**Explanation of Thread pattern mathing**

Date: **29/09-10**

Company: **Company F**

Authors: **Kaj N. Nielsen, Kenneth Pihl, Anders H. Poder, Lars Munch**

Revision: **A**

Document ID: **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 paterns 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**

**When looking at SR-14, it is specified that the matching of threadpatterns is done by the mathematical zyx procedure. This procedure is delivered as is. So no further actions are taken**.

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