



Passive Radar ?

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- Passive Radar has promised much, delivered a lot but its adoption into operational use has not happened to any great extent
- The market for passive radar is expected to grow to \$XB over the next ten years—this quote appears every year

“Within 5-10 years, passive radar systems would likely be in a prime state with fully-fielded systems in place over 10-15 years. Passive radar decreases electronic countermeasures in vulnerability systems and improves stealth target detection capability. Ongoing advancement in the passive radar industry would reject conventional ways to defeat enemy air defences, make it difficult to accomplish air superiority over passive radar opponents, and will need to adjust thinking to preserve US potential for power projection.”

- So, why hasn't passive radar happened?





Requirements

- Passive Radar is often spoken of in terms that are not used for active radar
- Requirements are CONOPS driven and aim to deliver specific military capabilities
- Requirements should be solution agnostic

But

- New technology offers new opportunities and influences requirements
- The matching of a technology solution to requirements is complex with multiple interactions and subtle aspects
- There are many trade-off that should be considered – a specialist activity

Separation of requirements from solutions allows all technologies to be considered on the same basis for selection of the most cost-effective solution





Airspace Requirements

- Target set
 - *Types of aircraft, missiles, UAVs,*
 - *Trajectory types*
 - *Numbers*
- Coverage
 - *Range*
 - *Elevation*
 - *Azimuth*
- Availability
 - *MTBF*
- Information Quality
 - *Detection and False alarm probabilities*
 - *Location accuracy*
 - *MDV*
 - *Classification*
- Other
 - *Re-locatable/on-the-move*
 - *Counter stealth*
 - *Vulnerability*
 - *Cost, up-front, through-life etc.*





Meeting Requirements

- Target set
 - *What - Adequate SNR – Target type dependent*
- Coverage
 - *Where - Adequate SNR – Target type dependent*
- Availability
 - *When – MTBF – re-visit times – EW – other dependencies*
- Information Quality
 - *Detection and False arms - Adequate SNR – Target type dependent*
 - *Location accuracy – Radar and processing design parameters – Target type dependent*
 - *MDV accuracy – Radar and processing design parameters – Target type dependent*
 - *Classification – Radar and processing design parameters – Target type dependent*
- Other
 - *Re-locatable/on-the-move – hardware constraints, weight, size, etc.*
 - *Counter stealth – Radar design parameters*
 - *Vulnerability – Radar concept and usage dependent*

All the above and more can be important in terms of designing a solution. Even more important are the interrelationships.

Matching a solution to a requirement is complex with many characteristics and is eventually a compromise based on as good an understanding of likely current and future scenarios.





- Passive Radar Advantages

- *Bandwidth free*
- *Covert*
- *Jam free*
- *Counter Stealth*
- *Lower through life costs*

- Passive Radar Concerns

- *No control over the transmitter*
- *Geometry*
- *Direct signal breakthrough*
- *Variable performance*
- *Limited altitude information*
- *Uncertain performance*
- *Passive radar not subject to same assessment as active radar*
- *Military need*

- Passive radar is different in the way it functions as an RF surveillance sensor
- These differences need to be carefully considered and balanced as part of meeting requirements

Concerns need to be directly addressed to speed Passive radar adoption





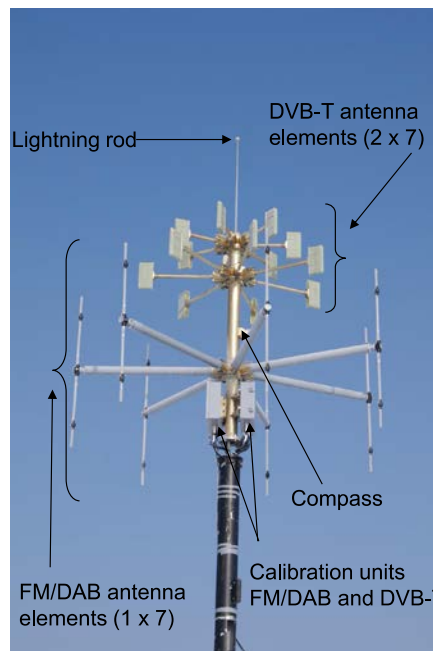
Passive Radar Adoption



ERA Silent guard



FHR LORA11 (FFI)



Hensholdt Parade



WUT Parade



CNIT SMARP



PIT-RADWAR



FKIE CORA Antenna

THALES

The Ground Master 100

Thales GA-100





Passive Radar Maturity

- Maturity
 - *Far less effort applied to passive radar compared to active radar*
 - *Much Passive radar research is by academia*
 - *Research dominated by new applications*
 - *Poor data on bistatic target RCS and many more parameters to cover*
 - *Poor data on bistatic clutter and many more parameters to cover*
 - *Antenna design evolving*
 - *Performance prediction*
 - *Forward scatter*
 - *No products*
 - *Little operational experience*
 - *Passive/Active systems performance a new area*
- Passive radar is much less mature than monostatic radar
- This accentuates uncertainties
- New technologies always have slow adoption

Customers need confidence to purchase





In Conclusion

- Clarity of requirements is essential
- Requirements must be solution agnostic
- Passive radar must be considered on the same basis as active radar
- Assessing the relative merits of active and passive radar against a complex, sophisticated set of requirements is challenging – a specialist activity
- Passive Radar adoption is slowed by legitimate concerns
- Passive radar technology is not fully mature
- Targeted passive radar research and development could aid adoption

Active/passive solutions potentially offer an extremely attractive mix but all the above need to be addressed.

Customers still need confidence to purchase





Questions?

