# Network Backbone: 173rd Airborne's Strategy to Enable the Modern Fight

## *Tactical edge*

**1st Lt. Vincent Gasparri**
*173rd Airborne Brigade*

High above the battlefield, a long-range unmanned aircraft system (UAS) silently patrols the skies. The drone maps the terrain. Its target recognition system flags a convoy of vehicles approaching a critical supply route. The UAS relays this information to the command post, where the battalion intelligence analyst recognizes the convoy as hostile.

Then, a nearby tactical leader's handheld device vibrates with an incoming alert. The live feed from the UAS appears on his screen, showing the hostile convoy's location, speed, and direction. The notification also reaches the brigade's command post, which is hundreds of miles away. The brigade's targeting team reviews the footage and identifies the enemy convoy as a high payoff target. Within seconds, the data is shared. The coordinates are sent to an artillery unit, and they prepare to engage. After the brigade analyst confirms the target, coordinates are sent directly to the firing system computer, and the fires mission is approved.

The artillery unit fires a precision-guided munition. The paratrooper watches the strike and reports battle damage assessment (BDA) from the UAS feed. The convoy is neutralized, and the supply route remains secure. The kill chain occurred in real-time: sensor to shooter in seconds. These technologies and processes are only limited by our ability to connect systems. An effective network is paramount.

### Network Backbone, Strategy, Architecture

The 173rd Airborne Brigade is rapidly modernizing its battlefield network to enhance lethality and situational awareness – shorten the kill chain, watch UAS feeds, and see the same common operational picture (COP). This involves integrating new sensors and systems into its formations while streamlining command and control (C2) functions (battle tracking, fires processing, intelligence, and sustainment) to amplify soldier lethality and battlefield awareness.

Our network ultimately ensures seamless connectivity and IP-based communication for all users prioritizing survivability, resilience, and flexibility. This robust network connects tactical edge devices with the cloud, enabling real time data sharing and faster decision making.

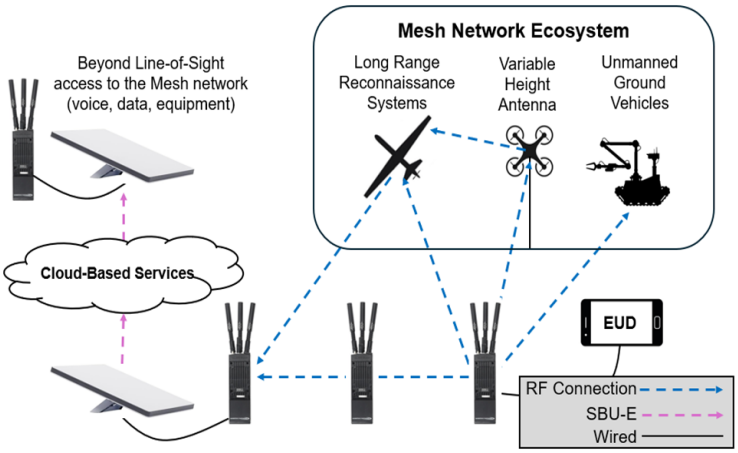
### Network Strategy

The 173rd Airborne Brigade's network strategy is formed through internal research, development, training and testing.

**Bottom Line**: The 173rd's tactical network enables modern battlefield command and control - allowing leaders, informed by efficient data analysis and flexible connectivity, to prioritize resources and assets in real time.

### Network Architecture

These end states are reached using a revised network architecture built with a robust brigade mobile ad-hoc network (MANET), widely proliferated mobile satellite communication (SATCOM) terminals, and comprehensive device integration.




**Brigade MANET**: A MANET is formed using mesh radios that can intelligently route data traffic, self-heal, and optimize data flow in real time. These radios simultaneously combine data, voice, and robotics onto one network. All clients connected to the network serve as repeaters. For example, a long-range intelligence, surveillance, and reconnaissance (ISR) platform can serve as a repeater for all ground radios, which greatly extends the size of the mesh. Adding systems of all types to the network allows access to their data and greatly increases the range of the network.

