# Silent Multi-Mode Radar (SMMR)
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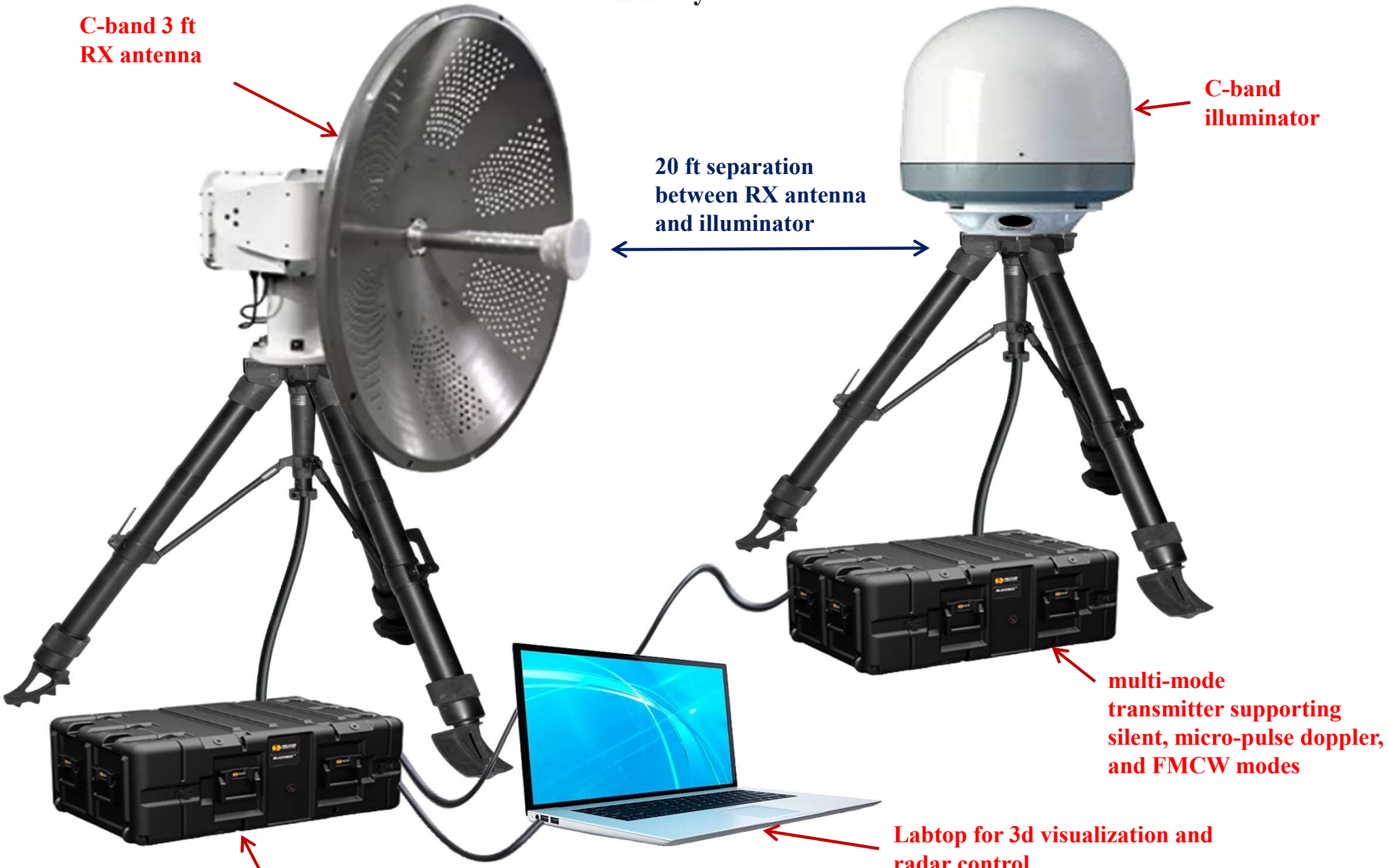
CMS, Inc. proprietary
Patent # 64/073,281
copyright pending



**The Silent Multi-Mode Radar (SMMR) supports three operating modes: silent, micro-pulse doppler, and FMCW. SMMR operates in C-band.**

**In silent mode, the radar implements an illumination technique with a range of 150 Kms and 6 meter resolution. The silent mode concept provides an illumination with low probability of detection while reducing the opportunity of accidental or deliberate jamming. The modulation concept makes it difficult for a sophisticated transceiver to detect the radar position and generate interference. The anti-jam/anti-detection passive-like nature of the radar will be of interest for DOD application. Additionally, silent mode concept provides a micro-doppler like capability to detect and differentiate small drone/UAS objects.**

**Micro-pulse doppler mode was added to support the Golden Dome Research effort and will specifically capture high-rate IQ data on dual removable 4 TByte eSATA hard drives for post analysis. The record format is similar to that of the NEXRAD WSR88D radar system.**

