GENI Instrumentation and Measurement Working Group

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Session outline

- **9:00am - Welcome and introduction**
- **9:10am - Initial view of WG objectives**
- **9:20am - Short presentations**
  - Instrumentation and Measurement for GENI- P. Barford
  - Instrumentation Tools for a GENI Prototype, J. Griffioen
  - OnTimeMeasure, P. Calyam
  - Leveraging and Abstracting Measurements with perfSONAR, M. Swany
  - Scalable, Extensible, and Safe Monitoring of GENI, S. Fahmy
  - Virtual Machine Introspection for GENI, B. Hay
  - Embedding real-time substrate measurements, K. Bergman
  - Programmable Measurements over LEARN, D. Gurkan
  - Integrated Measurement Framework, R. Dutta
  - ORBIT measurements arrangement, M. Gruteser
- **10:20am - Discussion of objectives**
- **10:50am - Wrap up**

A brief history of GENI I & M

- **'06 – '07: instrumentation and measurement systems discussed in facilities architecture WG**
  - **GENI design document 06-12**
- **'08 – '09: several spiral 1 projects oriented around measurement capability**
- **June '09: first GENI measurement workshop**
  - **Final report is nearly complete**

Vision for I & M in GENI

- **Instrumentation and measurement systems provides broad data gathering, analysis and archival capability**
  - Sufficient to support GENI scientific mission
  - Sufficient to support GENI operations
- **Key component for success of the infrastructure**

Measurement requirements

- **Ability to measure details of GENI behavior with high precision and accuracy across (all?) layers**
- **No (or at least measurable) impact on experiments**
- **Ubiquitous deployment**
- **Extensible**
- **Large capacity**
- **High availability**
- **Resilient**
- **Strong access control**
- **Seamless integration with control frameworks**

Conceptual strawman

- **Instrumentation**
  - **Taps in the network and systems that provide basic signals**

- **Collection & synthesis**
  - **Programmable systems that collect, combine and transform basic signals**

- **Archive**
  - **Measurement data index and repository**

Instrumentation

- **Link sensors**
  - Deployed on network links via taps
  - Provide basic link signals

- **Node sensors**
  - Deployed on all systems connected by links
  - Provide basic utilization/state/configuration data

- **Time sensors**
  - Deployed at all sites
  - Provide fine-grained, synchronized timestamps

Collection & synthesis

- **Programmable system(s) connected to sensors**
  - **Eg. DAG appliance**
- **Transform basic signals into data suitable for more standard analysis**
  - **Eg. framing and flow export**
  - **Eg. CAIDA's DatCat**
- **Transformations can be more sophisticated**
  - **Eg. streaming queries**
- **Select/transfer protocol moves data from node sensors**
  - **Eg. Simple Common Sensor Interface for PlanetLab**
- **Short term storage capability**

Data archive

- **High capacity data repository deployed across GENI sites**
  - Interface with sensors and collection & synthesis systems
  - Access control & anonymization
  - Eg. Amazon S3
- **Data catalog**
  - Indexes data in the repository
  - Eg. DatCat

Security and access control

- **Requirements**
  - **All systems and data must only be accessible to authorized users**
  - **Different views of the same data will be available depending on authorization level**
  - **Resilient to attack**
  - **User specify privacy**

- **Mechanisms for implementing security and access control are TBD**

Objectives of I & M WG

- **Create an architecture for measurement that enables GENI's goals to be achieved**
  - **Document and refine**
- **Facilitate dialog and coordination between teams focused on I & M development**
- **Identify key challenges in I & M that could otherwise inhibit the infrastructure**
- **Solicit feedback from users**
- **Mailing list, wiki, GEC's**

Short presentations…

Discussion points

- **What are the key components of an I & M architecture?**

- **What are the significant challenges in design, deployment and management of I & M systems?**

- **How should the I & M WG be organized?**

- **What are the objectives for the I & M WG over the next year?**