SNIA Emerald™ Program

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SNIA Emerald™ Training

SNIA Emerald Power Efficiency Measurement Specification, for use in EPA ENERGY STAR®

July 14-17, 2014

SNIA™ Green Storage Initiative

SNIA Emerald™

Agenda

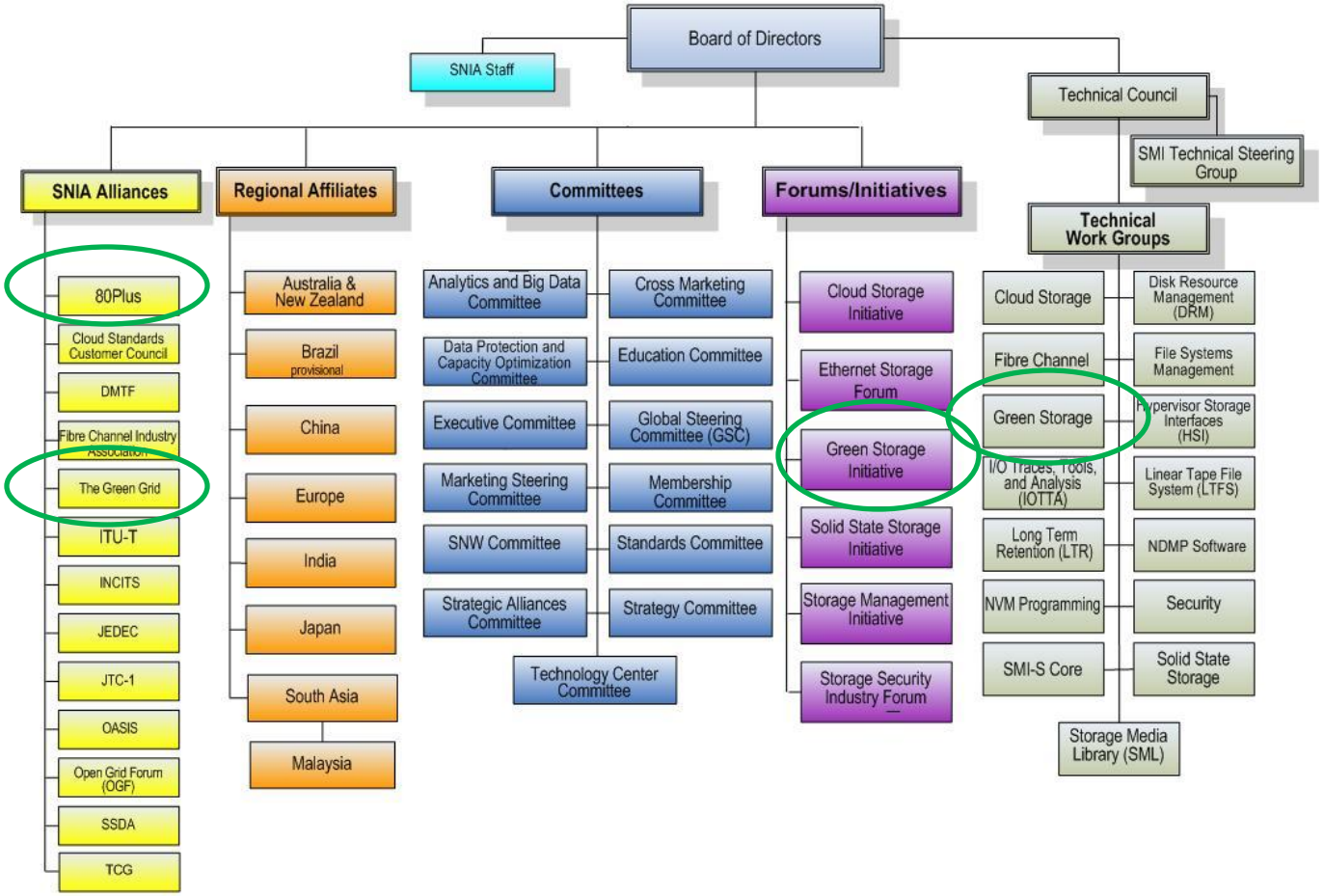
- SNIA (Storage Networking Industry Association)
- SNIA Green Storage Overview
- SNIA Emerald Program

