Application Brief

HF radio and TETRA interoperability improves Middle East border guard operations

This particular border guard group is responsible for maintaining the security of national borders and desert highways, including border checkpoints. The task of securing the borders is made even more difficult by the country's vast and expansive desert areas, which span thousands of kilometres. These "empty zones" lack the infrastructure necessary to support traditional communication technologies, hindering the border guard's ability to effectively fulfil their duties.

The end-user required a communications solution that was reliable and secure in challenging areas. The solution needed to interoperate with their existing Motorola TETRA network and have the same level of digital encryption.

End-user

Border guard in the Middle East region

Mission/area of operation

Securing the borders of a Middle Eastern country. Population approx 5.3 million. Area of approx 300,000 km².

Personnel and equipment

- 2000+ armed personnel equipped with militarised twin-cab utility vehicles.
- Multiple base stations.

Solutions

- HF radio network providing high-quality, secure digital voice communication, along with accurate GPS data transmission and tracking.
- HF Radio and TETRA interoperability.

Benefits

- Reliable and secure communication capabilities significantly expanded to cover areas that previously had no coverage.

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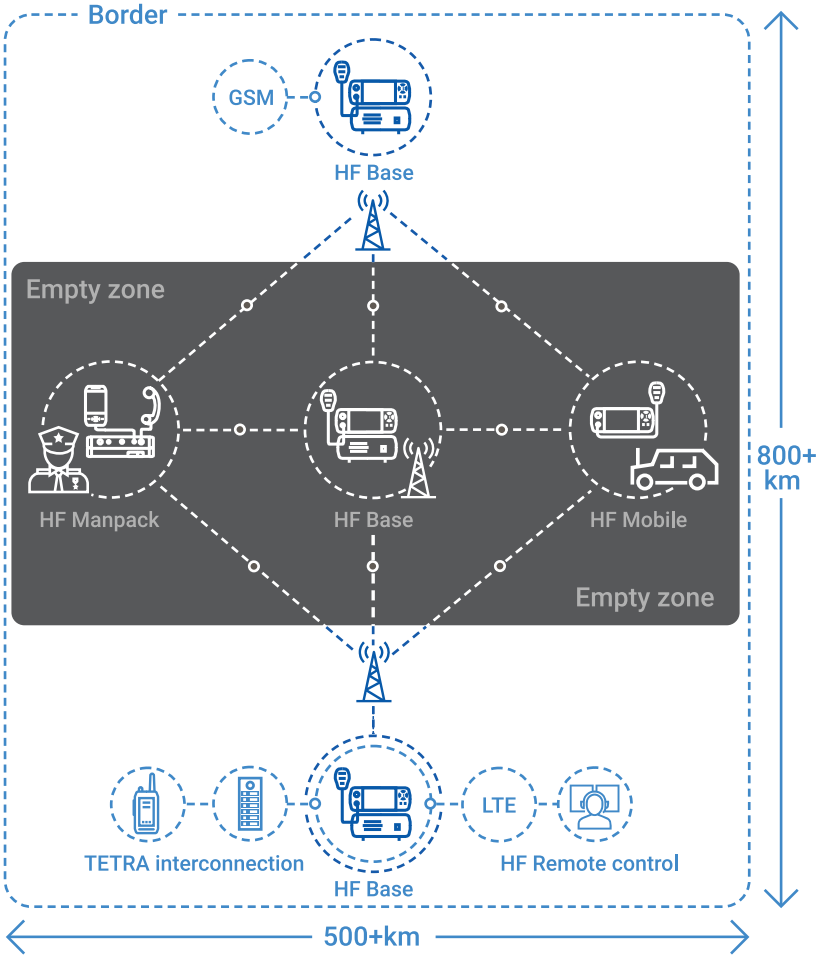
Challenges

The unforgiving and isolated environment of the desert poses substantial obstacles to the establishment of a dependable communication system. The absence of power sources and LTE coverage coupled with the ever-shifting landscape of sand dunes, makes the installation and upkeep of crucial infrastructure, such as communication towers, an insurmountable task. The distance of over 800 kilometres from the nation's capital, where the border guard headquarters and Network Operation Centre (NOC) are situated, further compounds these challenges. This lack of reliable communication infrastructure can severely hinder the border guard's ability to effectively monitor and patrol the border, potentially compromising national security. Additionally, the remoteness and harsh conditions can make it difficult for border guards to receive timely assistance in case of emergencies, putting their lives at risk.

