protocols”
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- In each, Section 1.4: “Relationship to Other Protocols”
- In particular, [MS-SMB] section 1.4 Figure 1:

![Diagram showing relationships between protocols]

[MS-BRW] and [MS-RAP] use [MS-SMB] as the underlying transport protocol.
For SMB2, see [MS-SMB2] section 1.4. In particular, Figure 1:
Free Test Suites!

- **File Server Capacity Tool (FSCT)**
  - Direct from Microsoft
  - Customizable “scenarios” and “workloads”

- **smbtorture**
  - From the Samba Team
  - Behavior testing and corner-case probing tool

- **The CIFS Plugfest**
  - Your best chance to meet and work with the geeks
  - Hit their implementations with yours, & vice versa
Pit Stops and Signposts

The Annual Samba Community Conference

- Held in Europe in the Springtime (Flowers! Birds! Rain!)
- Oriented toward Samba, of course
- Yet open to the CIFS community

SMB/CIFS/SMB2 implementors are welcome to attend and present.
Pit Stops and Signposts

CIFS.org
A Wiki for CIFS developers.
- Implementation notes
- Crazy ideas ...that just might work
- Trial and Error Experience
- Guidance and Wisdom
- Community

Please sign up and contribute!
unixsmb2.org

An industry collaboration with the goal of producing a consistent, coherent, sane, rational, workable Unix Extensions for SMB2 specification.
Conclusions and Concussions
Quick Notes

- SMB_COM_NT_RENAME
  - Undead!
  - Ask José
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  - The official name is “Direct Hosted TCP”.
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  - There was once “Direct Hosted IPX”.

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- We now know which error codes are always returned in SMBSTATUS format.
The End!
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Any Questions?