Explanation of Thread pattern matching

Action is required on item SR14

From :
Meeting4
Minutes of meeting Terma SRR meeting at IHA 28/09-10

Point 9 on the agenda
Restrict requirement SR-14 about the supported "intelligent" threat response
so it is more clear what is possible, i.e. which parameters the customer can set
and how many, etc.

Looking at SR-14 and the history.

SR-14 Originally as taken from : SRS Missile Warning System ver A

SR-14	When the Threat Response Subsystem automatically chooses a countermeasure program, it shall be done by matching the stored Thread patterns with the actual threat pattern and finding the best match using the mathematical zyx procedure.

In the tracability matrix this is traced back onto UR- 15

SR-14	UR-15	

UR-15 Originally as taken from "Terma Case.pdf"

UR-15   Automatic mode shall initiate an intelligent threat response without pilot interaction.

Critical view of UR-15

The word intelligent is not a very good word when reffering to system requirements so a question was raised:

From Terma case meeting at IHA 17/09-10 The question was raised as

21. UR-15: What is meant by an "intelligent threat response"?

This question is (at time of writing) still not answered.
(There is supposed to be an FAQ on the Campusnet, but it is only an FA ☺)

Analysis

A broader picture is achieved by looking at SR12-15 simultaneously

REQ ID	Requirement
SR-12	The Threat Response Subsystem shall be able to store 100 Threat patterns INFO : A thread pattern is a certain number of threads attacking the aircraft from certain angles.
SR-13	All data concerning the Threat patterns shall be handled by the winXYZapplication. This includes programming configuration uploading or downloading to the Threat response system.
SR-14	When the Threat Response Subsystem automatically chooses a countermeasure program, it shall be done by matching the stored Thread patterns with the actual threat pattern and finding the best match using the mathematical zyx procedure.
SR-15	All data concerning the mathematical zyx procedure shall be handled by the winXYZapplication. This includes programming configuration uploading or downloading to the Threat response system.

In the requirement SR-12 a vague INFO regarding a thread pattern is given.

In the requirement SR14 . More info regarding matching a thread pattern is needed

Solution

The info bullet under SR-12 will be replaced by the following

Thread patterns as saved in the thread response subsystem is a complex data structure that reflects important attack data like:
- the severity
- the angle or angles of attack
- the massiveness the number of missiles
- the speed of incoming missiles
- So on and so forth

The thread pattern data structure is open, meaning that new data elements may be in cooperated with full backward and forward compatibility. This enables an ongoing development of effectiveness of the system.

These threat patters are created/recorded:
- by sampling real time data from the MWS during real life attacks on fighters
- by sampling simulated data from combat simulators

An info bullet under SR-14 will be written

The actual thread pattern as observed by the MWS is correlated to the thread patterns in the database, and the best match is found.

Correlation is done with respect to all thread pattern data and a certain dynamic prioritizing is done by the mathematical zyx procedure

The newest technology regarding artificial intelligence, fast compression/decompression, DSP in FPGA is in a prototype of the mathematical zyx procedure

With the thread pattern there is also saved a link to the best suited Counter Measure Program to be executed.

If the customer wishes a further specification of the MWS GFE capabilities and the mathematical xyz procedure it may be given as follows:

REQ ID	Requirement
SR-14	The thread response to a given thread shall be determined based a maximum of the last 10 samples of the following MWS information for a maximum of 4 simultaneous missiles. * Aircraft position * Missile position(s) (accuracy defined by GFE MWS specification) * Time (accuracy defined by GFE MWS specification) * Heat signature (as defined by the the GFE MWS specification). INFO: The MWS information is processed by the xyz procedure and compared to the preprogrammed thread pattern. INFO: procedures exist to compare, integrate and differentiate the positions to obtain e.g. direction and speed of both the missile and aircraft.