DVD Compatibility Committee

Phase 1 findings
What is good compatibility?

• **Goal:** DVDs recorded on one device, will play back flawlessly on other devices

• **Definition:** a recordable DVD is “compatible” if its playback is equivalent to the playback of a pressed disc with identical content

• **Not testing specifications!**
What is the “DVD Compatibility Committee?”

- **A joint effort by 3 organizations:**
  - OSTA (Optical Storage Technology Association)
  - NIST (Natl. Inst. of Standards & Technology – US Chamber of Commerce)
  - DVDA (DVD Association)
- **Focused on identifying, testing, and fixing issues related to DVD Compatibility**
Committee Goals

- We do not provide specific brand or manufacturer recommendations
- We are not aligned with any DVD format
- We provide objective source of general DVD compatibility information
- We perform compatibility testing from a consumer point of view
  - Identify causes of compatibility problems
- We collaborate with manufacturers to improve their product compatibility
  - Provide detailed results back to companies
Committee Members

- Subutai Ahmad (YesVideo, Committee Chair)
- Oliver Slattery, Fred Byers (NIST)
- Bob Zollo & Lee Prewitt (Software Architects)
- Jim Taylor (Sonic Solutions, President DVDA)
- Victor McCrary (Johns Hopkins Applied Physics Lab)
- Dave Bunzel (Santa Clara Consulting, President OSTA)

• Active input from OSTA member manufacturers
Phase 1 tests

- Created objective test plan for testing DVD-ROM drives, published by NIST
- Assessed current market state of DVD-ROM compatibility
  - Tested 14 ROM drives representing ~60% installed base
  - Tested 50 discs, varying brands and formats
  - Only one burner per format for Phase 1
- Identified correlations between physical measurements and compatibility
- Fed detailed data back to manufacturers
- Tests completed: September 2003
Test Discs

- DVD-Video disc with data files
  - Pressed discs for control
  - Discs > 97% full
- Four sets of discs for each brand
  - > 50 sets in phase 1
  - Selection of brand for testing is based on market share and broad availability
- Media types tested
  - DVD-R for Authoring (CE players only)
  - DVD-R for General
  - DVD-RW
  - DVD+R
  - DVD+RW
  - DVD+R “Compatibility mode”
  - DVD-RAM (ROM drives only)
NIST DVD-ROM Test Plan

Two drives required:
- Reference drive
  Contains DVD-ROM title* of test disc
- Test drive
  Contains the writable test disc

Compare pressed disc to recordable disc

Four basic parts to the test
- Disc detection (spin-up)
- Byte to byte comparison
  - Performs direct sector to sector comparison
  - Examines approximately 1% of the total data, spread throughout the disc
  - Pass only if 100% of the bytes compare correctly
- Data rate drop
- Video and audio quality

*(‘Saint Saens and Bizet’ for DVD-R, DVD-RW, DVD+R, DVD+RW)
*(‘The Call’ for DVD-RAM test discs)
Summary of results
Compatibility not perfect but improved

- Compatibility not 100% across the board
- Increasing compatibility with newer drives
- Drives manufactured in 2002 and later are much more compatible
Format is not important for compatibility

- No difference between -R/RW and +R/RW with respect to compatibility
- With ROM drives, no difference between R and RW formats
Media Compatibility Variance is Huge

- Huge difference between media manufacturers and brands
- Worst media is intolerable
What determines good quality media?

- NIST / Library of Congress performed controlled physical testing of test discs
- Equipment used
  - DaTARIUS CS-4.2/DL
- Measured -R and +R discs for:
  - Average & Max inner parity (PIE)
  - Average Jitter
  - PIE fail
  - etc.
Max PIE was best predictor

- One particular measure had large effect on compatibility
  - Max Inner Parity Error
  - Measures ability to recover from disc errors
- Discs with Max PIE < 280 had compatibility around 95%
- Info fed back to mfrs
Set-top DVD Player testing

Testing and data courtesy of Ralph LaBarge, Alpha DVD
Article in DV Magazine
LaBarge DVD Player tests

- Same test discs used
- Over 30 models of consumer DVD players
  - All consumer DVD-Video players in the test matrix were designed to support at least one of the recordable DVD formats tested.
  - All consumer DVD-Video players tested were released during 1999-2003
- Extensive testing in independent facilities
- Results published in DV Magazine
• Similar results with set top players:
  – Little difference between –R and +R.
  – Some differences between R and RW

  - DVD +/- R (4.7 GB) = 87%
  - DVD +/- RW (4.7 GB) = 82.7%

  – Large differences between media brands / manufacturers

  - DVD +/- R 4.7GB 67% - 100%
  - DVD +/- RW 73% - 87%
Phase 1 Test Summary

- New drives performed significantly better
  - Best drive (2002) had only one “Fail”
- Format (- vs +) not as important as the quality of media
- There is significant deviation in scores
  - between discs, even within the same format
- No significant difference between write once and rewritable for ROM drives
General tips for consumers

• Use recent drives
  – ROM drives manufactured before 2002 will have poor compatibility

• Use high quality media
  – Typically major brand names will perform strict quality control

• Burn with verify mode “on”

• Use media recommended by burner manufacturer
  – DVD burners need to be optimized for different media brands
  – Most mfrs will list media that they have tested
  – Update burner firmware to latest version
Phase 2 testing started

- Testing burners and latest high speed media using Q2 03 sell through data
  - 6 burners representing > 75% of drives selling in Q2 ’03
  - Media represents 65-80% of media sold in Q2 ‘03
- Will create discs with each burner at fastest burn speed possible
- Same playback test plans
- Results available Q2 ‘03
References

• Phase 1 test plan distributed as a NIST special publication:

  www.itl.nist.gov/div895/pubs.html#DataPreservation

For more information contact:

Subutai Ahmad, Committee Chair        sahmad@yesvideo.com
Oliver Slattery (NIST)                  ollie@nist.gov
Dave Bunzel, President OSTA            dbunzel@sccg.org
Acknowledgements

• Special thanks due to Ralph LaBarge who contributed his test discs, and much of his time and expertise
• Siva Srinivasan and Alexei Nikolaev (NIST)
• OSTA manufacturers for their feedback