SNIA At A Glance
www.snia.org

- Voice of the storage industry representing approximately $50-60B in worldwide revenue for hardware and software
- Founded in 1997 as a non-profit trade association
- SNIA is an international consortium with affiliates world-wide
  - ANZ, Brazil, China, Europe, India, Japan, Malaysia, South Asia
- Technology Center activities in Colorado
- Focus on education, conferences, specifications / standards, software, industry alliances, best practices, plug-fests, and conformance testing for SNIA specifications
- Produce annual Data Storage Innovation Conference and Storage Developer Conference as well as hot topic conferences (e.g. Cloud, Data Protection, Big Data, Solid State Storage)
- A collaborative environment and serves as global contributor toward the advancement of standards, education, and innovation in the storage and information management industry

SNIA Structure

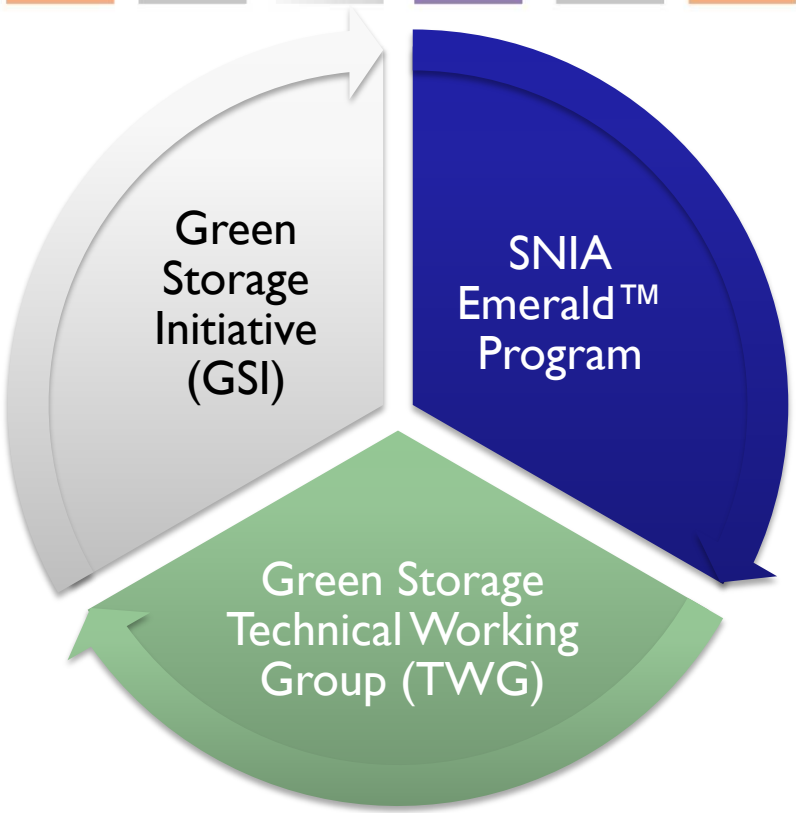
SNIA™ Green Storage Initiative



Storage Networking Industry Association • Governance & Committee Structure • September 2013

SNIA Green Storage Overview

SNIA Initiative where SNIA members collaborate on market requirements, education, alliances, and events to promote energy efficient storage and the SNIA Emerald Program



SNIA program to promote usage by vendors and test labs of the SNIA Emerald Test Specification and for IT professionals to reference energy usage metrics for storage vendor products to aid storage system procurement planning and optimization of IT storage operations

SNIA committee of technical storage system experts defining storage system energy measurement methodology, energy usage-related metrics, technical specifications, and best practices

SNIA Green Storage Initiative (GSI)

- Provides IT and industry requirements input to the SNIA Green Storage TWG for green storage metrics and technical specifications
- Educates the vendor and user community about power efficiency in shared storage IT environments through tutorials and whitepapers
- Manages industry alliances and collaboration with EPA, TheGreenGrid, 80Plus Program, ISO JTC1, SPEC, industry testing labs
- Provides external advocacy and support of SNIA Green Storage TWG technical work
- Manages the SNIA Emerald™ Program
- SNIA members pay an additional fee to join GSI. Fees are directed to technical engineering resources and programs. Membership includes SNIA Emerald Program test result submission fees.

