



FCC Program Experimental License (PEL) Application

Supporting Exhibits

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Executive Summary

Xtremis seeks a **Program Experimental License (PEL)** to support internal R&D and controlled field experimentation on radio-frequency (RF) sensing, interference detection, and controlled signal generation (including custom waveforms) to evaluate and improve system performance against airborne and ground emitters. The initial program is intentionally constrained for first approval:

- **Geography:** operations at a privately controlled site in Washington County, Arkansas; transmitters (including drone-borne emitters) remain within parcel boundaries.
- **Spectrum:** limited to ISM bands plus **one** U-NII block (UNII-1) to reduce licensing friction and coordination burden.
- **Technical ceilings:** bounded maximum occupied bandwidth and conservative power/EIRP limits.
- **Operations:** scheduled transmit windows, continuous monitoring/logging, and rapid shutdown procedures to mitigate interference risk.

Form-page eligibility, certification, and spectrum flag answers are completed directly in the ELS portal and are not duplicated here.

Administrative Information and Operating Location

2.1 Applicant and Administrative Information

- **Applicant Name:** Xtremis, Inc.
- **FRN:** 0037725090
- **Mailing Address:** 1025 33rd St NW, Washington, DC 20007
- **Primary Contact / Responsible Party:** Brandon Baggett (bbaggett@xtremis.ai), 479-684-6023
- **Alternate Technical Contact:** Peter Volgyesi, CTO (pvolgyesi@xtremis.ai), 615-294-6520
- **Prepared by:** Thomas Edman

2.2 Operating Location

Operating area details (mapping/boundary) are entered directly in the ELS portal.

Site Address

- **Site S:** 12743 W Highway 265, West Fork, AR 72774

Operational Constraint

All intentional RF transmissions, including drone-borne transmitters and mobile emitters, will occur only while the transmitting equipment is located within the Xtremis-controlled parcel boundary at Site S. Passive monitoring/receiving may occur off-site with property permission, but does not expand transmitter operating authority beyond the approved area.

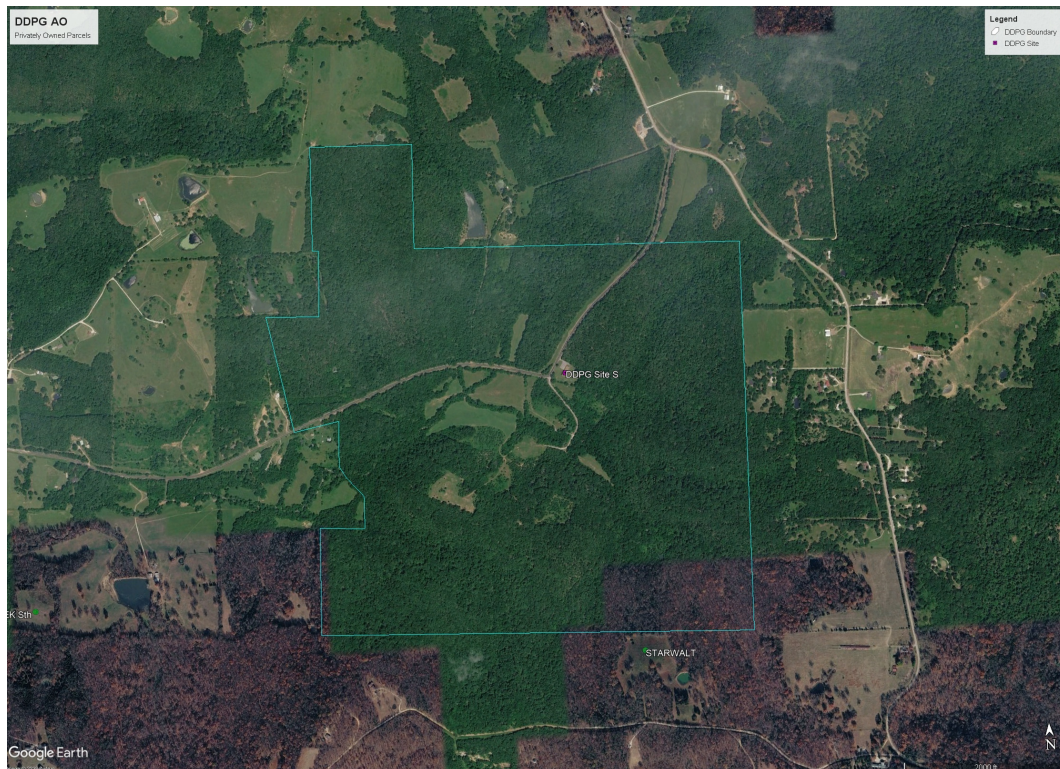


Figure 2.1: Site S — privately controlled Xtremis parcel, Washington County, AR.