**MANET-Internet Extension:** An internet source, like a SATCOM terminal, can be added to the radio mesh and give all users in the mesh access to the internet. This "MANET-internet extension" gives end user

devices, multiple radio hops away from an internet source, access to cloud resources. It also links disparate mesh networks through the internet. Someone with a mesh radio and an internet source anywhere in the world can see, control, and communicate on the local radio network.

**ROIP:** To minimize paratrooper physical load and quickly integrate partner units, green radio networks and traffic can be added to the network using radio-over-IP (ROIP). By ROIPing radio nets onto the brigade MANET, all voice traffic can be accessed from anywhere. Furthermore, partner militaries, adjacent units, and platforms with legacy radio systems (army aviation, artillery firing computers, counter battery radars), are quickly integrated into the 173rd Airborne Brigade's network.

**Satellite Communications Terminals**: Low Earth orbit satellite communications terminals provide low-latency access to commercial internet. Platforms like the Starlink Mini are increasingly portable and provide dismounted paratroopers cloud access. The 173rd Airborne Brigade currently distributes this access to the company, and if necessary, the platoon level. MANET radios automatically route traffic to the closest terminal or terminal with the strongest connection.

**Device Integration**: The ability to quickly onboard new devices is a critical component of aggregating battlefield data.

**Unmanned Aircraft Systems/Unmanned Ground Vehicles (UGVs):** Mesh radios can serve as both the means of controlling unmanned systems and the means of integrating them into the network. If a UAS system's data link uses a mesh radio, another mesh radio can pull the video feed to an end user. This is the most seamless and reliable way to quickly share data from systems. Alternatively, data, like video, can be routed from a system's controller to the MANET and the tactical network at large. This method typically introduces latency, extra configuration, and degradation. From the mesh, data can also be sent to cloud or local repositories for historic viewing and analysis.

**Ground Based Sensors:** The Cursor-on-Target (CoT) based tactical assault kit (TAK) ecosystem, provides a means by which to quickly incorporate sensors. Operators with mesh radios can easily share the data from their systems across the network to TAK ecosystem software and other systems.

**End User Devices**: Cloud tactical network virtual private networks (VPNs) remain accessible over the MANET-extended internet access.

**End-State**

**Maximize Battlefield Sensor Data Ingestion:** Tactical artificial intelligence implementation requires efficient sensor aggregation. Artificial intelligence will maximize the utility of data collection and the speed of formations' decision-making.

**Maximize Battlefield Robotics Connectivity:** A network that allows any user to control robotic systems (line-of-sight, beyond line-of-sight) creates operator redundancy, increases range, and allows real time flexibility and asset delegation. An operator in one formation can control or be given control of robotics anywhere on the battlefield.

**Maximize Access to Cloud and Intranet Services:** Tactical edge users can access high-computation resources, sensitive but unclassified-encrypted (SBU-E) commercial intelligence, persistent chat, and fight with the same tools as higher echelons.

**Provide Consolidated Network Awareness and Control:** Connectivity allows leaders to visualize their network. If terrain, electronic warfare, or priorities change, connectivity requirements, assets and frequencies can be shifted in real time to accommodate. Connectivity and signature can become an active and deliberate part of planning. An operator can move a robot repeater to a hilltop to ensure connectivity for the decisive point of an operation.

**Lessons Learned**

A unified network is required to enable capability. Choosing one radio and waveform for communications and equipment is critical. It is imperative that interoperability is a priority for radio and waveform designs to connect existing systems and additional platforms.

While maintaining communication, there is no way to completely conceal a brigade's signature. As a mesh network grows and the network becomes stronger, specific systems become less distinguishable and are harder to target. A large network of radios and systems is more resilient against jamming as it adjusts traffic routing in real time and gives leaders the information to shift resources in response.

The 173rd Airborne Brigade's network backbone is the foundation upon which further connectivity, redundancy, and efficiency will be built – enabling advanced robotics and computation to give the brigade a tactical edge.