**The low-noise receiver shown on page 1 provides enormous computational resources to perform real-time object recognition and tracking. The system supports Forward Area Air Defense Command and Control (FAAD C2) and Low, Slow, Small UAS Integrated Defeat System (LIDS) platforms.**

**The prototype C-band SMMR shown on page 1 was built to test the Silent-mode concept and provides the following features:**

1. **Horizontal and vertical beamwidth = 3.3 degrees,**
2. **Azimuth rotation in 3 degree steps for 360 degree azimuth coverage,**
3. **Elevation from 0 to +70 degrees,**
4. **Volume coverage pattern time = ~15 seconds with elevation angles = 1.5, 4.5, 7.5, 10.5, 13.5, and 16.5 degs,**
5. **Dwell time = 20 msecs supporting high-resolution, micro-doppler spectral signature analysis,**
6. **Unambiguous range = 150 Kms,**
7. **Range resolution = 0.015 meters.**

**The next version of SMMR will operate at Ku band and support minimal SWAP for military applications. The parabolic receive antenna of the prototype is replaced with multiple quad beamforming phased arrays. Following are performance features:**

1. **Vertical and horizontal beamwidth = 2 degrees,**
2. **Dwell time = 25 msecs for high-resolution, micro-doppler spectral signature analysis,**
3. **Azimuth rotation in 2 degree steps for 360 degree azimuth coverage,**
4. **Elevation from -45 degrees to +70 degrees,**
5. **Volume coverage pattern time = ~ 5 seconds with elevation from 0 to +70 degrees,**
6. **Unambiguous range = 150 Kms,**
7. **Range resolution = 0.015 meters.**

