FCC PART 5 · EXPERIMENTAL RADIO SERVICE

# Exhibit A — Narrative Statement of Research and Experimentation

Submitted in support of Items 4, 5, and 6 answered "No." · Project: **HamVoice** — Voice-Controlled Multi-Vendor CAT Interface for Amateur-Radio Transceivers.

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## APPLICANT & MOTIVATION

The applicant is **Envy Group, Inc.** The experiment will be conducted by its owner and principal investigator, **Robert Ayers** — a **service-disabled U.S. Air Force veteran** and an existing FCC licensee (**GMRS WRFL312**). Neither the applicant nor Mr. Ayers holds an amateur license; the Experimental Radio Service (Part 5) is the appropriate authorization for the research described, which involves automated / voice-initiated transmit control and multi-band, multi-mode operation that are not authorized under a GMRS license and are not accommodated by any radio service the applicant or Mr. Ayers otherwise holds. This experiment is motivated in significant part by **accessibility**: conventional transceiver operation depends on dense manual controls, multi-layer menus, and fine motor manipulation that present a real barrier to operators with mobility, dexterity, or vision limitations — a population that includes many disabled veterans. A reliable, safe, hands-free voice-control layer would materially widen participation in the radio service. Mr. Ayers's lived experience as a disabled veteran directly informs the human-factors and interlock design goals below.

### a. Program of research and experimentation, including equipment and theory of operation

The applicant proposes to research and develop a **vendor-agnostic, voice-controlled Computer-Aided Transceiver (CAT) control system** ("HamVoice") enabling an operator to command amateur transceivers and software-defined radios through natural spoken language rather than manual controls or vendor-specific software.

**Theory of operation.** Spoken operator commands are captured locally and converted to intent by an on-device speech-recognition and natural-language layer. Recognized intents are mapped to standardized rig-control instructions and issued to the connected transceiver over its CAT protocol (Icom CI-V and Alinco control, and — via the Hamlib / `rigctl` abstraction — additional vendors such as Yaesu / Kenwood / Elecraft / FlexRadio). Commands under test include frequency and band selection, mode selection, memory recall, antenna tuning, and **transmit (PTT) initiation**. A software-defined receiver

(Uniden SDS-series scanner or SDRplay RSP) provides a closed receive-monitoring loop, feeding spectrum and signal telemetry back into the voice system. Transmit is gated by explicit safety interlocks — positive confirmation of transmit intent, transmit time-out, and automatic station identification — so that voice-mediated operation remains consistent with control-operator responsibility.

**Equipment. Icom IC-7300 MkII** (HF / 6 m SDR transceiver, SSB voice, Icom CI-V CAT); an **Icom IC-705** (all-mode QRP transceiver — HF / 6 m / 2 m / 70 cm, battery-portable, Icom CI-V CAT — the mobile/POTA rig); and an **Alinco DR-735** dual-band transceiver (2 m / 70 cm FM voice). The control abstraction is designed to extend to additional vendors (Yaesu / Kenwood / Elecraft / FlexRadio); software-defined receivers including **Uniden SDS-series scanners** and **multiple SDRplay RSP devices**; a control host — a general-purpose computer, an embedded single-board computer (e.g., Raspberry Pi), or a **smartphone / tablet application** (the smartphone mode is central to the hands-free, portable accessibility objective) — running the experimental HamVoice software; a selection of antennas including **end-fed / long-wire HF antennas** at the fixed station, VHF/UHF vertical antennas, and portable field-deployable wire and whip antennas for mobile and POTA use. The experiment is conducted from a **fixed base station at 1000 Lantern Hill Road, Shavertown, PA 18708** (Luzerne County), and also **mobile and portable — including Parks On The Air (POTA) activations** from public lands. All portable and mobile operation is temporary and low-power, with no permanent antenna structure or facility construction.

