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BLUE FORCE SITUATIONAL AWARENESS INTEROPERABILITY[2][3][4]

In today's joint operational environment, the military has numerous service-specific command and control and situational awareness systems that are not interoperable. This deficiency adversely affects the ability of joint warfighters and the lack of interoperability prevents sharing of information, and increases the risk of fratricide. This article shortly describes the history and significance of the blue force tracker systems and uncovers the reasons for the lack of interoperability and suggests the way a head.

BARÁTI ERŐK HELYZETELEMZŐ ÉS ÉRTÉKELÉSI RENDSZEREINEK EGYÜTTMŰKÖDÉSI KÉPESSÉGE

Napjaink összhaderőnemi műveleti környezetében számos haderőnem specifikus vezetési, irányítási és helyzetértékelő-elemző rendszer található, melyek nem képesek az együttműködésre. Ez a hiányosság hátrányosan érinti a katonákat, akik a különböző rendszerek együttműködésének hiánya miatt nem kapják meg a szükséges információt, növelve ez által a baráti tűz bekövetkezésének esélyeit. A cikk röviden ismerteti a baráti erők helyzetét jelző rendszerek történetét és jelentőségét, feltárja az együttműködési képesség hiányának okait és javaslatot tesz a jövőre vonatkozóan.

INTRODUCING BLUE FORCE TRACKING SYSTEMS

Blue Force Tracking is a GPS-enabled system that provides the location of friendly forces, with the color of blue denoting friendly forces. The system provides a common picture of the location of friendly forces, therefore it is referred to as the „Blue Force" tracker [1]. It gives ground commanders and pilots a clear picture of situational awareness (SA) and assists with battlefield or airspace deconfliction. BFT helps to increase combat effectiveness and prevent fratricide with accurate friendly position mapping and communications.

The system integrates the Blue Force Common Operational Environment (COE) into a Common Operational Picture (COP). It will identify the status of joint and coalition forces operating throughout the battlespace, both within and beyond the line of sight. [2]

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Soldiers in combat can see blue icons on the computer screen inside their aircraft or vehicle to locate their teammates. They can plot improvised explosive devices and enemy locations with red icons on the same computer map, alerting other friendly units. BFT systems displays a variety of markers on area maps including blue force positions and status, known red force positions and engagement locations. This can be described as the digitized version of the hard copy maps with overlays in combat operation centers [3].

HISTORY AND NECESSITY OF BLUE FORCE TRACKING SYSTEMS

Prior to the first Persian Gulf War combat identification had not been viewed as a system requirement by military forces. [4] Development had focused on measures to increase the survivability of vehicles and crews. During that conflict, however, fratricide was recognized as a significant risk and attempts were made to assist with target identification.

Allied vehicles were outfitted with fluorescent orange panels, which also had chevrons painted on them to differentiate them from enemy vehicles. Dust and smoke frequently obscured the panels and rain and fog could cov ered infrared reflections, making the identifying panels ineffective [5].

The Anti-Fratricide Identification Device (AFID) was deployed to prevent air-to-ground fratricide. AFID consisted of an infrared beacon using two infrared diodes. A major concern with this beacon technology was that enemy forces could detect AFID emissions and use them to target coalition vehicles [6].

Identification is made especially difficult for soldiers in environments such as Afghanistan by the asymmetric nature of that conflict, characterized by a difficulty in knowing who the enemy is, and where they are. Operating in unfamiliar environment among different nations often leaves soldiers with limited knowledge to distinguish neutral from potentially hostile soldiers.

Several factors contribute to a greater risk of fratricide in the modern battlespace. Weapons have longer ranges than in past conflicts, meaning that targets can be engaged before it is possible to acquire positive identification [7].

The greater range of weapon systems also means that remote sensors, which may provide only partial cues to identity, must be relied on to a greater extent. Greater mobility of forces has led to operational environments in which forces are more dispersed, making it more difficult to maintain good situational awareness (SA).

Failures of situational awereness, command and control and communication frequently contribute to fratricide and neutricide[5] incidents. All of these issues are exacerbated in high-tempo operations that decrease margins of error [8].

In addition to the greater risk of fratricide and neutricide, the use of more precise weapons and

[5] Neutricide is the term to describe incidents when civilians and civilian infrastructure are accidentally targeted or misidentified and deliberately targeted

surveillance allows fratricides and neutricides to be more easily detected [9]. Accidental deaths and injuries due to friendly fire that may have gone unexplained in past conflicts can now be more accurately identified as fratricide or neutricide.

Blue-Force Tracking systems help to mitigate the risk of fratricide by supplying positional information regarding friendly units. BFT directly enhances situational awareness by providing location information of friendly units. BFT also enhances joint/coalition interoperability through transmitting of blue-force positional data. Another advantage of BFT systems is that friendly position data can be fused with tactical data to further enhance situational awareness.

BLUE FORCE TRACKING SYSTEM CHALLENGES

Operational need for BFT has risen exponentially since the onset of the global war on terrorism.

The variety of devices and different capabilities they provide have created interoperability problemes that directly affect the ability to exchange this data at the tactical level. These challenges will increase unless a joint capability is developed that can meet all mission requirements.

Interoperabilty

In today's joint operating environment, the military has numerous service-specific command and control and situational awareness systems that are not interoperable because of the differences in data standards, protocols, security requirements and procedures [10]. This deficiency adversely affects the ability of joint warfighters and the lack of interoperability prevents sharing of vital information, and increases the risk of fratricide.

Historically, the Services have been responsible for designing, procuring, introducing, and sustaining their own equippment [11]. Unfortunately, Service specific requirements do not facilitate joint interoperability today. These systems were developed individually, without coordinating with other services. This means that warfighters can see only a fraction of the friendly forces on the battlefield.