Green Storage Technical Working Group (TWG) - 1

- Technical body of storage experts defining and validating green storage metrics, measurement methodology, and specifications
- Develops the *SNIA Emerald™ Power Efficiency Measurement Specification*
  - V1.0, V2.0, V2.0.1, V2.0.2, next version in-progress
- Develops "how to" *User Guide for the SNIA Emerald™ Power Efficiency Measurement Specification*
  - Revised for each version of the Emerald specification and as needed
- Technical collaboration with GSI established alliances
- Major contributor to Emerald training

Green Storage Technical Working Group (TWG) - 2

- Has path to de-jure (ISO, ANSI) standardization
- Operates under SNIA RAND intellectual property policy protecting developers and adopters of technical work
- SNIA members can participate in TWG as part of base SNIA membership fee. GSI membership is not required.
- Join the Green Storage TWG to
  - Influence the direction and content of the Emerald specification
  - Have early information on future of the specification
  - Gain a deep understanding of the specification
  - Be part of the network of green storage technical experts

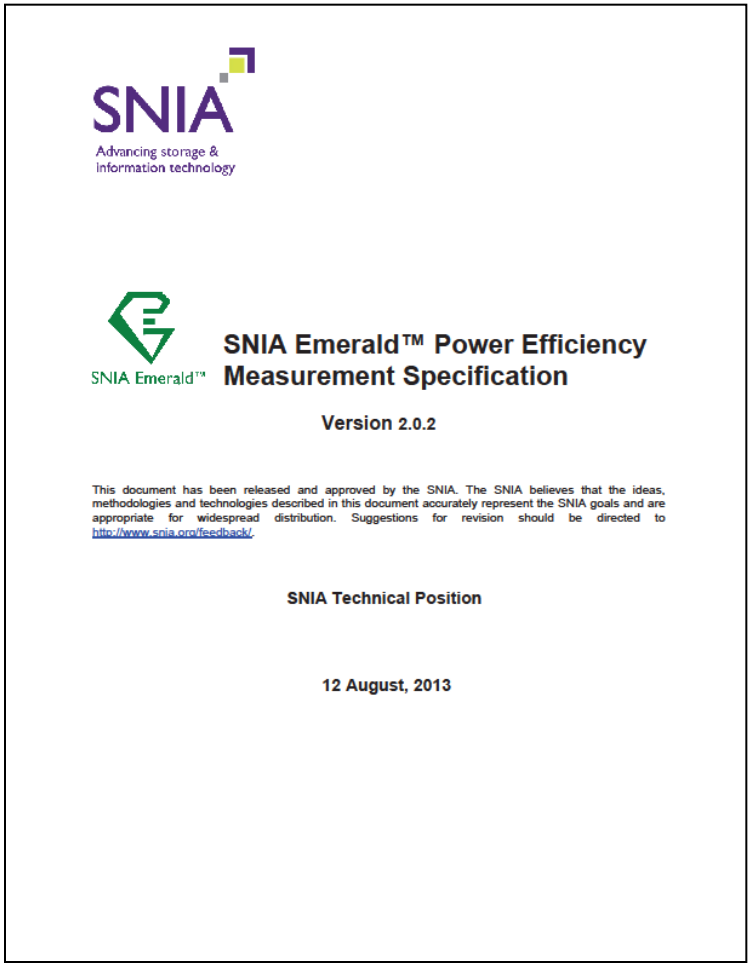
SNIA Emerald™ Program: Purpose

- Promote use of the *SNIA Emerald™ Power Efficiency Measurement Specification* methodology and test results
- Provide open access to storage system power efficiency information using a well-defined testing procedure and additional information related to system power characteristics
- Help IT professionals make storage platform selections as part of an overall Green IT and Sustainability objective

SNIA Emerald™ Program

- Program for the SNIA Emerald Test Specification
  - www.sniaemerald.com
- Vendors and Test Labs access program for:
  - Posted Technical Test Specification and How to Guide
  - Test and measurement tools
  - Comprehensive technical training
  - Technical support
  - Submitting SNIA Emerald Test Data Reports
- IT Professionals access program for:
  - Reviewing posted vendor product Test Data Reports to aid procurement decisions and optimize deployed systems
  - Raising awareness with their preferred storage suppliers to participate

SNIA Emerald™ Power Efficiency Measurement Specification


SNIA
Advancing storage & information technology

SNIA Emerald™

SNIA Emerald™ Power Efficiency Measurement Specification

Version 2.0.2

This document has been released and approved by the SNIA. The SNIA believes that the ideas, methodologies and technologies described in this document accurately represent the SNIA goals and are appropriate for widespread distribution. Suggestions for revision should be directed to http://www.snia.org/feedback/.

