

MPEG-2 IPMP Conformance Test Suite Development

Nickolay Pakoulin, Vitaly Omelchenko, Alexander Koptelov, Alexandre Petrenko, Alexander Kossatchev

Institute for System Programming Russian Academy of Science

{npak,vitaliy,steve,petrenko,kos}@ispras.ru

<http://www.unitesk.com>

Chunyen Cheng

Morphbius Technology Inc.

spencer@morphbius.com

<http://www.morphbius.com>

Interoperability and Conformance

- Interoperability is one of the key issues facing any deployment of AVS DRM solutions
- Conformance to AVS DRM should ensure interoperability between AVS DRM solutions

Objectives

- Provide high-quality conformance testing suite for various aspects of interoperability
- Improve official specification to make it really interoperability oriented

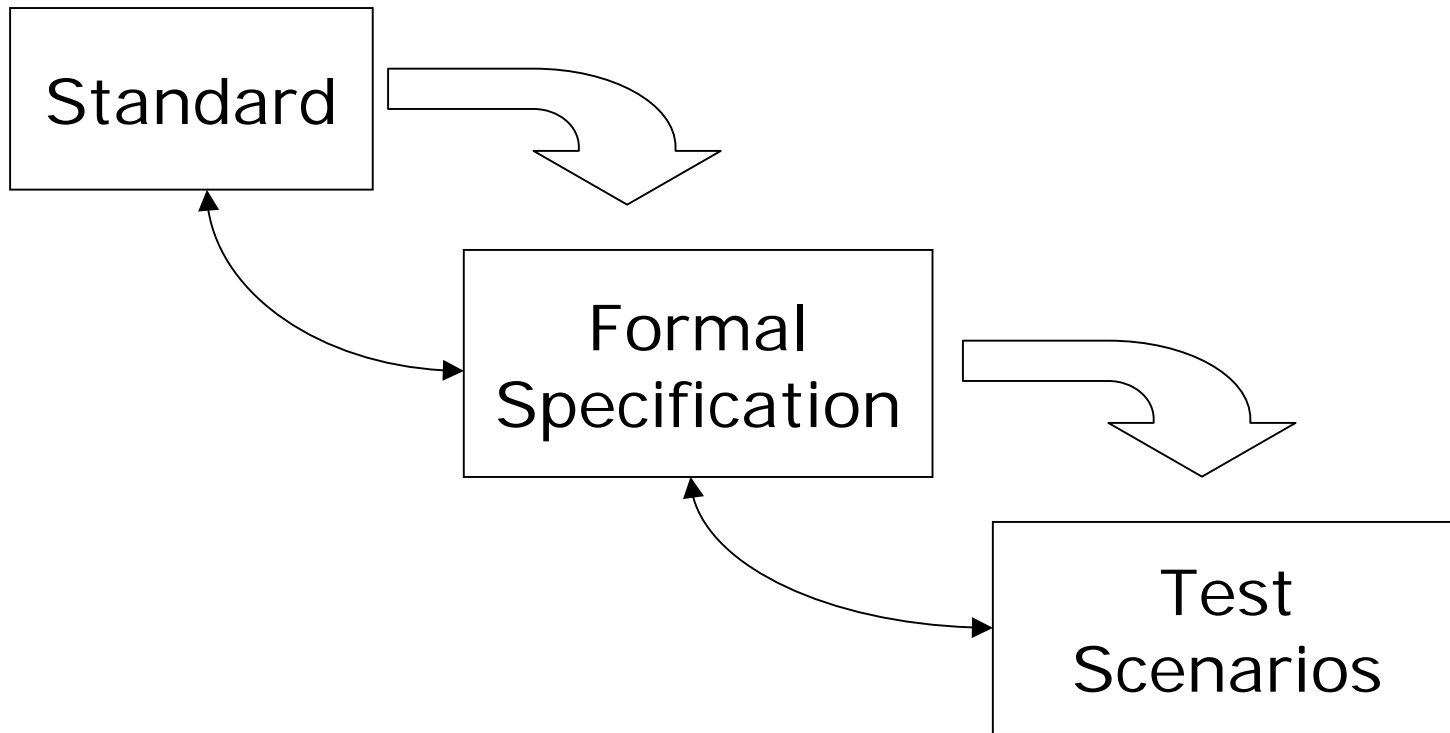
Manually developed test suites

- Tedious work
- Uncertain coverage of IPMP-2 specification requirements
- Uncertain criteria for verdict

UniTesK Method: Specification Based Testing

- Foundations
 - Rigorous model
 - Automated generation of test data and sequences
- Benefits
 - Rigorous model – automated check of behavior correctness
 - Automated test generation – large and thorough test sequences for reasonable effort

UniTesK Method: Test Suite Development



The Trial

- Develop test suite incrementally, feature by feature
- Identify use cases in IPMP-2 specification
- Started with
 - Processing of IPMP Control Information
 - IPMP Descriptors in Program Map Table
 - IPMP Stream processing

Trial State

- Processing of IPMP Control Information
 - IPMP Tool Info Class with alternatives (no parametric description because it is underspecified currently)
 - IPMP Tool List with such Tool Info
- Model for Processing of IPMP Control Information done
 - 7 potential interoperability problems identified
 - 2 errors in IPMP specification found

Preliminary Results

- ISO/IEC 13818-11 FDIS lacks conceptual model of operations. It might result in interoperability problems between IPMP Tools and IPMP Terminal
- ISO/IEC 13818-11 FDIS lack precise requirements to correctness of incoming bitstreams
 - Issues with IPMP Control Information Processing that might result in interoperability problems

Results (2)

- Tool Connection Issues that might prevent IPMP Tools from operating
 - It is unclear how IPMP Descriptor is sent to a new tool instance when the tool is connected;
 - The specification does not provide a policy on how to assign IPMP Descriptor ID in order to avoid address conflicts
- Errors found in ISO/IEC 13818-11 FDIS
 - Undefined data structure IPMP_Tool
 - Overlapping ranges for IPMP_ToolID

Conclusion

- Test suite for AVS DRM should be developed in parallel with the AVS DRM standardization process
- The method allows revealing various gaps and inconsistencies in the standard
- The development of the rigorous model of AVS DRM would significantly improve its standard specification