Operation Iraqi Freedom highlighted the limiting fact that US Army and Marine Corps situational awareness systems were not interoperable at the tactical level. As the Army moved towards Baghdad on the west side of the Tigris/Euphrates Valley, they could not „see" the Marine Corps units moving on the east side. The task organization for offensive operations in Fallujah required a force mix of seven Marine Corps battalions and two Army battalions. During execution, none of these battalions could exchange digital information with each other [12].

Communication network

A significant weakness of BFT is that it depends on a communication network to gather data and to transmit an integrated picture. Such networks are subject to failures that could leave units without BFT information. Although the goal for a BFT system is real-time position data, in real life this is extremely

difficult to achieve and these systems typically suffer a lag of several minutes [13]. This may be too long to maintain an accurate picture when units are moving, especially at high speed.

Blue Force Tracking satellite-based system is subject to the limitations of a space-based communications system. Because the system is susceptible to deadspace, blackouts, and solar interference, current locations are not always updated when BFT signals are blocked from satellite receivers by terrain or satellite position [14].

Space-based communication also increases operating costs when military satellites can not be used. Use of commercial systems also brings up the question of sensivity and reliability of data, particularly when service providers are foreign owned and operated.

Blue force information security

Information security is paramount during combat operations. The BFT system automatically reports the users current position, providing and displaying near real-time position reports of all units on the battlefield to the user. If this system is compromised, the enemy can use this information to target or avoid friendly units operating in their areas.

The classification of the data plays an important role in designing these systems. There is a significant debate about the proper classification of BFT data. For example, the Army approaches the classification problem from the perspective of providing every soldier with a BFT capability in the future. Since it is unrealistic to get every soldier a security clearance, they fight for declassification of BFT data for users below the squad level.

Most of the combatant commands believe that classification is mission dependent, for example Personnel Recovery or Special Operation BFT systems should operate at a classified level [15].

Currently, intelligence, and information system experts are working on this issue, and are considering a compromise where data generated from users below the squad level is considered unclassified and everything above classified [16].

Establishing a policy on the classification of BFT data is a fundamental in developing a joint capability. There is a joint need for safe communication among all friendly forces. Network vulnerabilities that potentially provide enemy forces with this type of information must be guarded against at all costs.

THE WAY AHEAD

Interoperability

The complexity of warfare and the joint environment highlight the need for a joint capability in this critical area. The requirement for an interoperable BFT system is very important due to the high level of joint operations.

Under the Coalition Blue Force Situational Awareness project experts are working with Ministry

of Defense staff and contractors to develop the operational and tactical level exchange of BFT data between the U.S. and the United Kingdom's situational awareness systems. A similar effort is ongoing among NATO coalition partners. While sharing information with NATO nations is a key factor, a more important outcome could be the cooperation to establish an international standard for BFT data [17].

The growth of BTF devices will exacerbate interoperability problems. One device will not be able to satisfy all requirements, but there is a significant need for reduction in the number of systems used. The continued Service-centric development of BTF devices will be totally inadequate for the future.

Having fewer types of devices would limit the various architectures and configurations and this would improve interoperability and training efforts. The ability of devices or systems to intercommunicate would facilitate efficiency and effectiveness. Maintenance and sustainability would also improve with a focused effort on fewer numbers of systems.

As a solution a family of systems approach must be adopted to reduce the number of different systems currently being used to fulfill the same capability requirement. Furthermore, several of the devices are produced by the same contractor, yet many of these devices are incapable of communicating to each other [18].

Communication network

The future challanges make it clear that the military must be prepared to operate in any climate and place. The ability to deploy and operate globally on short notice requires global coverage for the collection and dissemination of BFT data. Current communications architectures can best be described as theater specific.

Space power is a decisive, asymmetrical advantage for the United States, especially for the U.S. military. But heavy reliance on overhead assets creates some vulnerability. Most potential adversaries study and understand U.S. capabilities, and try to adapt technologies to overcome their own disadvantages [19].

BTF sytems relies heavily on commercial satellite access. Commercial systems not under the control of the military, significantly degrades combat effectiveness. The government has to pay for service, therefore reducing the likelihood of using this system in a training environment.

Creating a system that can operate via satellite as well as terrestrially would be beneficial. This capability would reduce satellite service costs and would lead to an increased efficiency of limited bandwidth.

Enhancing Expeditionary Capabilities

Present BFT systems work relatively well in the current static operating environment, where units are located on permanent forward operating bases. Any future BFT system that is developed must be expeditionary [20]. It must be available for use during training, and ready to deploy with minimal coordination.

The rapid employment of expeditionary operations does not allow satellite service contracts. Some geographical locations in the world lack satellite coverage. Units require the ability to deploy to any location worldwide and to have communication with their C2 architecture.

Expeditionary operational requirements are not predictable. Present BFT system is heavily reliant on satellite communications and it is limited by civilian contractual agreements. With budgeting constraints impacting armed forces, it is unlikely that they would spend money to have satellite coverage available in all parts of the world.

SUMMARY

The chaotic battlefield environment requires a system that is secure, expeditionary, and standard across coalition forces and the services. The goal is to provide an integrated Blue Force picture to the warfighter, using equipment they already have, and were already trained to use.

The variety of devices and different capabilities they provide have created interoperability challenges that directly affect the ability to exchange this critical data at the tactical level. These challenges will increase unless a joint capability is developed that can meet all mission set requirements.

Interoperability is the foundation of effective joint, multinational operations. Interoperability is a mandate for the future joint force, especially in terms of communications and information sharing. Information systems and equipment that enable a common relevant operational picture must work from shared networks that can be accessed by any appropriately cleared participant.

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