SNIA Technical Position

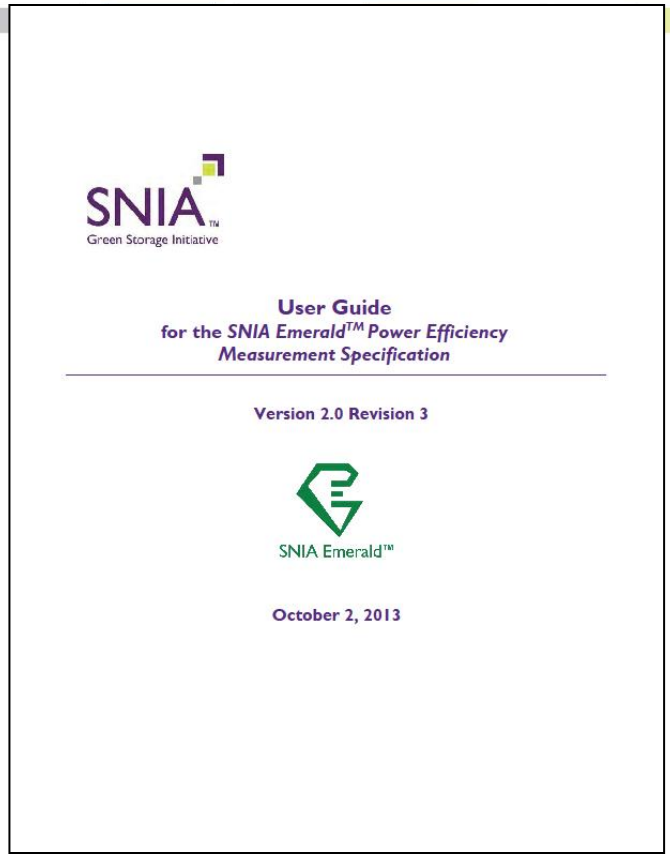
12 August, 2013

- **Taxonomy**: An industry-wide means of segmenting storage system products that span the range from consumer solutions to enterprise configurations. Used to categorize test results.
- **Test Methodology:** A detailed and consistent means of testing various types of storage systems with load generators and power measurement instruments.
- **Test Metrics - Idle Measurement Test:** **capacity/watt**
  Storage system is configured, powered up, connected to one or more hosts and capable of satisfying externally initiated, application-level initiated IO requests within normal response time constraints, but no such IO requests are being submitted.
- **Test Metrics - Active Measurement Tests:** **performance/watt**
  Storage system is in an "active" state processing externally initiated, application-level requests for data transfer between host(s) and the storage system.
  - Random-access read and write workload profiles
  - Sequential-access read and write workload profiles
  - Hot-band read-write workload profile
- **Capacity Optimization:** The specification addresses determining whether the storage system supports energy-saving storage capacity optimizations, including features such as deduplication and thin provisioning.

Supporting Materials for Using the Emerald Specification

- User Guide containing advice on performing measurements according to the Emerald Specification
- Workload generating software tool for driving the storage system under test (Vdbench)
- Script Template for operating Vdbench
- Test Data Set Generator software for certain (COM) tests
- Forms to use for submitting test data to the Emerald Program
- Definitive access to current materials

http://sniaemerald.com/download



Training

- Slides and videos from Emerald training events available
  - http://sniaemerald.com/training
  - 4 day training session conducted June 2013
  - Half-day training session conducted January 2012
  - Materials from July 2014 (this event) are available
    - http://sniaemerald.com/training/July2014
    - Page now available to class attendees
    - Will be linked to /training page for general access and announced, when completed and polished
- SNIA Tutorials on green storage
- Available to anyone at no charge

Recognized Tester Program (RTP)

SNIA Emerald™ RECOGNIZED TESTER PROGRAM

SNIA™ Green Storage Initiative

- Recognize organizations that have demonstrated proficiency in performing testing in accordance with the SNIA Emerald Specification
  - Testing service vendors
  - Independent labs
  - Manufacturers' in-house test teams

