Heuristic Approach to Evaluate the Occurrence of IEMI Sources in Criminal Activities

F. Sabath*, H. Garbe [†]

* *Bundeswehr Research Institute for Protective Technologies and NBC-Protection (WIS) Munster, Germany,*
FrankSabath@bundeswehr.org,
[†] *Department of Electrical Engineering, Leibniz Universität Hannover, Hannover, Germany,*
Garbe@geml.uni-hannover.de

Abstract

This paper discusses a technique which enables the assessment of key parameter of various intentional electromagnetic environments (IEME) for electronic systems, including the likelihood of their occurrence. The technique starts with a categorization of aspects, including non-technical aspects like availability of components, required knowledge and costs. Based on this categorization the likelihood that an offender has access to such an IEMI source is determined by a heuristic approach. In a second assessment step the possibility that a considered IEMI source might occur in the ambient of a given target system is estimated.

Keywords: intentional electromagnetic interference (IEMI); IEMI source; EM environment; likelihood of occurence.

1 Introduction

The initial step of an IEMI risk analysis is the identification and characterization of the threat scenario and the generated EM environment. In a naive attempt one could simply use the maximum threat level of known HPEM sources to specify the IEM environment. As this attempt ignores the likelihood that criminal and terrorist offender obtains access to such sources and the ability of the sources to come close to the system under consideration (target) it will result in an overestimation of the existing threat and consequently in the requirement of an oversized protection.

In [1] we introduced the risk assessment cube, consisting of the aspects threat level, mobility and technological challenge. We indicated that the mobility and the technological challenge enable the determination of the likelihood of occurrence of a given IEM environment. This paper is intended to close this gap by presenting a heuristic technique which enables the assessment of the likelihood that criminal and terrorist offender get access to IEMI sources.

2 Likelihood of Occurrence

The likelihood of occurrence expresses how likely a considered IEMI source will occur during an IEMI attack in the vicinity of the target system. It became common practice for risk assessment to express the likelihood in relation to a small number of categories.

The likelihood of occurrence of a considered IEMI source can be divided into two parts: (1) the likelihood (P_{CU}) that a (criminal or terrorist) offender gets access to it and (2) the likelihood (P_{ACC}) that the source appears in the vicinity of the target system, i.e. it is capable to enter a defined accessibility zone. The first part P_{CU} depends on the technological challenge and is mainly determined by the availability of the system and its components, the required knowledge and the cost.

One approach to map the availability, knowledge and cost categories to categories for the likelihood that an offender gets access to a source of this availability is the category rating by experts. To enable a basic mapping, without expert's involvement, we approximated the experts rating for

- Availability (AV_C):

$$P_A = 11 - 2AV_C \tag{1}$$

- Knowledge (K_D):

$$P_K = 10 - \frac{7}{5}K_D \tag{2}$$

- Cost (C_{EXP}):

$$P_C = 1 + \frac{\left(5,3 - C_{EXP}\right)^2}{2,25} \tag{3}$$

The discussed likelihood contributions P_A, P_K, P_{EXP} must be compiled to the demanded likelihood of criminal use (P_{CU}) of a considered IEMI source.

$$P_{CU} = \sqrt[3]{P_A \cdot P_K \cdot P_C} \tag{4}$$

The values determined by (4) are index numbers that enable a ranking of various IEMI sources (or source classes) with regard to its possible use in an IEMI attack [2].

References

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