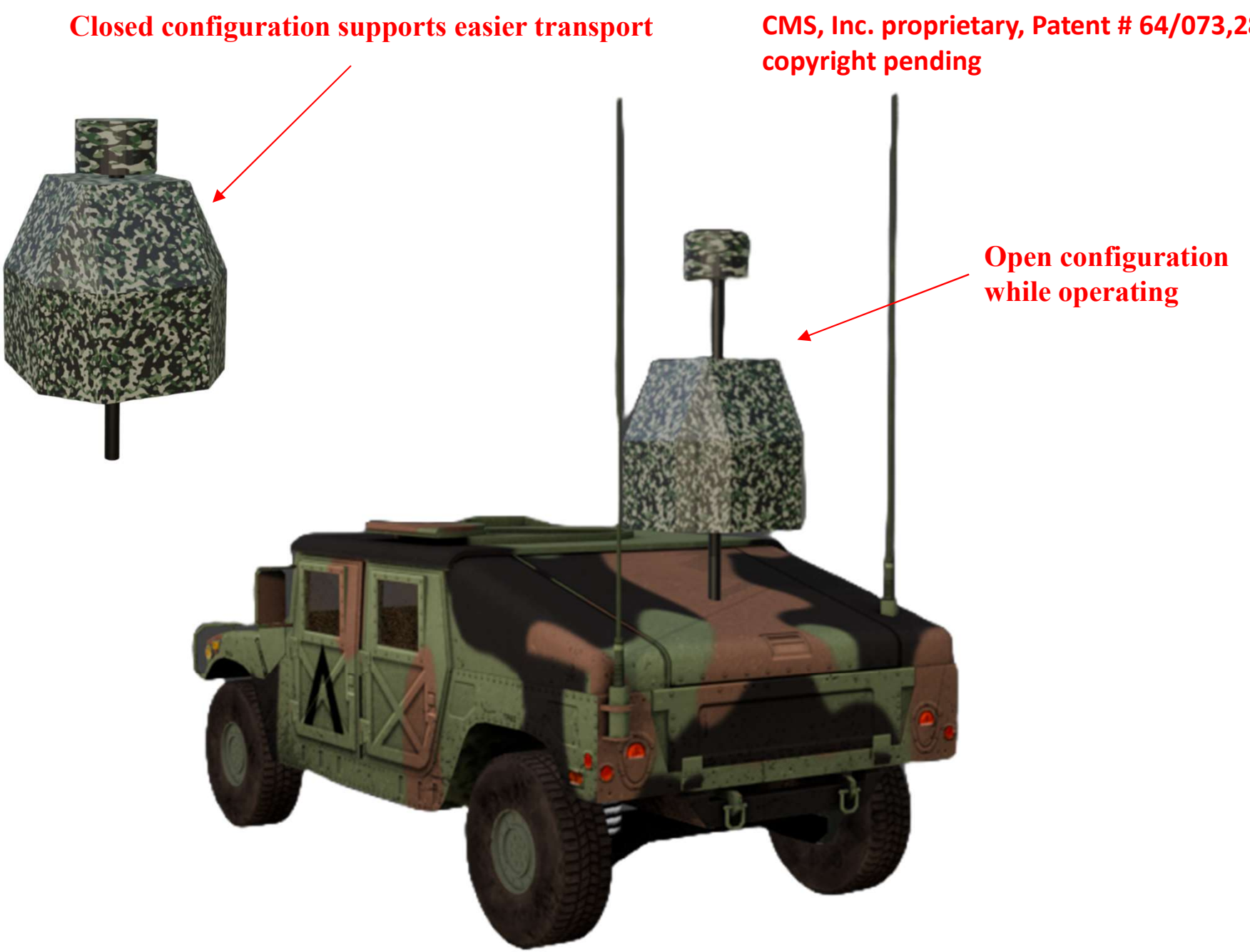



**Figure 1. Ku-band SMMR attached to Humvee**

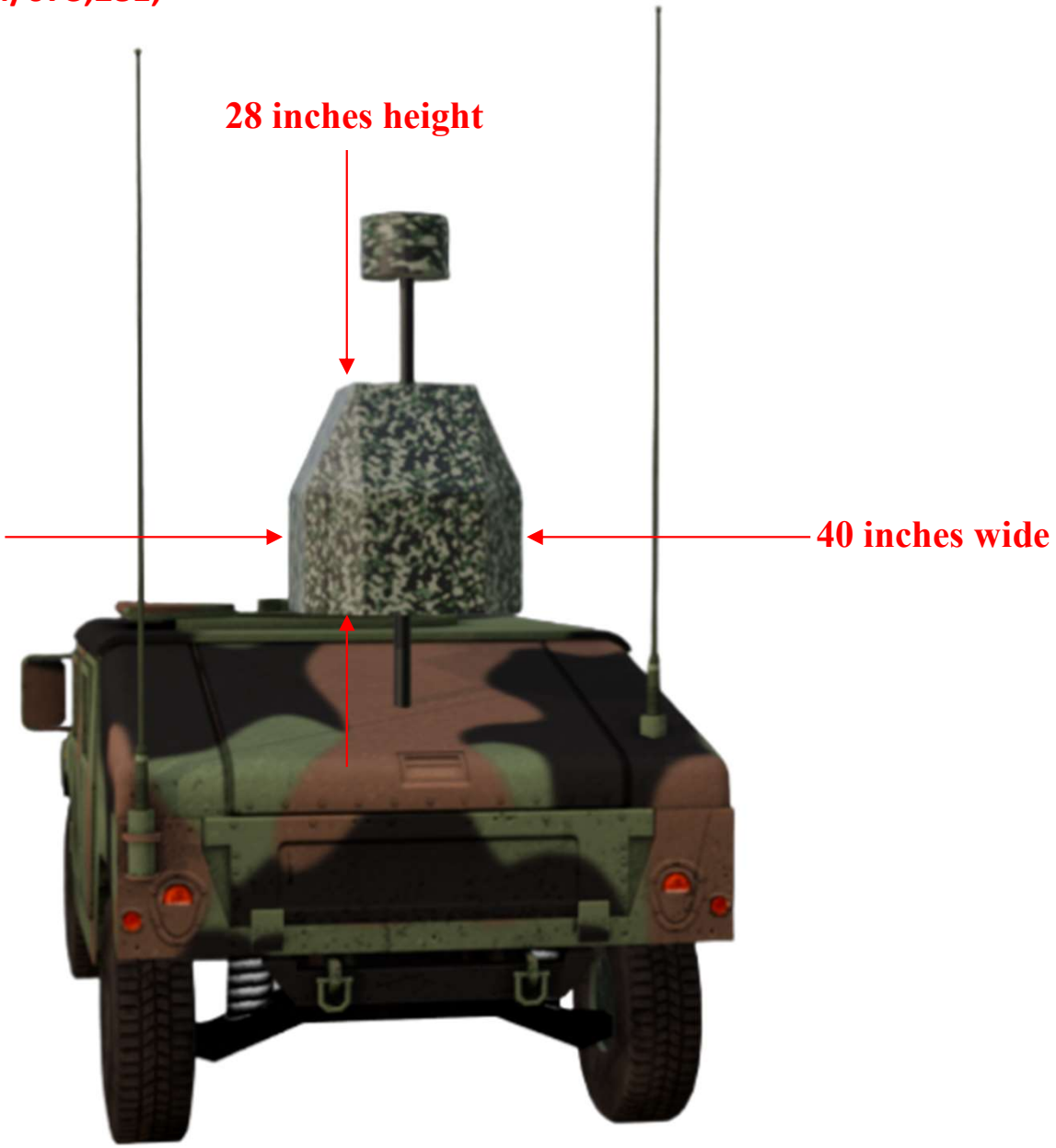



**Figure 2. Ku-band SMMR attached to Humvee**


**Figure 3. Ku-band SMMR attached to tripod**