

## EVALUATING THE INFORMATION ASSURANCE OF IT NETWORKS USING QUANTITATIVE METRICS

### WHAT IS INFORMATION ASSURANCE?

The term assurance has been regularly used in IT infrastructure as an expression of confidence that one has in the strength of services offered by the network. Current networking technology is rapidly evolving both in terms of offered services and in terms of system/hardware/software complexity. In the current competitive and dynamic information technology environment, several applications and services are integrated into a common operating framework. Such convergence and complex systems makes it more difficult to accurately define the notion of “information assurance”.

One of the pressing issues is the adoption of **uniform, deployable measures and metrics that can reliably depict the information assurance associated with specific software, hardware and networking infrastructure**. Despite the existing work that is underway, there is currently no standard or widely accepted method of capturing and presenting the assurance levels associated with a particular IT infrastructure.

### WHY IS IT IMPORTANT?

The intention is to develop a set of IA ratings which will serve as an index of Information Assurance for an IT network. In the early stages, the **IA rating index** may not represent a comparative measure between two IT networks but rather give a measure of how a particular IT network evolves/improves with reference to itself over time (i.e. if the index increases this shows improvement, or if the index fluctuates more than x units this should trigger an alarm etc.). Analogous indices exist in the area of financial/commodity markets that were developed through substantial research and data collection in the past. Similar IA health indices are required for Information Technology (IT) infrastructure.

The **expected audiences** who may be interested in such a metric include decision-makers who can utilize it for the purposes of public safety assessment, budget approval, and for the evaluation of proposals of infrastructure investment. In addition, this work will be of interest to technical personnel responsible for administering the IT infrastructure.

### WHAT IS AVAILABLE OUT THERE?

There have been a number of recent industry initiatives to develop standardized ratings to certify a particular vendor’s specific product offering. e.g the Common Classification Criteria (CCC). However, there is no such equivalent set of metrics or rating for the Information Assurance of an entire IT infrastructure. The recent work in the United States and Canadian Governments in the area of IT security self-assessment promises an interesting step towards development of metrics that easily represent the IA for an IT network.

## WHAT HAVE WE DONE TO IMPROVE THE LANDSCAPE?

At the request of PSEPC (Public Safety and Emergency Preparedness Canada), Solana Networks and Sombra Labs undertook recent work in the area of Information Assurance (IA) Metrics.

As part of the work for PSEPC, Solana Networks utilized a definition of Information Assurance based on 3 key attributes related to IT infrastructure: **Security, Quality of Service (QoS)** and resource/network **Availability**.

Our work proposed a detailed **taxonomy** of IA metrics that can be suitably utilized to obtain the IA rating of an IT network. The proposed taxonomy captures **organizational, operational and technical** impacts on the Information Assurance of a network. The taxonomy divides the metrics space into logical groups that have a defined relationship. Descriptions are provided for the logical groups in the proposed taxonomy and example metrics defined for each of the groups.

Solana Networks also developed a set of operational measures associated with a sample set of metrics based on the taxonomy. A **framework** is proposed which utilizes the **taxonomy and metrics** to arrive at a **single rating** that captures the assurance of the metric. This framework aggregates the individual metrics and utilizes a set of weights that ensure its applicability across diverse infrastructures and organizations.

We conducted a thorough review of state of the art work in the area of IA metrics. The proposed taxonomy was compared against alternative taxonomies proposed by government and research organizations in the United States. Finally, the work included an in-depth analysis of the issues related to real-time **data collection** for the purposes of IA metrics.

The above work will be published in a report by PSEPC in the Fall of 2004. A summary of the above work will appear in the 2nd Annual Conference on Privacy, Security and Trust to be held October 13-15, 2004 at the University of New Brunswick. We are currently seeking to collaborate with other Government and Academic Institutions who are interested in this area.

## WHAT CAN WE OFFER?

We can offer 2 key services to organizations interested in the area of Metrics for IT Networks:

- **Development of a software tool** - The tool would be based on the proposed taxonomy, framework and set of metrics. It would assist an organization to evaluate its IA rating. The system would take inputs from a variety of sources (including network/system measurement tools and assessment forms) and apply the proposed framework to the metrics based on a specified weight map. The tool would guide administrators on how to obtain the individual metrics that are required.
- **Run a brief field-trial** with the proposed taxonomy, metrics and framework for an organization so that it gauges its IA strength. the field trial scope can kept to a limited size initially and then expanded if that is the wish of the organization.