Supporting Exhibits

3.1 Exhibit 1 – Applicant Eligibility Statement

Applicant

Xtremis, Inc. (FRN 0037725090) is a U.S.-based developer and integrator of RF sensing and spectrum awareness technologies and associated test platforms used for research, evaluation, and development activities. Xtremis qualifies for experimental licensing under FCC Part 5 as both a manufacturer of radio frequency equipment and a manufacturer that integrates RF equipment into end products.

Nature of the Program

The requested Program Experimental License supports internal product development and experimental testing, including controlled field experiments and measurement campaigns, to evaluate and improve system performance. The program is not intended to provide commercial service to the general public and is not a market trial.

Responsible Parties

- **Primary Responsible Party:** Brandon Baggett (bbaggett@xtremis.ai), 479-684-6023
- **Alternate Technical Contact:** Peter Volgyesi, CTO (pvolgyesi@xtremis.ai), 615-294-6520
- **Prepared by / Administrative Support:** Thomas Edman

3.2 Exhibit 2 – Program Narrative / Statement of Experimental Purpose

Program Objective

Xtremis is developing RF sensing and spectrum experimentation capabilities intended to:

1. detect, observe, and characterize RF emissions in dynamic environments;
2. evaluate interference conditions and system robustness using controlled signal generation;
3. develop and validate techniques for emitter detection and classification, including airborne emitter scenarios (e.g., drone-borne transmitters operating within the controlled site); and
4. assess end-to-end system performance across sensor configurations and operational concepts under repeatable experimental conditions.

Why Program Experimental Licensing is Needed

The program requires flexibility to conduct recurring experiments over time without filing separate applications for each test iteration. Experiments will vary across:

- transmitter placement (fixed, mobile, airborne within parcel boundaries),
- waveform and modulation parameters (including custom waveforms),
- experiment scheduling windows and test conditions,
- sensor configurations and data collection objectives.

A program license provides a controlled framework to conduct these experiments while maintaining conservative technical limits and interference safeguards.

Program Constraints (First-Approval Posture)

To minimize interference risk and streamline initial approval, Xtremis commits that initial experiments will:

- operate only within the Xtremis-controlled parcel at the approved site in Washington County, Arkansas;
- use only the spectrum bands listed in the Technical Overview (ISM + UNII-1 only);
- avoid bands used for safety-of-life and critical services (e.g., public safety, CMRS/cellular, aviation surveillance/ADS-B, satellite allocations);
- use scheduled transmission windows, continuous monitoring/logging, and rapid shutdown procedures.

Future Expansion

Xtremis anticipates that, after initial approval and operational experience, the program may be expanded via appropriate FCC processes (e.g., modification) to incorporate additional operating areas (easements/permissions) and/or additional spectrum bands where justified. Such expansion is explicitly out of scope for the initial filing.

3.3 Exhibit 3 – Technical Overview

Summary

This exhibit defines conservative ceilings for the initial PEL to enable repeatable experimentation while bounding risk. Specific experiments will remain within these limits.

Authorized Frequency Bands (Initial)

- **ISM:** 902–928 MHz; 2400–2483.5 MHz; 5725–5850 MHz
- **U-NII (one block):** UNII-1 (5150–5250 MHz)

Explicit exclusions (initial): CMRS/cellular bands, public safety bands, aviation surveillance/ADS-B bands (978/1090 MHz), satellite bands, and federal-exclusive/shared allocations.

Emission Types / Waveform Classes

Xtremis will conduct experiments using a variety of emission types bounded by bandwidth, power, and operating controls. Waveform classes may include:

- CW / single-tone / beacon-like signals for calibration and test references;
- Narrowband digital modulations (e.g., FSK/PSK/QAM-family) for controlled test links;
- OFDM-like waveforms to emulate Wi-Fi-like channel conditions and signal structures;
- Spread-spectrum or chirp-like signals for detection/classification testing; and
- Bursty/pulsed transmissions as needed for specific test objectives.

All transmissions will remain within the technical ceilings below.

Bandwidth / Duty Cycle

- **Maximum occupied bandwidth:** ≤ 80 MHz.
- **Scheduling:** transmissions occur in **scheduled windows**; experiments are planned and logged.

Power / EIRP Limits (Initial)

- **Airborne (UAS payload transmitters):** ≤ 1 W conducted; ≤ 4 W EIRP.
- **Ground/mobile transmitters:** ≤ 5 W conducted; ≤ 25 W EIRP.

