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framework for performance optimization

The verification systems described in arms control treaties are the products of negotiations that involve compromises. As a result, the end product may not be optimal. Nevertheless, the associated technical organizations are expected to provide assurances that information generated through monitoring will be sufficient to detect non-compliance. To evaluate the performance of a verification system, one needs to take into account not only the associated technologies and methodologies, but also the constraints imposed by each treaty. These limit the types and number of measurements that can be performed as well as the outcomes of the analyses of the monitoring data. This paper presents a framework for optimizing the performance of treaty verification systems. It is based on the observation that arms control treaties that incorporate monitoring, verification and enforcement of compliance are in effect feedback control systems. Consequently, the approaches and techniques used in evaluating such systems are also applicable to the treaty verification systems. Using the CTBT as an example of a feedback control system, the paper will emphasize the measurement, analysis and evaluation components for the purpose of identifying potential improvements and inherent limitations in their performance within the constraints imposed by the treaty.

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