

Compress Drone Telemetry by 80–95%

Streaming per-message compression for BVLOS, Inspection & Fleet Operations. Traditional compression (gzip) fails on small telemetry — ALEC is built for it.

THE CHALLENGE

- Satellite C2 links: 128–512 byte payload limits
- Iridium SBD: \$0.04–0.13 per message cost
- Radio TX consumes 80–90% of total power
- gzip/zstd expand small telemetry by 30–70%

THE SOLUTION

- Evolving shared context — improves with flight time
- Per-message streaming — no batching, no buffering
- P1–P5 priority — safety alerts always transmitted first
- 2 KB RAM — runs on Cortex-M0+ flight controllers

KEY RESULTS

80–95%

Data Reduction

10.9×

vs gzip cold start

<1ms

Encode Latency

2 KB

RAM Footprint

USE CASES

Application	Data Types	ALEC Impact
BVLOS Operations	C2 telemetry, position, health	Compress satellite/LTE link. More updates per bandwidth budget.
Indoor Inspection	IMU, LiDAR positioning, thermal	Max throughput on degraded RF in confined spaces (tanks, mines).
Fleet Telemetry	Multi-vehicle GPS, battery, status	Gateway compression for 100+ drones. 80% cloud ingestion savings.
Long-Range Survey	GPS, altimeter, camera metadata	Less radio = more battery for flying on 100+ km missions.
eVTOL / UAM	Vibration, motor, flight ctrl	Anomaly detection on compressed streams. Transmit deviations only.

ALEC Complexity — QCT anomaly detection: motor degradation, IMU drift, battery anomalies detected 70% earlier.
Works on compressed data.

Option A
Flight Controller
SDK

C/Rust for PX4, ArduPilot

Option B
Ground Station
Gateway fleet
compression

Option C
Cloud Decoder
REST API + analytics