CAVP Testing
Current Algorithm Validation Testing vs. Entropy Source Validation Testing

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To provide assurance that the algorithm has been implemented correctly
Algorithm Validation Test Development

- Analyze the specifications in the special publications
  - Identify all elements to be tested
  - Identify all mathematical calculations within the elements
  - Identify the requirements identified by “shall” statements addressable at the algorithm level
- Design a suite of algorithm validation tests that address the above specifications and challenge each specification with allowed and non-allowed values to assure they are handled properly.
Functions are
  • Instantiate function
  • Reseed Function
  • Generation Function
  • Uninstantiate Function

For 4 different DRBG mechanisms
  • Hash DRBG
  • HMAC DRBG
  • Counter DRBG
  • Dual EC DRBG
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Possible branches within the algorithm

- Equations
- If..Then..Else statements
- While statements
- Etc.

Example – Step 7 of 9.3.1

7. If reseed_required_flag is set, or if prediction_resistance_request is set, then

7.1 status = Reseed_function(state_handle, prediction_resistance_request, additional_input).

7.2 If status indicates an ERROR, then return status.

7.3 Using state_handle, obtain the new internal state.

7.4 additional_input = the Null string.

7.5 Clear the reseed_required_flag.
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9.3.1 The Generate Function

The following or an equivalent process shall be used to generate pseudorandom bits.

Generate_function (state_handle, requested_number_of_bits, requested_security_strength, prediction_resistance_request, additional_input):

...  

The CAVS DRBG tests verify the correct operation of the Generate_function.
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Current Algorithm Validation Testing Process

- Cryptographic Algorithm Validation System (CAVS) Tool
  - uniform validation testing for all approved algorithms
  - Automated, objective tests
- Distributed to all accredited laboratories
- Testing done by vendor or laboratory at vendor or laboratory site (laboratory not required to be present)
Current Algorithm Validation Testing Process

- Results are sent to laboratory where results are confirmed
- Once results are correct, lab sends validation request to CAVP where it is confirmed
Differences between Algorithm Testing and Entropy Testing (SP800–90B)

- Algorithm vs. entropy source
  - Deterministic vs. non-deterministic (random)

- SP800–90B – series of statistical testing provided to estimate the amount of entropy
  - Entropy testing will return a score indicating the amount of entropy provided instead of Pass or Fail.
List of Discussion Points to Assist In Determining Differences in Validation Testing for SP800–90B Entropy Sources

- Location of testing
- How is data collected from the entropy source?
- Must the laboratories be present during testing?
  - What does this mean for labs? Staffing, travel costs, etc.
List of Discussion Points to Assist In Determining Differences in Validation Testing for SP800–90B Entropy Sources

- Section 6.0 Entropy Source Development Requirements
  - Provides required documentation for entropy source validation
- Section 7.0 Validation Data And Documentation Requirements