SNIA Emerald™ RECOGNIZED TESTER

- Planned for Q3 2014 availability
- Leverage SNIA Emerald™ training
- Build global ecosystem of quality testers
- Nominal Fee to enroll; awarded Certificate; SNIA Emerald Program website listing

Central Information Repository

- Web site http://sniaemerald.com is the central repository for information on the SNIA Emerald™ Program and related topics, including
  - Current version of Emerald Specification
  - Current versions of materials supporting the use of the Emerald Specification
  - Training materials
  - Much more…
- Make it a frequent destination
  - Current materials
  - Up-to-date information on everything related to the Emerald Program

Email Publications

- SNIA Emerald™ Newsletter
  - Broad set of topics related to Emerald Program
  - Published as needed
  - Archived on the http://sniaemerald.com web site
  - For everyone interested in the Emerald Program
- SNIA Emerald™ Update
  - Timely, single-topic notifications
  - Established to provide timely notifications of revisions to Emerald testing-related materials to testers
- Other Emerald-related material is also sent to this list
  - E.g. announcements of training events, such as this
- Sign up!
  - "Sign Up For Our Newsletter" http://sniaemerald.com

EPA ENERGY STAR Data Center Storage X-reference SNIA Emerald Test Specification

- SNIA collaborated with EPA in defining ENERGY STAR Data Center Storage (DCS) V1.0 Specification; in effect Dec 2013
- EPA adopted the SNIA Emerald Specification for test and measurement methodology that must be used for DCS
- DCS measurements
  - Are performed according to the SNIA Emerald Specification, *and*
  - Must meet some additional EPA requirements
- SNIA and EPA ongoing collaboration
  - Participates in SNIA Emerald Training events
  - Participates in SNIA meetings and industry workshops
  - EPA encouraged SNIA to create Recognized Tester Program
  - Review and analysis of industry test data to refine test methods
  - Prioritize storage taxonomy classes for future specifications

SNIA Emerald™ Test Data Publication Program

- Offers publication vehicle for Emerald test results – http://sniaemerald.com/view
- Complementary vehicle and format to ENERGY STAR for making test data available to IT professionals to help make storage platform selections
- Legal protections for those submitting and using results
- $0-$1500 fee to publish a result
  - SNIA Membership not required
  - Lowest cost for SNIA GSI members
- No fee to access results; Anyone can access results

