National Framework for the Evaluation and Regulation of Electromagnetic Protection Technologies

Problem Analysis and Proposed Unified Evaluation Protocol

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The Problem of Electromagnetic Protection Without Comprehensive Evaluation Criteria

The electromagnetic protection industry encompasses shielding materials, absorptive systems, blocking barriers, filters, personal accessories, and technologies marketed as harmonizers or neutralizers. However, the term "electromagnetic protection" brings together different functions that cannot be evaluated through a single test or recognized through a generic certification. Attenuating a field, absorbing energy, modifying its distribution, altering particular signal characteristics, or producing a physiological response are different outcomes. The problem arises when evidence of a limited function becomes a promise of complete protection.

The first requirement is therefore to establish unified criteria defining the problem each technology is intended to address. An evaluation must distinguish changes to the electromagnetic environment, human exposure, interaction with the body, and the advertised benefit. These dimensions may be related, but none automatically substitutes for the others. A reduction in intensity does not, by itself, describe the overall result of an installation; a physiological improvement does not necessarily demonstrate reduced exposure; and preserved connectivity does not, by itself, establish biological protection.

This difficulty is related to the limitations in instrumental characterization discussed in the companion documents to this proposal. When an evaluation does not adequately record electric and magnetic components, temporal variations, spatial distribution, or source operating conditions, part of the outcome remains unobserved. This lack of information does not establish that a hidden benefit exists or that the intervention is harmless. It means that the conclusion must remain limited to the quantities and conditions actually evaluated.

For absorption, blocking, and shielding materials, the behavior of a sample must be distinguished from the behavior of an installed system. Performance may vary with frequency, geometry, surface continuity, openings, orientation, aging, and sources located inside the treated space. A solution may reduce a particular contribution while leaving others largely unchanged. It may also modify reflections, transmission, and the spatial distribution of energy. The outcome must therefore be examined both within the intended protection area and in nearby areas that could receive redistributed fields.

Evaluation must include the behavior of active devices. An intervention that degrades a link may trigger power-control responses, retransmissions, or changes in operation. These effects should not be assumed inevitable, but neither should they be omitted when plausible for the installation. The question is whether the solution reduces the intended exposure, displaces part of it, introduces interference, or changes communications performance in a way that contradicts the advertised benefit.

In this analysis, telecommunications noise is a technical quantity that must be defined and measured. A local increase in signal strength, interference, and an increase in the noise floor are not interchangeable phenomena.

Their evaluation requires specification of frequency bands, measurement bandwidth, traffic conditions, location, and instrument configuration. Signal-to-noise or signal-to-interference-plus-noise ratios, as appropriate, must also be examined alongside link performance. Wireless coexistence and its test methods already constitute a field of metrological work; this proposal incorporates that dimension into the evaluation of protection products. NIST technical reference

Products described as harmonizers present a different but equally verifiable requirement. A technology that does not block or attenuate fields should not be excluded from evaluation for that reason alone. Any claimed physical modification or biological benefit can be examined, provided the claim is sufficiently precise to be tested. Openness to different mechanisms must be accompanied by clear requirements: what is modified, through what proposed process, under what conditions, by how much, and through which independent results it can be verified.

When effects on the body are claimed, evaluation must distinguish perceived well-being, physiological changes, and clinically meaningful benefits. Heart rate variability, blood measurements, cellular responses, oxidative-stress indicators, brain activity, and microcirculation may form part of relevant investigations. Not all will be necessary for every product, and none should automatically be considered specific to electromagnetic protection. Their selection must correspond to the manufacturer's claim and use appropriate methods, controls, and reproducible outcomes.

Evaluation must also account for the possibility that an intervention produces different outcomes across different dimensions. An observed benefit in one person does not rule out unfavorable effects on communications or other parts of the surrounding environment. Conversely, an improvement in link performance does not demonstrate a health benefit. Comprehensive evaluation must recognize these outcomes without reducing them to a single rating that conceals their differences.

The problem for consumers is that these distinctions are rarely understandable within a general promise of protection. A partially useful technology may be presented as universal; a limited test may be used to support much broader claims; and a seal may be interpreted as a guarantee of effectiveness or safety outside the conditions evaluated. The scientific organization of this industry must recognize demonstrated partial functions while preventing additional benefits from being attributed to them without evidence.

Proposal for a National Evaluation and Regulatory Framework

EFEIA proposes establishing a National Framework for the Evaluation and Regulation of Electromagnetic Protection Technologies, supported by a Unified Protocol for Determining Efficacy, Scope, and Adverse Effects.

Its purpose would be to organize evaluation across this industry through shared scientific criteria, reproducible methods, and conformity statements with explicitly defined scope. The framework would cover absorption, blocking, and shielding materials and systems, as well as non-blocking technologies claiming to modify the electromagnetic environment or produce benefits for people.

Classification would begin with the claimed function and benefit, rather than the commercial name. Each manufacturer would have to specify what the product is intended to modify and what outcome it promises. If a mechanism of action is invoked, the manufacturer should describe it in a technically examinable way, distinguish established findings from hypotheses, and provide procedures for testing it. An explanation of the mechanism would not substitute for evidence of efficacy, just as an isolated favorable result would not justify any proposed causal explanation.

The protocol would comprise three coordinated dimensions. The first would evaluate the technology's physical performance. The second would examine its effects on the environment and telecommunications. The third, where biological or health claims are made, would determine the evidence required to substantiate them. These dimensions would not constitute an automatic progression: demonstrating physical performance would not, by itself, confer recognition of biological benefit.

Testing would combine controlled conditions with representative use scenarios. Laboratory tests would isolate variables and establish reproducibility; installed-system evaluations would assess behavior with multiple sources, users, and active devices. Comparisons should document conditions before and after the intervention, uncertainty, changes unrelated to the product, and potential consequences outside the treated area.

Reproducibility would be established among laboratories with demonstrated competence and capability for the relevant test. This would require sufficiently detailed procedures, calibration, reference materials where applicable, and interlaboratory comparisons. Laboratory competence and product efficacy would be separate forms of recognition: laboratory accreditation would not automatically validate all commercial claims associated with its reports. ISO/IEC 17025 reference on laboratory competence

Each product certification or declaration of conformity should specify, at a minimum, the verified function, evaluated frequencies and configurations, installation conditions, magnitude of the result, limitations, and identified adverse effects. It should also state which aspects were not evaluated and which product or installation changes would require renewed verification.

A partial solution could receive recognition for its partial function. A material that attenuates particular bands could be recognized for that performance without receiving a general declaration of health protection. A technology with evidence of a specific benefit could be recognized within the conditions studied, without extending that result to other populations, exposures, or mechanisms. Recognition should be understandable to users and retain the same scope in labeling, advertising, and commercial documentation.

The proposed regulation would incorporate post-market surveillance, review of design changes, and mechanisms for recording performance deterioration, interference, or adverse outcomes. Where a limitation could be managed through installation conditions, those conditions should form part of the authorization or certification. Where an effect contradicted an essential product claim, that claim or its recognition should be reviewed.

Development of the framework would require a multidisciplinary organization involving metrology, electromagnetic engineering, telecommunications, materials science, product safety, biological and clinical research, conformity assessment, and consumer protection. Independence, disclosure of conflicts of interest, and review of both favorable and unfavorable results would be conditions of credibility.

The proposal seeks to make “electromagnetic protection” a description of verified functions, with clearly identified benefits, limits, and potential consequences, rather than an undefined commercial category. Unified criteria must allow different technologies to be evaluated without requiring all of them to work through blocking, and without granting any technology a promise broader than the evidence it can demonstrate.