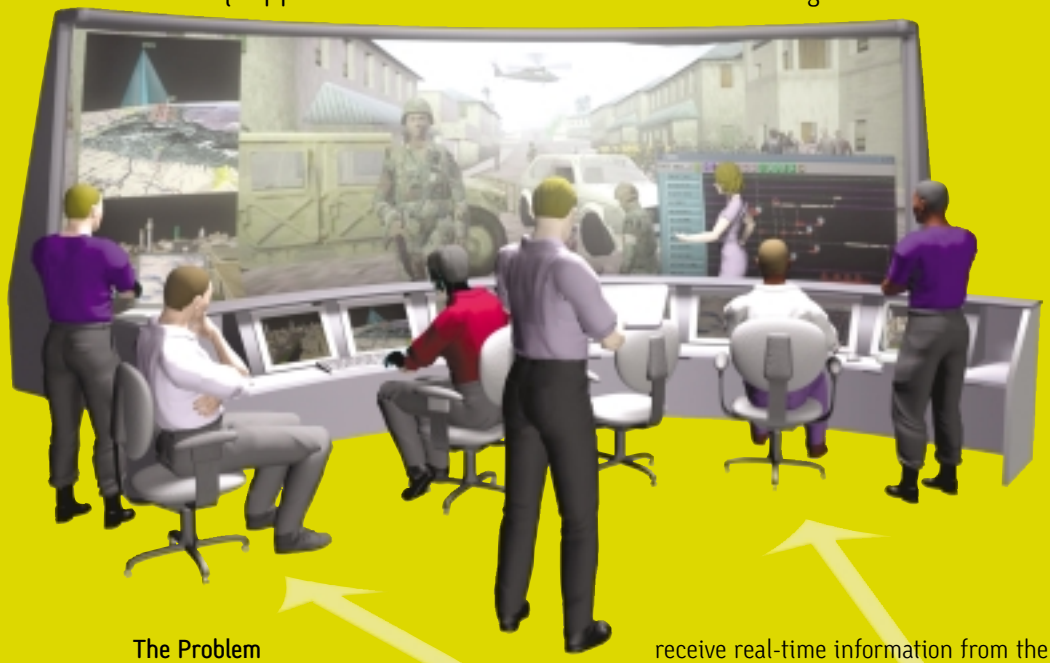
Solutions Brief

Visual Area Networking in Defense

Military Applications of SGI Visual Area Networking

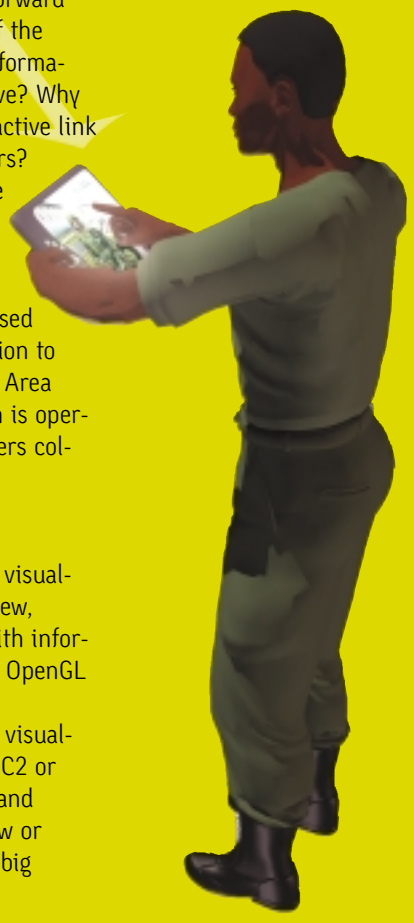


The Problem

As we move further from the command-and-control center (C2) to the operator, battlefield situational awareness decreases. Currently, deployed forces and forward operating locations need real-time imagery and intelligence to conduct their missions. Most often these assets are down range and away from the main command-and-control or combined air operations center (CAOC) that has the necessary supercomputing and visualization assets, as well as access to relevant data feeds and analysis resources. So the question surfaces: how does each level of command receive and present the best intelligence, imagery, or slice of the combined operating picture relevant to the decision makers on the spot?

At the central C2 or CAOC, all of the many data and information components that go to make a complete combined operating picture will be received and maintained. But only those that are of immediate interest to commanders need be displayed at any one time, as they call for them. Commanders can therefore dictate the content and form of their Combined Operating Pictures (COP) so that their situational awareness precisely meets their current needs, and ideally no more.

How can subordinate levels of command, then, share data and information between themselves and the C2? How can the central C2 or CAOC receive real-time information from the field regarding live mission status? A tremendous number of electronic sensors and integrated systems are relied upon to provide intelligence of a combat theater, but nothing can ever surpass the human in the loop. Why do forward operating locations that are the "tip of the spear" receive the lowest quality of information? Why is the battle not collaborative? Why isn't there a comprehensive and interactive link from commanders to the field operators? What if we could remotely connect the warfighter in the field to information derived in real time from a supercomputer and display data in a readily understandable form, specifically focused for those in the field? There is a solution to these problems, and it is called Visual Area Networking (VAN). This system, which is operational and deliverable by SGI, empowers collaboration among your assets.