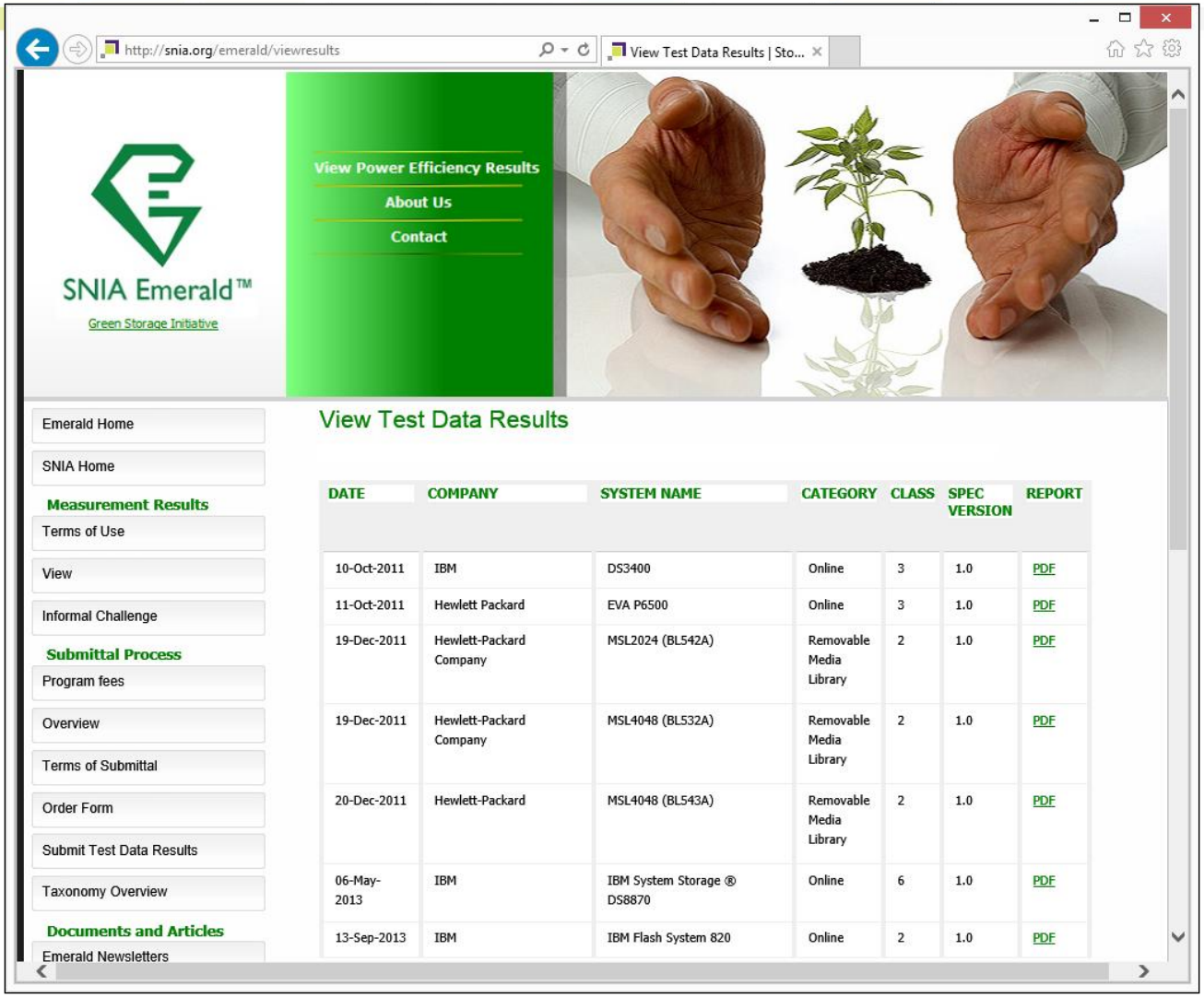
Test Data Publication Process

- Process
  - Storage Vendors test their equipment and submit test results to the Emerald Program
  - Submission is reviewed
  - Emerald Program publishes results on http://sniaemerald.com
  - IT users (public) download results from http://sniaemerald.com
  - Vendor gains right to use the SNIA Emerald™ logo in conjunction with tested product
- Legal protections
  - Terms of Use: conditions on use of test results agreed to by those downloading results
  - Terms of Submittal: agreed to by vendor submitting test results

