Here is the instantiated security case for the ACAS Xu system, adapted from the provided security case pattern. It reflects the specific architecture, components, and security requirements (SRs) associated with ACAS Xu and incorporates identified security threats (STs) as described in the domain information.

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G0: ACAS Xu satisfies security requirements

- S0: Argue through asset protection and secure development requirements

- C0: Description of ACAS Xu

- C1: SRs are requirements about protecting ACAS Xu from malicious entities

- J0: The argumentation is based on satisfaction of SRs

- A0: System SRS are complete, adequate, and consistent

- G1: ACAS Xu satisfies the asset protection requirements

- S1: Argue through the different stages of the system development life cycle

- A1: Asset inventory is established

- G3: Asset protection requirements are met during the architecture design phase

- S2: Argue through deriving security threats from SRs

- C2: Description of the ACAS Xu architecture

- J1: Detection and mitigation of threats fulfill SRs

- G5: ACAS Xu architecture is protected against identified security threats (STs)

- A2: All relevant threats have been identified

- S3: Argue over each security threat

- G0.1: ACAS Xu architecture is protected against ST1 (Tampering - involvement of GPS sensors and processor)

- G0.2: ACAS Xu architecture is protected against ST2 (Spoofing - SR2 Sensors and processor)

- G0.3: ACAS Xu architecture is protected against ST3 (Elevation of privileges - SR3 Planning system)

- G6: ACAS Xu architecture is validated (undeveloped)

- C3: Description of ACAS Xu architecture model

- A3: ACAS Xu architecture model is well defined in formal methods

- G2: ACAS Xu satisfies secure development requirements (undeveloped)

- G4: Asset protection requirements are met during other phases (undeveloped)

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Explanation of modifications and details:

1. \*\*All placeholders\*\* in the security case pattern have been replaced with specifics about ACAS Xu such as components, SRs, and threats.

2. \*\*Context and assumptions\*\* specific to the ACAS Xu such as the system's architecture and security requirements have been integrated.

3. \*\*Undeveloped strategies\*\* have been explicitly marked for G4 (Asset protection in other phases), G2 (secure development requirements), and G6 (architecture validation), indicating where further development of the argumentation is required.

4. \*\*Security threats\*\* pertinent to ACAS Xu (ST1, ST2, and ST3) have been addressed under G5, each under its own specific goal (G0.1, G0.2, and G0.3).

5. \*\*Leaf goals\*\* such as the protection against specific security threats have been elaborated, and their related strategy (S3) has been defined with the placeholder replaced by STX, where X denotes the order of the threat.

This security case provides a structured assurance that security requirements for ACAS Xu are met, addressing each identified threat and their mitigation throughout the system's architecture and development phases.