CREATING A COMMUNICATION INFRASTRUCTURE FOR SIMULATING URBAN OPERATIONS

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Joint Forces Command is currently developing a large-scale, human-in-the-loop (HITL) federation to support a Joint Urban Operations (JUO) experiment. This resulting JUO HITL federation brings together hundreds of simulations running on both Scalable Parallel Processors and standard desktop computers located at sites ranging from Hawaii to Virginia. This endeavor faced the challenge of developing a communication infrastructure that could support a demanding set of simulation requirements while faced with multiple technological hurdles. These diverse issues, which included high latency rates, huge amounts of network traffic, and organizing large numbers of computers, had to be solved to create both a stable and reliable federation.

This paper shall focus on how the communication infrastructure for the JUO HITL Environment was constructed. It shall describe how the capabilities and demands of the network, machines, run-time infrastructure, and multiple simulations affected the communication topology design. The paper shall also describe the resulting infrastructure used for the JUO HITL federation with a discussion of system strengths and weaknesses. The paper shall use quantitative measurements to illustrate how changes to infrastructure affect network traffic levels and performance. This paper shall also introduce the specific tools created to facilitate the rapid generation and distribution of the complex communication topology. Finally, future development work shall be discussed that should result in an even more robust system with improved implementation features.
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