Motivation for 1149.1 Initialization Process

Configurable I/O

- Since the original development of the 1149.1 Boundary Scan standard, the complexity and variation of I/O cells as well as the ICs themselves has greatly increased in the digital IC industry

- Process technology advancements have reduced the safe operating voltage ranges of transistors

- I/Os are now configurable for the electrical characteristics such as power levels, drive strength, VIL/VIH, impedance, etc.

- Unused I/O may be configured to be power downed and to not actually be capable of receiving logic values placed on the pin for lower power modes

- In both mission and test modes, I/Os frequently require configuration before they can be used

Boundary Scan Operation Failures

- I/O cannot correctly drive or receive a logic 1 or 0 until the correct configuration for the given instance is loaded and known

- Mismatched configurations of I/Os on a board could cause a driven logic 1 to be received as a logic 0

- In mission mode, a powered-off I/O analog cell cannot SAMPLE the pin value to the BSR

- Until an Initialization Procedure is completed to program or configure the I/O, none of 1149.X instructions which control or observe the pins can be reliably depended on to correctly operate

IC Initialization for "Safe" operation for Board-level Interconnect Test

- It may be desirable or necessary to place an IC into a "safe" mode during Board-level tests
- If board interconnect tests are performed before attachment of heat sinks, it may be necessary to power down large portions of IC core for thermal management
- To reduce power consumption, PLLs may need to be disabled during board level interconnect testing
- Without setting the I/O voltage level program correctly, incorrect applied input signal voltage may permanently damage an I/O cell
- Chips with Secure information might first delete data before Boundary operations

Initialization Procedure

- All of these issues can be resolved by Initialization procedure
- The proposed Initialization procedure support needs to allow for the following:
  - Optional parameterized configuration by setting data in a TDR
  - Optional specification a minimum number of TCKs for configuration completion to take effect (either for a state machine execution or a "settling time")
  - Option to receive status bits
  - Option to "poll" for earlier completion
  - Control of when the mission mode is disrupted