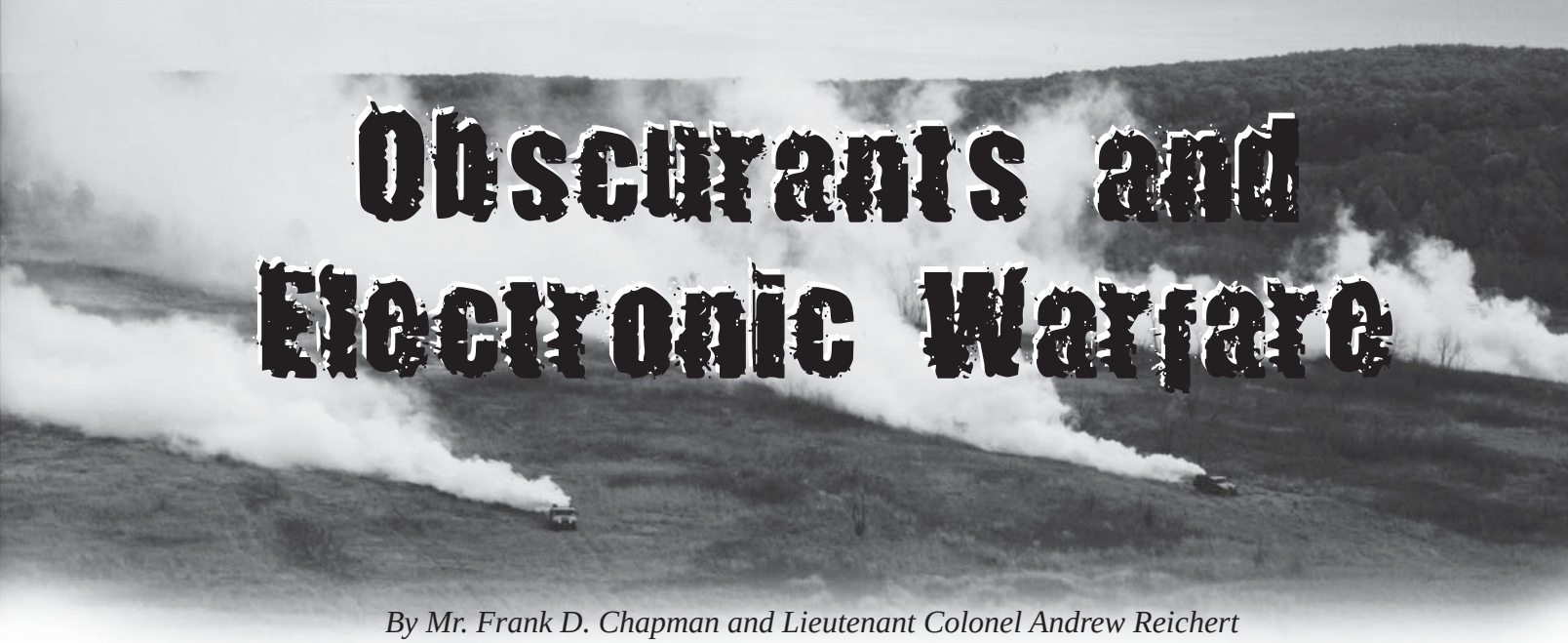


Obscurants and Electronic Warfare

By Mr. Frank D. Chapman and Lieutenant Colonel Andrew Reichert

Obscurants serve as a key electronic warfare (EW) enabler in the current operational environment and will continue to be used in assisting commanders at all levels with unified land operations.

History of Obscuration and EW

At a time when few of our adversaries were capable of using anything more advanced than visual sensor systems, we used traditional (visual) means of obscuration. However, visual obscurants were of limited value because they defeated our own Soldiers and equipment and restricted our ability to perform information denial missions across the complete electromagnetic spectrum (EMS).

Today, obscuration allows the Army and other Services to defeat the enemy across a broad range of the EMS. The unique current and near-term capability of obscuration to defeat directed-energy systems such as lasers was identified during the Cyber/Electromagnetic (EM) Environment Capabilities-Based Assessment. The Army and joint Department of Defense community now consider obscuration as EW. In the Joint Capabilities-Based Assessment, which was written by the U.S. Strategic Command, obscuration is considered "EW electronic attack" and—although associated with its own task—it is addressed in the context of "conduct electronic deception operations; jam adversary EM capabilities; and protect friendly personnel, equipment systems, information, and facilities from adverse EW effects."

