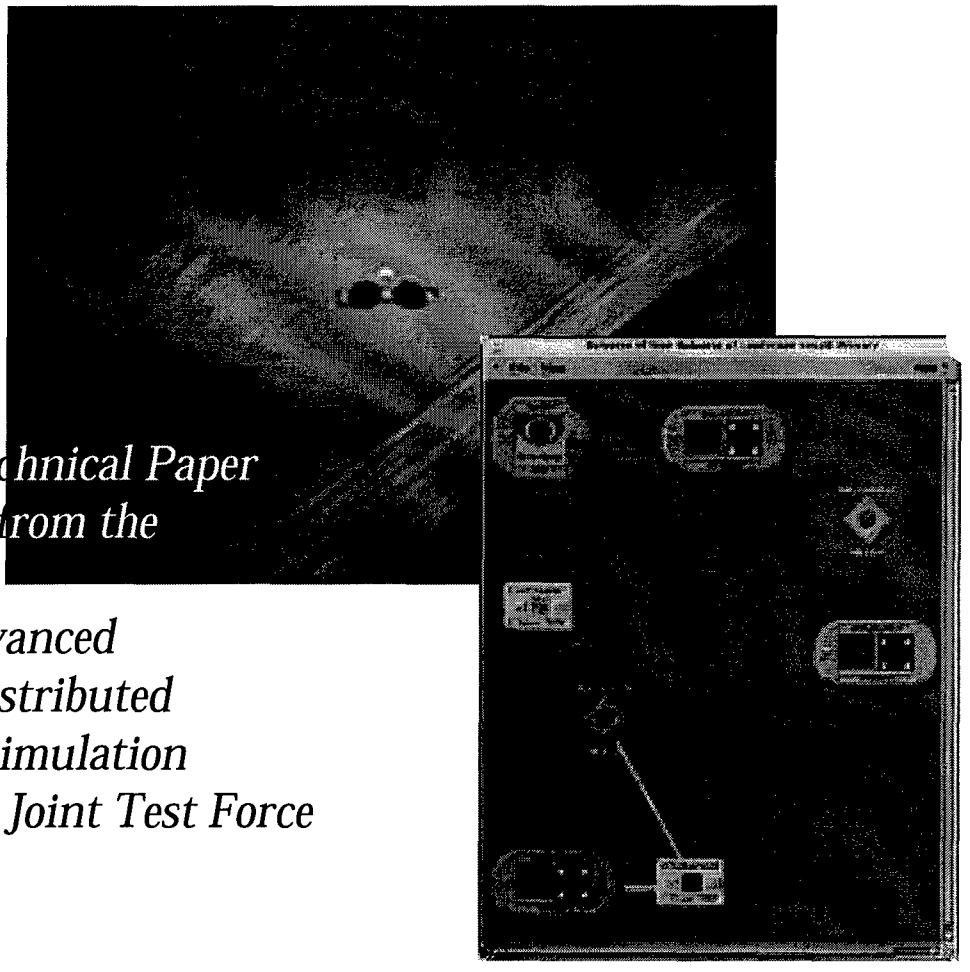
Analysis Tools and Procedures for Distributed Networks



A Technical Paper from the Joint Advanced Distributed Simulation Joint Test Force

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ABSTRACT

The Joint Advanced Distributed Simulation (JADS) Joint Test Force (JTF) is chartered by the Office of the Secretary of Defense to investigate the utility of Advanced Distributed Simulation (ADS) Technology to Test and Evaluation (T&E). JADS is executing three formal test programs representing slices of the overall T&E spectrum to form its conclusions, linking live test assets, constructive models, and virtual simulations at multiple test facilities and test ranges across the country. Although each test targets different distributed equipment, all three tests have similar requirements for a methodology and tools that support evaluation of cross-country network performance and its impact on data quality. JADS uses a suite of both on-site and remote network monitoring tools to provide insight into distributed network performance before, during, and after test exercises.

Prior to conducting any test exercise, it is important that a baseline analysis of the network's capabilities be performed. The comparison of baseline capabilities to projected network requirements allows identification of network shortcomings so that they can be addressed and provides confidence that distributed equipment will be able to communicate satisfactorily during testing. The baseline characterization of JADS network links includes Bit Error Rate Testing, or BERT, both no-load and loaded link latency testing, PDU (or HLA packet) verification testing, and stress testing.

During JADS test execution, network analysis is an integral part of the test control and monitoring process. Latency, error rates, and data verification continue to be of high interest. In addition, packet rate, bandwidth utilization, link availability, and time synchronization across sites may be monitored real-time. A specific network portion may be monitored continuously if immediate notification of a network outage is necessary. Network monitoring tools provide a remote troubleshooting capability that enables JADS test personnel to identify the problem's exact location and probable cause, should an outage occur.

The evaluation of network performance post-test is no less useful. Statistical analysis of link availability, bandwidth utilized, or other parameters based on data collected during testing helps characterize network usage trends. The detailed understanding of network performance gained through such study can be instrumental in implicating or exonerating the network as the cause of an observed test anomaly or degradation in data quality. Identification and understanding of network shortcomings leads to better definition of network requirements; paving the way for smoother future test events.

A variety of both in-house and commercially available data logging tools, network performance analysis tools, and time synchronization tools, as well as simple protocol analyzers and utilities, provide JADS with the capability to perform network analyses to support these purposes. This paper will discuss these tools and concepts in the context of the second formal JADS test program, the End-To-End (ETE) Test.

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