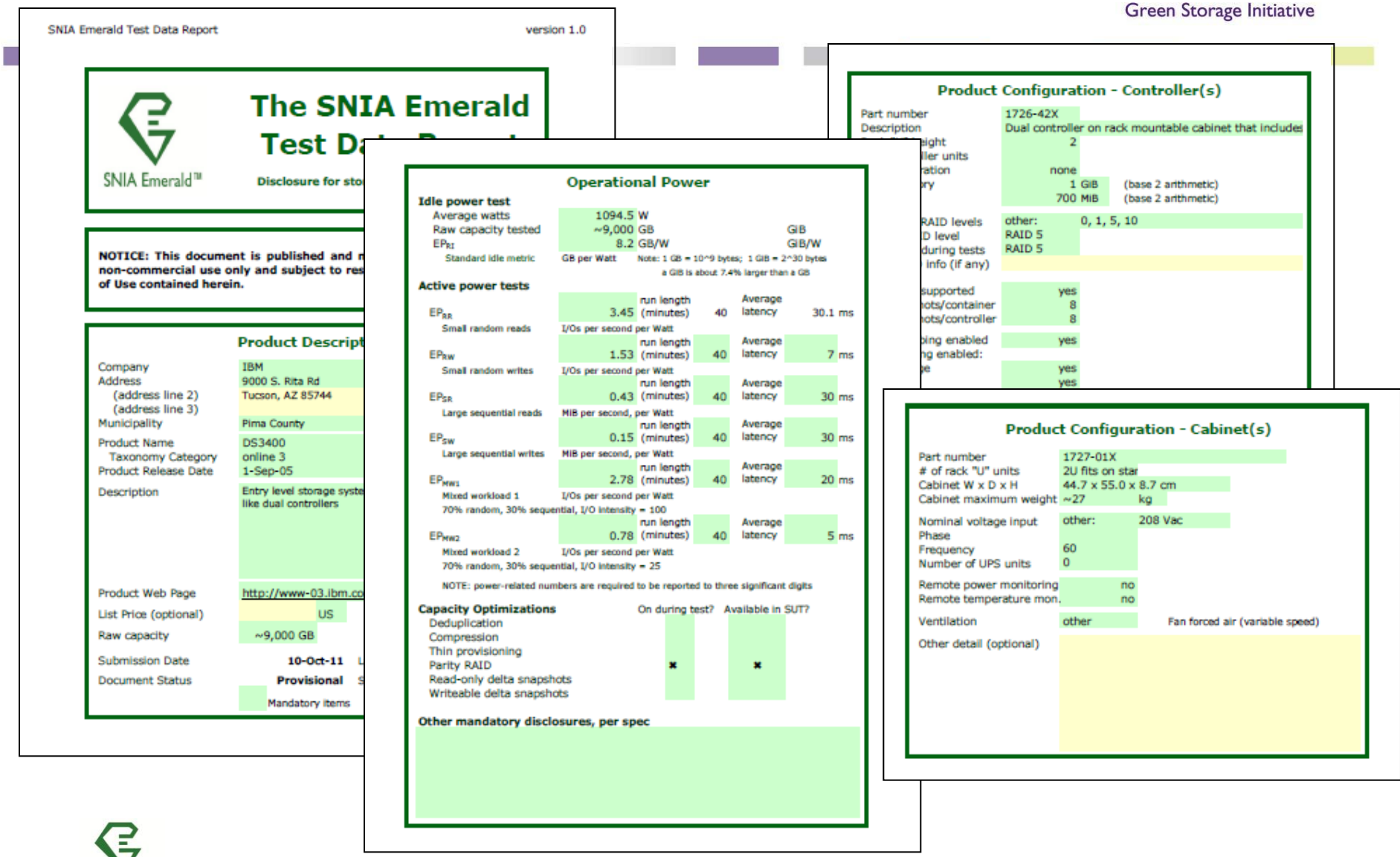
SNIA Emerald™ Test Data Publication Program and ENERGY STAR

- Coordinated with EPA ENERGY STAR program for enterprise storage
  - Based on same test specification and test process
  - One test execution can generate the data needed for both programs
  - Test results can be submitted to either or both SNIA Emerald™ and EPA programs
  - Increases efficiency, lowers costs!
  - Test results submission for EPA and SNIA Emerald are different and independent
- SNIA Emerald™ publication and ENERGY STAR publication are complementary

SNIA Emerald™
Table of Test Data Result Reports



Example of Posted Report



Why Storage Vendors Should Use Emerald Test Data Publication

- Stimulate the IT community to more rapidly deploy and more efficiently operate multi-vendor storage technology
- SNIA Emerald™ publication
  - Provides a level playing field for test sponsors by using industry-defined methodology
  - Offers IT community data that is powerful and yet simple to use
  - Provides value for vendors by giving products and energy efficiency capabilities market visibility
  - Easy to submit test results
  - Provides test results that are easy to use

Why Storage Consumers Should Use the Emerald Publication Program

- Standard metrics and data in an easy to use format allow IT architects to objectively compare a range of possible storage solutions
- IT users can select the mode of storage usage that accomplishes their work objectives with the lowest overall energy consumption
- Vendor companies are driven to innovate and compete in the development of energy efficient storage products as measured by the standard yardsticks

Resources

- Storage Networking Industry Association
  - http://www.snia.org
- SNIA Green Storage Initiative
  - http://www.snia.org/forums/green
  - Green storage tutorials, white papers, and alliances
- SNIA Emerald™ Program
  - http://sniaemerald.com
  - SNIA Emerald Test Specification
  - Comprehensive online technical training
  - Storage vendor product listing with measured energy usage metrics
- USA EPA ENERGYSTAR Data Center Storage
  - Specification: https://energystar.gov/products/specs/node/144
  - Storage vendor product listing with measured metrics
  - https://data.energystar.gov/Active-Specifications/ENERGY-STAR-Certified-Data-Center-Storage/gqtf-hp7x

Thank You!

SNIA™ Green Storage Initiative

Questions?
Comments!

- Email additional questions and feedback to:
  - SNIA Emerald Program: emerald@snia.org
  - Green Storage Initiative: GSI@snia.org
  - Green TWG: greentwg-chair@snia.org