Threat

An increase in the use of, and reliance on, communication, global positioning, and directed-energy devices and systems has caused EMS use to increase at a staggering rate. The growth of technology has resulted in the weaponization of the ultraviolet, visual, infrared (IR), and centimeter wave (CMW)/millimeter wave (MMW) portions of the EMS. All major nations and some minor ones produce and actively market systems that use these areas of the EMS. U.S. forces can now expect to encounter potential adversaries who are equipped with a full range of battlefield weapons systems (and associated optics), ranging from simple systems that require an operator; to visually guided (laser designator) munitions; to intended target sensors; to sophisticated systems that, once engaged, use IR or MMW trackers/seekers for guidance. Increasingly sophisticated battlefield weapons systems equipped with onboard countermeasures will appear in greater numbers on future battlefields. As these advanced systems become more prevalent, they will pose an increasing threat to the survivability of U.S. forces. Many of the systems expected to be encountered by the U.S. Army and joint forces will be man-portable devices that are employed by one- or two-person teams attempting to make precision strikes or to defeat our use of the EMS by employing unconventional warfare. Due to the capabilities and small size of these portable devices, it is extremely difficult to locate and engage them before they are employed.

Future adversaries are also aware of our own reliance on advanced sensors and precision weapons and, in turn, have accelerated their development of advanced obscurants to defeat our use of the EMS. Their capabilities include small- and large-area multispectral obscurants that can defeat our communication and targeting systems and active jammers and eliminate our ability to defeat certain types of improvised explosive devices.

These adversarial threats will persist as technology continues to be developed and we continue to rely on the EMS to defeat hostile forces.

Obscuration, EW, and the EMS

The term *EW* refers to any military action involving the use of EM energy to control the EMS or to attack the adversary. EW consists of offensive and defensive electronic attack (EA), electronic protection, and EW support. The threat posed by modern target acquisition, designation, and guidance sensors has grown rapidly over recent years. The ability to employ obscurants provides the commander with an important ready, able, and deployable force multiplier that can affect the enemy's ability to control or use the EMS at specific times and locations. (See Figure 1, page 22.)

Obscurants	Fog oil Hygroscopic chloride mixture White/red phosphorus Fog oil and graphite mixture Fog oil and MMW graphite threads						
Wave Subgroups	**Visible light**	**Near-IR**	**Mid-IR**	**Far-IR**	**CMW**	**MMW**	**Ultra-high frequency**
Portion of EMS	**Visual**	**IR**			**Microwave**		
Systems	● Old starlight scopes ● Battlefield television ● All daylight sights ● Standard aerial photography ● Some satellite imagery	● Antitank guided missiles ● Dragon IR tail flares ● Hellfire I ● Artillery (Copperhead) ● Lasers ▪ Range finders ▪ Target designators		● Thermal imagers ▪ TOW II ▪ FGM-148 ▪ Javelin ▪ Thermal night sights	● Battlefield radar ▪ Ground surveillance radar ▪ Air surveillance ▪ Tactical Reconnaissance and Counterconcealment-Enabled Radar (TRACER) ▪ Foliage penetration (FOPEN) ▪ Hellfire II		

Figure 1. Obscurants and systems used for various portions of the EMS

To ensure the proper employment of obscurants, the effects must be planned and deconflicted properly during the planning phase and continuously throughout the execution phases. The Chemical, Biological, Radiological, and Nuclear (CBRN) Protection Cell and Cyber/EW Cell (comprised of cyber, EW, and EMS operations personnel) are responsible for ensuring the proper employment of obscurants across the operational environment—not only for self-protection, but also to limit or deny the use of the EMS in all aspects of Army and joint operations.

Concept-of-Operation Requirements

There are four doctrinal concept-of-operation requirements—EA (offensive), EA (defensive/on demand), EA (on call), and deception.

EA (Offensive): This refers to the ability to deny information that supports the adversary's efforts to conduct reconnaissance, intelligence, surveillance, and target acquisition (RISTA) or mission command for adversarial operations. Examples of scenarios that provide the commander with this ability include—

- An unmanned aircraft system (UAS) places a selected obscurant over a target area where digital communication wavelengths are used, thus creating a communication blackout for a specified time. (The target could be located in an area where normal weapons could not be used.)
- A UAS places a selected or broadband obscurant over a long front, thereby defeating ground surveillance radar systems (without knowledge of the exact locations of the systems).
- Selected or broadband obscurants are placed along an aerial insertion or exit route to defeat air defense early warning systems and weapons.
- Battery fire is countered by putting obscurants in front of or over the adversary's artillery counterfire detection systems.
- Breaching and gap-crossing operations are planned using artillery- or mortar-delivered multispectral and broadband obscurants for the far side of the gap and, depending on the threat, UASs or unmanned ground vehicles on the breach or gap itself.

