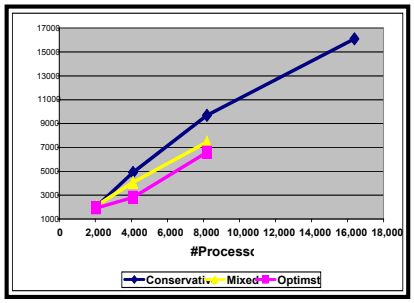
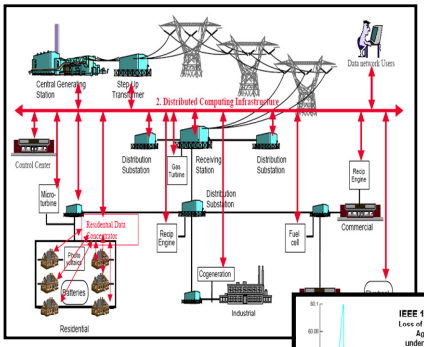
OAK RIDGE NATIONAL LABORATORY FACT SHEET
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Scientific Computing within the ORNL Modeling and Simulation Group: System-of-Systems Simulation – R&D for Parallel Discrete Event Simulation

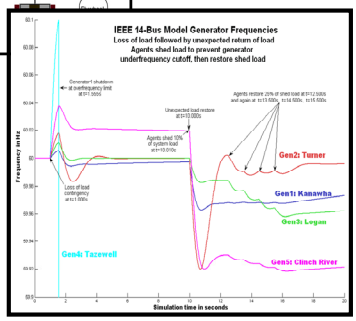
The ORNL Modeling and Simulation Group (MSG) develops sophisticated numerical solutions for a wide range of scientific, engineering, and operational applications. MSG's core competency is computational physics and engineering, and within this context we have a substantial program for the development of efficient scalable parallel-discrete-event-simulation (PDES) numerical engines for large-scale systems simulation. These numerical tools are being developed as enablers for next-generation high-performance computing applications such as future defense systems, critical infrastructures, and transportation systems. Research focus areas include parallel DES algorithms, component-based simulation frameworks, & integration of HLA-compliant components. Our current emphasis is communications-dependent networks, and expertise includes network & subsystem emulation, wireless channel modeling, visualization, and sonification. These advanced scientific computing capabilities represent an extremely versatile modeling and simulation resource for a broad range of R&D, industrial, homeland defense, and military applications. We welcome the opportunity to discuss your potential applications and ways MSG can contribute to a solution.

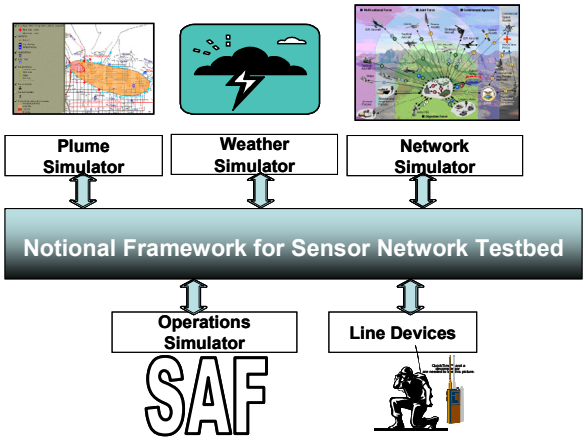


MSG achieved the largest PDES executions to date, with 1 million event-driven logical processes exchanging 10 million events on as many as 16,384 processors

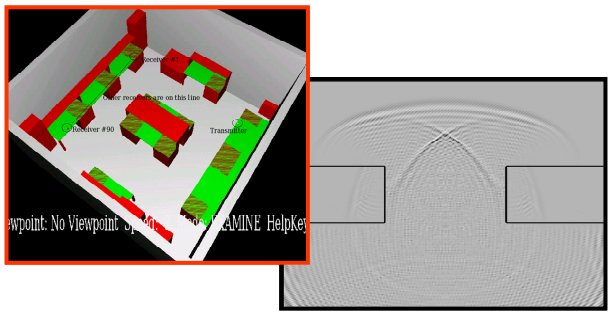


MSG utilized the ADEVS & NS2 software to simulate automatic load shedding & restoration schemes to prevent under-frequency failures on a 14-bus power generation & distribution system





MSG performed some of the most detailed analyses to date of integrated plume, weather & communication models to quantify model-fidelity effects on sensor network operation



MSG utilized ADEVS to develop fast 2D/3D wave propagation models for wireless network simulations within indoor & urban environments

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