#### FREQUENCIES, EMISSIONS, AND POWER PROPOSED

The experiment will be conducted across representative HF and VHF/UHF ranges under the requested experimental authorization, so that the voice-control layer is validated across both VHF/UHF and **HF**, where the human-factors and propagation-dependent operating workload are greatest. All operation will conform to the specific frequencies, power, and conditions the Commission specifies in the grant:

| Segment | Range | Purpose in experiment |
|---|---|---|
| HF — 80 m | 3.500–4.000 MHz | Voice-control latency under HF SSB operating workload |
| HF — 40 m | 7.000–7.300 MHz | Band-change + tuning command validation |
| HF — 20 m | 14.000–14.350 MHz | Primary HF SSB / digital-voice test band |
| HF — 15 m | 21.000–21.450 MHz | Cross-band command consistency |
| HF — 10 m | 28.000–29.700 MHz | SSB + digital-voice mode-switch tests |
| VHF — 6 m | 50–54 MHz | VHF PTT / mode interlock validation |
| VHF — 2 m | 144–148 MHz | NBFM transmit-control + auto-ID tests |

| Segment | Range | Purpose in experiment |
|---|---|---|
| UHF — 70 cm | 420–450 MHz | UHF FM command reliability + auto-ID |

**Emissions:** analog voice — SSB (`2K80J3E`) on HF and 6 m; NBFM (`16K0F3E`) on 2 m and 70 cm. Digital-voice modes (FreeDV / Codec2 over SSB, `2K80J2E`) are a planned extension of the program, to be added by amendment. **Maximum power:** ≤100 W on HF and 6 m (Icom IC-7300 MkII); ≤10 W on VHF/UHF (Icom IC-705). **Estimated program duration and requested license term:** 36 months, allowing for iteration across seasonal HF-propagation conditions and progressive multi-vendor equipment integration.

> Part 5 authority is sought because the experimentation involves **automated / voice-initiated transmit control** and multi-band, multi-mode operation that are not authorized under the applicant's GMRS license and are not accommodated by any radio service the applicant holds — the applicant is not an amateur licensee — precisely the novel, controlled testing the Experimental Radio Service exists to authorize.

### b. Specific objectives

1. Determine whether a single natural-language voice abstraction can **reliably and safely** operate transceivers across multiple, incompatible vendor CAT protocols.
2. Characterize **latency, recognition-error rates, and failure modes** of voice-initiated control, and validate transmit safety interlocks (confirmation, time-out, auto-ID) under real over-the-air conditions.
3. Develop and prove a **control-operator-compliant framework for voice/AI-mediated transmit control** — establishing where human confirmation is required and how automated control can be conducted responsibly.
4. **Advance accessible, hands-free station operation for disabled operators, including disabled veterans**, for whom conventional multi-knob, multi-menu rig operation is a barrier — quantifying the accessibility gain and publishing the interlock and interaction patterns that make it safe.
5. Evaluate integration of software-defined **receive monitoring** into the voice-control loop for closed-loop, situationally-aware operation.

### c. Reasonable promise of contribution to the radio art / lines not already investigated

No existing amateur or commercial product provides a **unified, vendor-independent natural-language voice-control layer** over the fragmented CAT landscape, integrated with software-defined receive and with **validated safety interlocks for voice/AI-initiated transmit**. This program advances the radio art along several lines not previously investigated:

- **Human-factors and safety of voice-mediated RF control** — a rigorous characterization of how spoken / AI control interacts with control-operator requirements, yielding a reusable interlock framework other experimenters and manufacturers can adopt.
- **Cross-vendor interoperability** — a standardized control abstraction spanning incompatible manufacturer protocols, reducing the vendor fragmentation that constrains the art today.
- **Accessibility for disabled operators and veterans** — hands-free operation materially expands who can participate in the radio service. This is a genuine, under-served public-interest contribution, informed by Mr. Ayers's own experience as a service-disabled veteran.
- **Closed-loop SDR-plus-voice operation** — coupling real-time software-defined receive telemetry to voice-driven transmit decisions.

The results — interlock designs, latency and error characterizations, the accessibility findings, and the control-operator framework — are intended to be documented and shared with the amateur and experimental community, contributing to the development, extension, expansion, and utilization of the radio art.