Solution

A Proof of Concept (PoC) initiative was undertaken to assess the viability of HF radio as a solution for establishing communication in areas lacking existing infrastructure. The PoC activity successfully demonstrated the effectiveness of HF radio in providing high-quality, secure digital voice communication, along with accurate GPS data transmission and tracking, at designated Target Reference Points (TRP). The outcomes of the PoC highlighted HF radio as a reliable communication solution.



Base station equipment

- 4050 HF SDR Transceiver.
- 912 Multi-wire broadband antenna or 4047 automatic tuning HF horizontal dipole antenna.
- Remote control via LTE, GSM, or IP of all base stations with Barrett remote control app.

Vehicle mobile equipment

- 4050 HF SDR Transceiver.
- 4049 automatic tuning mobile antenna with NVIS whip.

Manpack equipment

- PRC-4090 HF SDR manpack transceiver.

Transceiver options fitted

- ALE 3G (Automatic link establishment).
- Secure digital voice.

The border guard's existing TETRA network was integrated with the Barrett HF radio system. This was accomplished by utilising a Motorola Solutions conventional channel gateway (CCGW). The primary function of the CCGW is to facilitate interoperability between analogue and digital channels, allowing them to interface seamlessly with Motorola Solutions MCC 7500 consoles.

Results

Previously empty zones now covered by HF Radio

The HF radio system provided complete coverage to the entire patrol area, including areas where communication was previously impossible. The system's ALE 3G functionality automatically maintained constant contact between all stations across all seven frequencies, and performed well in all scenarios, including base station, mobile vehicle, and manpack configurations. Additionally, all base stations were successfully controlled remotely via IP, LTE, or GSM as needed. The HF radio solution outperformed a satellite system in testing. The satellite system's downlink was too slow for vehicle tracking, it lacked PTT functionality, and it lacked broadcast capability.

Digital audio quality

The assessment of voice communications transmitted over the HF system was conducted with a focus on clarity and intelligibility. In many instances, the audio fidelity was evaluated to be exceptionally clear, with some evaluators using the term "crystal clear" to describe the quality of the audio transmission. This suggests that the HF system was capable of delivering voice communications with a high degree of accuracy and with minimal distortion or interference, allowing for easy understanding and interpretation of the transmitted messages.

GPS data transmission

The HF radio network's ability to transmit GPS location data was rigorously tested. The accuracy and timeliness of the transmitted GPS data were evaluated, particularly at high vehicle speeds. The system was tested at speeds of up to 160 kph to ensure that accurate GPS data could be consistently transmitted even under challenging conditions.

HF radio and TETRA interoperability

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Benefits

Security

The HF radio solution, designed to meet the stringent security requirements of border control operations, incorporates secure digital voice technology. This ensures that all on-air communications are protected by robust encryption, aligning with the existing security protocols of the border guards' Motorola Solutions TETRA network. This integration provides a communication infrastructure, where all voice transmissions, regardless of the network used, are shielded from unauthorized interception or decryption.

Cost effective solution

The HF radio system, once set up, does not incur any ongoing call costs, resulting in significant long-term savings and a reduction in operational expenses.

Support

Motorola Solutions has provided a highly skilled team to facilitate the Proof of Concept (PoC) and ongoing implementation of the program. This dedicated team ensures a smooth and successful deployment, minimising disruptions and maximising the effectiveness of the solution.

The border guard agency will also benefit from comprehensive through-life support within the country, ensuring continued assistance and maintenance throughout the system's operational lifespan.

Conclusion

The Proof of Concept (PoC) successfully showcased the capabilities of the Barrett HF radio solution at the designated Temporary Reference Points (TRPs). It proved the solution's feasibility and effectiveness as a viable alternative for communication in areas with limited or non-existent traditional communication infrastructure. These areas are typically inaccessible and pose challenges for establishing reliable communication networks.

To learn more, visit: **www.motorolasolutions.com**

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