EA (Defensive/On Demand): This consists of onboard vehicle systems; hand-controlled munitions; artillery and mortar munitions; manned, large-area systems; and UAS and unmanned ground vehicle systems for rapid employment. The primary mission is to provide immediate, on-demand obscuration from direct and indirect fire, smart munitions, and individual vehicle and personnel observation. This type of obscuration mission requires a 30-second to 25-minute employment timeframe. Examples of scenarios that provide commanders and Soldiers with opportunities to use this ability are—

- Mounted and dismounted urban operations.
- Breaching and obstacle emplacement operations.
- Force-on-force (vehicle versus vehicle or Soldier emplacement) operations.
- Smart weapon attacks from indirect fire or IR/MMW/acoustic minefields.
- Direct fire attacks.
- Ambushes using conventional and advanced weapons and combatants.
- Stealth vehicle penetration of friendly positions.

EA (On Call): This consists of large-area (minimum 1- by 5-kilometer) obscuration with a duration of more than 15 minutes. Commanders and Soldiers use this ability when—

- Employing obscurants directly on or in front of the adversary to deny RISTA or target engagement.
- Providing overhead concealment or protection from RISTA using aircraft, UASs, and space-based sensors.

- Using canopy obscurants to provide overhead protection from direct, indirect, and smart weapons.
- Providing protection from all types of adversarial RISTA and target acquisition systems at river and choke points.
- Protecting high-value targets (aerial ports of debarkation, sea ports of debarkation, ammunition and resupply points) from all types of adversarial RISTA and engagement systems.
- Defeating electromagnetic pulse devices.

Deception: This concept adds new capabilities and also maintains the overall deceptive intent, which is the same as that employed by the warfighter. Informational dominance of the battlefield denies adversaries access to data and also denies them the ability to promptly react to a situation. This, in turn, leads to the complete success of an operation. The ability to employ advanced obscurants by UAS and unmanned ground vehicle allows commanders to—

- Selectively cover far-ranging and in-close ground surveillance systems that could compromise the mission.
- Affect selected mission command and radio communication systems. The mission command network can be degraded, limiting the ability of the adversary to grasp and process required information.
- Force the adversary into making the wrong judgment (when employed with other theater/service assets).

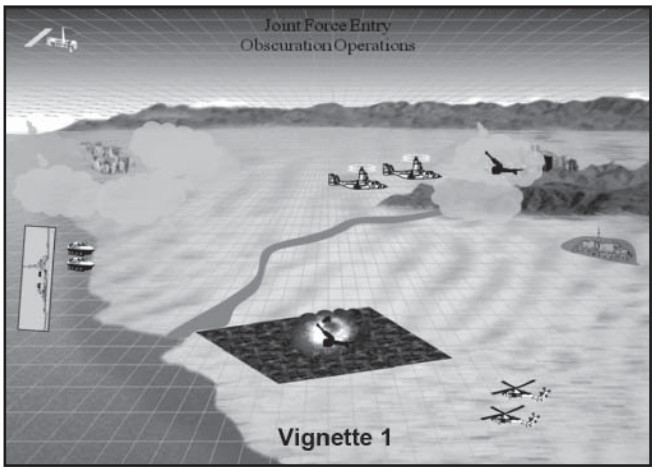
Operational Vignettes

Vignettes 1–3 illustrate how obscuration could be employed in various scenarios. For each of the scenarios, it is assumed that the adversary possesses advanced frequency-agile radios, satellite communications, laser radios, sensors, radar, towed and mechanized air defense systems artillery, short- and long-range missiles (with built-in multisensor capability), and laser-guided armor and antitank weapons—some with "fire and forget" dual seekers. It is also presumed that they will use defensive EA systems, counterbattery radar, advanced portable ground surveillance radar, advanced night vision (ultraviolet/IR) devices, and satellite surveillance systems. Their EW capabilities will include multispectral obscurant systems (visual, IR, MMW), advanced decoys, and Global Positioning System jammers—which they will plan to employ against any real or perceived threat.

Vignette 1: Joint Force Entry (Amphibious Landing) Obscuration Operations

Situation:

- *Army and Marine forces conduct a landing against heavily fortified positions. Naval gunfire, Marine and Navy aircraft, and UASs provide ground support to the landing forces; however, the hostile forces' centralized, hardwired, nonemitting sensor network is survivable against fire encompassing cyber and EW assets, air launch munitions, and artillery systems.*
- *Naval ships arrive at two locations, producing visual obscurants from over-the-horizon distances at various times beginning a couple of days before the attack.*



During these deception missions, the Navy also employs limited offensive EW (including IR and MMW obscurants) and signals to confuse hostile forces with regard to plans. About 2 hours before the landing force arrives, Navy ships and aircraft begin to produce EW effects (including visual obscurant hazes) at both locations. Just before the arrival of the landing force, they begin producing IR and MMW obscurant screens to confuse the hostile forces with regard to the specific landing location.

