Certainly! Below is an assurance case for the Airborne Collision Avoidance System Xu (ACAS Xu) displayed in a hierarchical tree format using dashes to denote different levels. The case is structured using the Goal Structuring Notation (GSN), where each goal is broken down into sub-goals, strategies, solutions, assumptions, and justifications.

---

\*\*Goal (G1):\*\* Ensure the safety and security of ACAS Xu.

- \*\*Context (C1):\*\* ACAS Xu operates on airborne platforms to prevent mid-air collisions.

- \*\*Strategy (S1):\*\* Decompose the assurance argument into key safety and security aspects.

- \*\*Sub-goal (G1.1):\*\* Demonstrate that ACAS Xu is functionally correct.

- \*\*Context (C2):\*\* Functional correctness relies on accurate detection and response to collision threats.

- \*\*Solution (Sn1):\*\* Verified through rigorous testing and validation.

- \*\*Assumption (A1):\*\* Operational environment conditions are well-defined.

- \*\*Justification (J1):\*\* Functional correctness ensures timely and accurate response in collision scenarios.

- \*\*Sub-goal (G1.2):\*\* Ensure robustness of ACAS Xu against external threats.

- \*\*Context (C3):\*\* Covers threats such as malicious attacks and environmental disturbances.

- \*\*Strategy (S2):\*\* Address robustness through integrity, confidentiality, and availability aspects of ACAS Xu.

- \*\*Sub-goal (G1.2.1):\*\* Integrity: Prevent unauthorized data manipulation.

- \*\*Solution (Sn2):\*\* Implement strong cryptographic measures.

- \*\*Assumption (A2):\*\* Cryptographic methods used are up to industry standards.

- \*\*Sub-goal (G1.2.2):\*\* Confidentiality: Ensure data is accessed only by authorized entities.

- \*\*Solution (Sn3):\*\* Employ access control mechanisms.

- \*\*Assumption (A3):\*\* Access control policies are regularly updated and audited.

- \*\*Sub-goal (G1.2.3):\*\* Availability: Ensure ACAS Xu remains functional under stress conditions.

- \*\*Solution (Sn4):\*\* Design redundancy and failover systems.

- \*\*Assumption (A4):\*\* Backup systems and failover mechanisms are regularly tested.

- \*\*Sub-goal (G1.3):\*\* Verify compliance with global aviation standards.

- \*\*Context (C4):\*\* ACAS Xu must comply with standards set by aviation authorities such as FAA and ICAO.

- \*\*Solution (Sn5):\*\* Regular audits and certifications by regulatory bodies.

- \*\*Assumption (A5):\*\* Regulatory guidelines are clearly defined and executable.

- \*\*Justification (J2):\*\* Compliance ensures alignment with international safety norms.

---

This tree structure ensures that each aspect of the assurance case for ACAS Xu is broken down systematically, with clear goals, strategies, and solutions contextualized within the operational environment and regulatory framework.