To create a security case for ACAS Xu (Airborne Collision Avoidance System Xu) based on the given security case pattern and representing it in a hierarchical tree format, first, we need to instantiate the placeholders with specific details relevant to ACAS Xu. We will replace placeholders such as {System} and other relevant placeholders, appropriately contextualizing to ACAS Xu and filling the uninstantiated elements.

### Instantiation of Security Case for ACAS Xu

\*\*Security Goal Tree:\*\*

- G0: ACAS Xu satisfies security requirements

- \*\*Context\*\*:

- C0: Description of ACAS Xu

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

- J0: The argumentation is based on satisfaction of SRs for ACAS Xu

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

- \*\*Supported By\*\*:

- S0: Argue through asset protection and secure development requirements

- G1: ACAS Xu satisfies the asset protection requirements

- \*\*Assumption\*\*:

- A1: Asset inventory for ACAS Xu is established

- \*\*Supported By\*\*:

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

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

- \*\*Context\*\*:

- C2: Description of the ACAS Xu architecture

- \*\*Supported By\*\*:

- S2: Argue through deriving security threats from SRs

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

- \*\*Assumption\*\*:

- A2: All relevant threats have been identified

- \*\*Supported By\*\*:

- S3: Argue over each security threat

- G0.X: ACAS Xu architecture is protected against Security Threat X (undeveloped, needs details)

- G6: ACAS Xu architecture is validated (undeveloped)

- \*\*Context\*\*:

- C3: Description of ACAS Xu architecture model

- \*\*Assumption\*\*:

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

- \*\*Justification\*\*:

- J1: Detection and mitigation of threats fulfill SRs for ACAS Xu architecture phase

- \*\*Undeveloped\*\*:

- G4: Asset protection requirements are met during other phases

- \*\*Undeveloped Stantiated\*\*:

- G2: ACAS Xu satisfies secure development requirements

This hierarchical structure details how each goal, strategy, context, assumption, and justification interrelate in developing a security case for ACAS Xu following the structured and methodical approach typical in assurance and security cases. The tree format illustrates the decomposition of goals into strategies and further sub-goals while tying back to contexts and assumptions that support the correctness and completeness of the case. Undeveloped and uninstantiated elements highlight areas that require further development or specific instantiation details for the security assurance case to be complete.