- *Obscurant-generating systems deploy visual, IR, and MMW obscurants in front of the landing craft to avoid detection and acquisition by hostile weapon systems. Naval gunfire is used to project multispectral obscurants in precise locations on the beaches for short periods of duration to allow landing forces to amass with sufficient combat power.*
- *As agile friendly forces operate over and behind hostile positions, vertical-lift aircraft and helicopters use hand-tossed, multispectral grenades and missiles and UASs deliver broadband multispectral obscurants to provide screening and limit the enemy's ability to use radio communications. In some cases, an option can be selected to allow the missiles to provide a lethal overpressure/blast on selected targets using the same munitions that provide the broadband obscurants. This allows friendly forces to cut off hostile reinforcements.*
- *The casualty level (less than 5 percent) is manageable enough to allow the landing forces to quickly move inland. Hostile forces attempt to use an IR obscurant to mask their own positions, but are ineffective due to the deception missions, which force them to extend units and obscurants over a larger area. Agile friendly forces rapidly defeat hostile units on the beachhead. Mechanized, large-area, visual, IR, and MMW obscurants may support actions to expand the beachhead enough to protect and enable logistic supply operations, equipment repair, replacement, and storage—thereby relieving pressure on friendly forces. Army artillery uses selectable-effects munitions to conduct a broadband obscuration mission against areas with a large civilian population or a culturally sensitive facility. This is done to limit collateral damage or effect lethal damage (destroying light vehicles and other high-value targets) while limiting the logistical loads required in the initial fight/landing.*

How Obscuration Was Employed:

- *Tightly controlled and integrated uses of joint obscurants prevented the enemy from concentrating units and fire at one location (deception obscurant).*
- *All types of obscurants (visual, IR, MMW, and multispectral) were synchronized and employed without limiting the effectiveness of friendly weapon systems and landing support craft.*
- *MMW systems pierced hostile IR obscurants and allowed smart systems to identify and destroy hostile forces.*
- *Projected and generated obscurants from ships, aircraft, and vehicles were used to maximize obscurant effectiveness and reduce inherent limitations on employment.*
- *Obscuration was employed as a force multiplier in support of the mission.*
- *Obscurant-generating equipment was assigned a high priority in the theater of operation.*
- *Integrated joint obscuration was used to avoid large numbers of casualties and the destruction of equipment after completion of the deception mission.*
- *Selected-effect munitions were used to limit the types of munitions to be landed and to ensure the inability of the enemy to use the local civilian population and cultural facilities to limit the ability to engage enemy forces.*

Vignette 2: Obscuration Operations (Lethal and Nonlethal) for Seizing an Enemy Center of Gravity in Urban Terrain

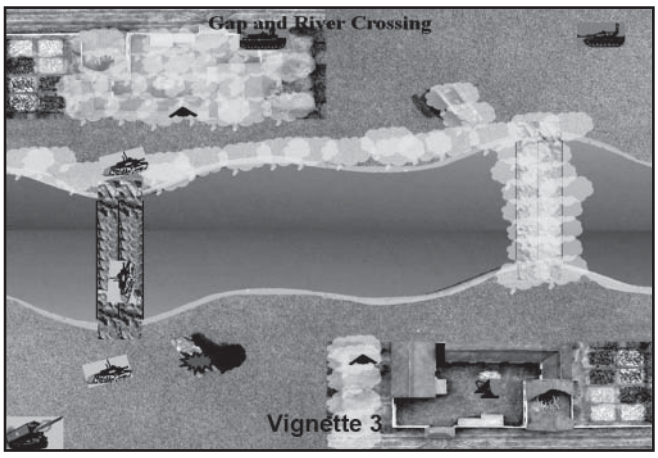
Situation:

- *The Government House is an old, historic site where structural damage has been kept to a minimum.*
- *Deaths to the civilian population must be avoided to the extent possible.*
- *Joint obscuration is employed to shield Army and Marine assault forces from enemy observation as they approach the objective (the Government House).*
- *Projected obscuration (mortar-delivered and unmanned, vehicle-delivered) enables assault forces to more rapidly maneuver through alleys and intersections that are covered by enemy observation and fire.*
- *The use of joint obscuration in support of lethal and nonlethal weapons capabilities enables assault forces to clear the axis of advance, secure the facilities, and block access to the secured objective—all with fewer enemy and civilian casualties.*