Solution Description

SGI has developed an information and visualization solution for commanders, aircrew, troops, C2, and CAOCs to wage war with information synergy. VAN, enabled by SGI® OpenGL Vizserver™ software, can deliver high-performance computing and real-time visualization from a main command center (C2 or CAOC) directly to the field operatives and back again. The information, either raw or processed/exploited data, stays in the big

command center infrastructure. This secures your data and keeps you from having to copy the data over to a "client" or worry about version control, or which data is which.

This collaborative supercomputing and visualization system can be integrated with your current network architecture and work in a heterogeneous environment that supports legacy systems. You can thus empower your users by utilizing the computers they are currently using (PCs, Sun™ systems, laptops, etc.) and connecting them to high-performance computing and visualization systems.

This system can bring information from the field directly to the command centers. Big blocks of data are hard to move around in real time—especially over thin encrypted networks—and VAN is not a panacea for all remote users. The performance that a remote Visual Area Networking user will get depends on the bandwidth and age of the network, the application requirements, and the client-side window size. That said, OpenGL Vizserver software manages these issues as efficiently as possible.

VAN allows you to move the right data at the right time. For example, intelligence and mission-planning cells (MPC) may need space-based imaging to exploit a target area. However, the processing power required to perform this task is huge. The ability to run this type of exploitation in the field is not possible unless one deploys a large computing platform (large footprint and power) and the personnel to conduct the exploitation. This is logistically impossible for fielded ground troops, considering the speed and size of their support units in combat. But this computing capability is already required in the command center, so why repeat it at the forward location? What VAN accomplishes is to keep the high processing requirements and exploitation in the command center. VAN creates and exploits an interactive session between the field and the command center. It uses this interactive technology to allow the field operatives to manipulate the view and evaluate imagery, maps, photos, or field positioning for their benefit. In addition, the field can input critical information into the entire battle picture for the command assets to see. Put simply, the computing is in one location and the analysis can be wherever you want—creating collaboration at every level of the battle.

The Vision and Technology of Visual Area Networking

The vision of Visual Area Networking is to enable universal access to advanced visualization, using any computing device over standard networks. OpenGL Vizserver™ 3.0 is the key software that allows users of OpenGL® API-based applications to interact with visualization supercomputers individually or as a collaborative community of users, from anywhere in the world. It allows globally dispersed teams to visualize and interact with data without having to replicate either the data or the visualization supercomputers at each site. Remote visualization and collaboration using OpenGL Vizserver and SGI® Onyx® family centralized visual serving resources provide new levels of location independence and flexible decision processes.

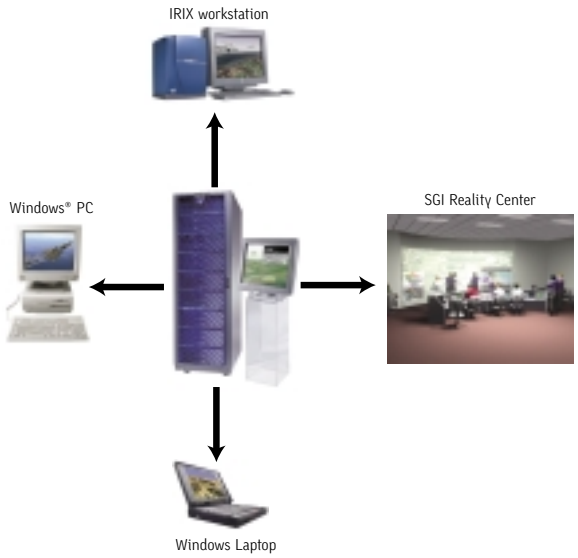
The concept of Visual Area Networking means that data is stored and processed in one place but can be interactively used by users across existing networks, using any client device, from tablets and laptops to large SGI® Reality Center™ facilities. Visual Area Networking removes the requirements to possess either the data or the advanced visualization capability locally, or to have enhanced, ultrahigh bandwidth networking resources connecting the remote and the centralized locations.

The concept of Visual Area Networking represents a shift from focusing only on advancing pure rendering power to include consideration of the location and availability of visualized data sets across the network. Visual Area Networking makes rendered data available to the user by sending only the pixels of the visualized graphic, rather than the raw data, to each user. As such, VAN protects the integrity of the data being visualized by eliminating redundant copies and version control problems, as well as limiting unauthorized access.

Components of Visual Area Networks include:

- SGI Onyx family visual computing system running IRIX® 6.5.11 or greater
- OpenGL Vizserver 3.0 or greater
- SGI® SAN solutions and CXFS™
- Client devices running IRIX®, Sun™ Solaris™, Linux®, or Microsoft® Windows NT®, Windows® 2000, or Windows® XP
- Existing or upgraded TCP/IP networking infrastructure
- OpenGL API-based applications

Visual Area Networking can be implemented by integrating the components described above, or by SGI Professional Services to a defined specification.



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