Antenna Types

- Omni-directional antennas are expected for most tests.
- Directional antennas may be used when required; **directional antenna gain** is capped at ≤ 12 dBi.

Operational Bounds

- **Geographic constraint:** transmitters operate only within the approved controlled parcel.
- **Altitude:** UAS operations ≤ 400 ft AGL (subject to FAA rules/waivers as applicable).
- **Concurrency:** ≤ 3 transmitting drones and ≤ 5 total experimental transmitters at the site at any time.

3.4 Exhibit 4 – Interference Mitigation and Safety Statement

Xtremis recognizes that experimental operations must not cause harmful interference to authorized services. The program is structured to reduce risk through conservative spectrum selection, bounded power/bandwidth, controlled operating areas, and defined operating procedures.

Risk-Reducing Design Choices

- Initial experiments are limited to ISM bands and UNII-1 (no CMRS/public safety/aviation surveillance/satellite/federal bands).
- Transmitters operate only within the Xtremis-controlled parcel at the approved site.
- Emissions are constrained by maximum occupied bandwidth and conservative power/EIRP caps.
- Transmissions occur during scheduled windows with logging and operator oversight.

Monitoring and Control

Xtremis will employ continuous monitoring and logging during experiments, including:

- pre-test checks (including baseline scans as appropriate for the site and band);
- confirmation of expected signal conditions (presence, clipping/overload checks, time/telemetry alignment where applicable);
- in-test monitoring by operators and automated sensing to detect abnormal conditions; and
- post-test verification and archival of experiment metadata and logs.

Rapid Shutdown / “Stop Buzzer” Policy

Xtremis will maintain a written rapid shutdown plan for experimental transmitters. At minimum:

- **Authority:** the on-site operator-in-charge and designated technical contacts may order immediate shutdown.
- **Mechanism:** transmitters can be immediately powered off and/or remotely commanded to cease transmissions (where supported).
- **Timing:** immediately upon being notified, Xtremis will shut down operations.
- **Escalation:** upon any interference concern, operations cease, logs are preserved, and mitigation steps are taken prior to resuming tests.

Interference Complaints and Remediation

Xtremis will promptly investigate any report of harmful interference potentially associated with its operations. Experiments will be suspended immediately upon credible indication of harmful interference until the issue is resolved. Xtremis will coordinate with affected parties as appropriate and will adjust operational parameters (frequency/time/power/location) to prevent recurrence.

Contact Information

- **Primary:** Brandon Baggett (bbaggett@xtremis.ai), 479-684-6023
- **Alternate:** Peter Volgyesi (pvolgyesi@xtremis.ai), 615-294-6520

3.5 Exhibit 5 – RF Exposure / Safety Compliance Statement

Xtremis will conduct experimental operations in compliance with FCC RF exposure requirements. Operations are conducted at a controlled site with access management and trained personnel. For initial program operations, transmitters are bounded by conservative conducted power and EIRP limits, and experiments are scheduled and supervised.

Xtremis will:

- ensure appropriate separation distances between transmitting antennas and personnel or bystanders;
- restrict access to transmitter locations during operation as required;
- use signage and administrative controls to prevent inadvertent proximity to radiating antennas;
- operate within the program technical ceilings (power, EIRP, bandwidth) defined in the Technical Overview; and
- maintain documentation supporting compliance (including device configurations, operational logs, and site procedures).

Appendix A: Technical Envelope Summary (One-Page)

Initial PEL Envelope (Summary)

- **Geography:** privately controlled Xtremis parcel in Washington County, AR (Site S). Transmitters only within parcel boundaries.
- **Bands:** ISM 902–928 MHz; 2400–2483.5 MHz; 5725–5850 MHz; plus UNII-1 5150–5250 MHz.
- **Bandwidth:** occupied bandwidth ≤ 80 MHz.
- **Power/EIRP:** Airborne ≤ 1 W conducted / ≤ 4 W EIRP; Ground ≤ 5 W conducted / ≤ 25 W EIRP.
- **Antennas:** omni typical; directional allowed with gain ≤ 12 dBi.
- **Ops:** scheduled transmit windows; continuous monitoring/logging; rapid shutdown plan.
- **UAS:** ≤ 400 ft AGL (subject to FAA rules/waivers); ≤ 3 transmitting drones; ≤ 5 total transmitters at the site simultaneously.

Postscript: AI Assistance Disclosure

Disclosure

This report was prepared with assistance from **Claude** (Anthropic) for initial drafting and text preparation. All technical limits, operating constraints, and final filing decisions were reviewed and approved by Xtremis personnel.