How Obscuration Was Employed:

- *Obscuration, though not a nonlethal effect, was included in this study.*
- *Obscuration was essential to the success of the lethal and nonlethal missions through the shielding of assault forces from enemy observation as they approached the Government House.*
- *Projected obscuration delivered by mortars and unmanned vehicles enabled forces to maneuver through alleys and intersections that were covered by enemy observation and fire more safely and rapidly than when only organic smoke grenades and the Light Vehicle Obscuration Smoke System were employed.*
- *Projected multispectral obscuration was a key means used to impair and defeat enemy target acquisition capabilities.*
- *Models demonstrated that forces were able to accomplish the mission more often when using obscurants and nonlethal capabilities than when using nonlethal capabilities only.*
- *The attacking force suffered major causalities when using nonlethal weapons alone, and facilities could not be kept secure after capture. The mission could not be completed without resorting to lethal capabilities.*

Vignette 3. Gap and River Breaching and Crossing Operations



Situation:

- *The division is tasked to capture weapons of mass destruction facilities and to stop munitions/bulk materials from being hidden or transferred to another nation.*
- *The division is made up of three brigade combat teams, one maneuver enhancement brigade, and allocated support from corps-assigned artillery for this mission.*
- *Along the routes capable of supporting heavy armored vehicles, there are three bridges and several potential crossings where bridges could be placed.*
- *The commander decides to bypass the bridges until one of the brigade combat teams can secure both sides of the river, eliminating hostile forces and their fire.*

The commander opts, instead, to have the maneuver enhancement brigade engineers emplace two ribbon bridges.

- *With support from the CBRN Protection and Cyber/EM Cells, the commander plans to conduct deception missions, including the use of projected multispectral obscurants and sound devices around the two ribbon bridges, which are capable of handling division vehicles. He also plans to use large-area V obscurants at the two bridge sites to obscure the vehicles transporting the bridges to be emplaced. In addition, aircraft will drop visual, IR, and MMW obscurants at these sites across the river to defeat any long-range observation systems and to appear to be part of deception operations, which also include two other sites along the river.*
- *After the first platoon crosses and establishes protection across the river, large-area obscuration vehicles cross and employ multispectral obscurants. This allows division forces to rapidly cross the river and secure the three major bridges. The commander then rapidly sends the forces down the route to secure the weapons of mass destruction sites.*

How Obscuration Was Employed:

- *Tightly controlled and integrated uses of joint obscurants prevented the enemy from concentrating units and fire at one location (deception obscurant).*
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- *Selected-effect munitions were used to limit the types of munitions to be landed and to ensure the inability of the enemy to use the local civilian population and cultural facilities to limit the ability to engage enemy forces.*

Recommendations

The following courses of action are recommended:

- Develop and refine obscurant doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) requirements and solutions jointly. These initiatives are urgently required to ensure that Soldiers, Marines, Sailors, Airmen, and Coast Guardsmen survive against the more capable weapons and sensors that the future force must face and defeat.
- Establish a joint CBRN/cyber/EW obscurant requirements group to—
  - Develop and approve the integration of doctrine and training for joint obscurant operations based on an analysis of the EW capabilities of obscurants.
  - Develop and approve materiel requirements for necessary joint obscurant operational capabilities that involve true broadband obscurants.
  - Develop long-range standoff obscurants that can be selected to provide a broadband or enhanced blast capability.
  - Refine individual and collective tasks, programs of instruction, and training; integrate training into combat training centers and unit exercises; and ensure joint refinement.
  - Ensure that leaders understand how efforts institutionalized in professional military education should be synchronized.
  - Conduct an organizational review to ensure that the alignment of units and systems meets future requirements.
- Ensure that approved simulations include the modeling of obscurants to support the joint warfighter at all levels, from tactical to strategic.
- Commission and sponsor a joint, obscuration-focused warfighting experiment to—
  - Maximize visual, IR, MMW, and advanced (broadband) obscurant that is value-added against weapon and RISTA systems.
  - Determine and define requirements for passive and active obscurant systems to improve the survivability of critical, high-value communication systems; detection systems; electronic jammers; and weapon systems.

Future Concept of Operations

From 2016 through 2020 and beyond, obscurant missions carried out in support of EW should be conducted under the four doctrinal concept-of-operation requirements. These concept requirements address new, unparalleled capabilities for controlling or defeating the EMS. Through the use of new, advanced obscurants, commanders are now uniquely able to select not only the time and location for obscurant use, but also the windows of opportunity that will allow friendly—but not adversarial—systems to penetrate the obscurant cloud.

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