



Report WG 6.89.004

EARTH STATION SHIELDING

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Source: Working Group 6

RECOMMENDATION

Subject Area: Earth Stations

Title: Earth Station Shielding

EARTH STATION SHIELDING

NSMA Working Group 6, (Earth Station Shielding) was formed to address the issue of the effectiveness of earth station shielding, i.e., how to determine it either experimentally or theoretically (or both) to ease the prior coordination between terrestrial stations and earth stations. This report summarizes the discussions that have taken place in the meetings of Working Group 6.

Very little data has been made available to the group, which has placed us in the position of largely working with verbal information imparted in the meetings. The resulting consensus is that we do not currently have sufficient data to release a recommendation for comment and review, but it is thought that the publication of this report might stimulate the release of information in the form of data or other contributions for consideration. The area of earth station shielding seems to be many faceted, making it difficult to determine which problems should be addressed with a good probability of obtaining a solution. It appears that a number of different concerns are envisioned when the "shielding" topic is discussed.

Within the broad outline of the Working Party's mission, the group has settled on a three-tiered approach:

- Theoretical
- Experimental (Measurement Data)
- Practical Judgment

The first two avenues have not yielded much in the way of results. The theoretical approach has not provided any results as yet, and measurements data have not been made available to the Working Group. Regarding the latter, it is difficult to assess whether this is because of companies' reluctance to release the information or, if upon closer evaluation of the data, the owners believe that it would not provide the desired information. It should be noted that Working Group 4 has wrestled with the problem of obtaining reliable results and has suggested that obtaining valid measurement results is difficult. To obtain the desired information requires many measurements at a particular site and the measurements should be taken over a "long" period of time. The group has not yet solidified an approach to obtaining these types of results.

This has left us with the practical results discussion proposal that was presented at the Annual Conference in 1987 in Denver. To refresh memories, that proposal stated that 15 dB was found to be a value for shielding for solid absorptive shields that completely block direct energy from the radiator. In addition, the following caveats (and other considerations) were wrapped around the number.

1. Earth berms may be worth more.
 - a. A working figure of 17 dB may be applied if the berm is within the satellite arc.
 - b. Up to 25 dB may be allowed outside the satellite arc.
 - c. The type of construction should be considered.
2. There is an angular consideration.
3. Distance of the shield from the antenna must be considered. For the purposes of this list, the obstruction must be within 50 meters of the antenna
4. The relative size of the shield and the antenna is a factor.
5. The type of material associated with the obstruction or shield must be determined.
6. Near field is not considered at this point. Contributions on the subject are welcomed.

7. Any particular structure may be worth more than the indicated 15 dB figure.

8. The numbers discussed here Considered to be the maximum "rule of thumb" values that will be assumed for the maximum "rule of thumb" values that will be assumed for an obstruction documentation or measurements justify a larger value. Less loss may be assumed if the measurements or documentation do not seem to support even the above rule of thumb figures.

This "strawman" has generated some discussion both pro and con within the coordination community. The bulk of the negative responses seem to center on the fact that some coordinators appear to have embraced the number rather than the concept, i.e., there has been some rigid applications of the 15 dB figure without considering other factors. Given this situation, Working Group 6 felt that some additional material be published to expand on the intent of the "magic number" that was put forth.

The value advanced seemed to be one that was somewhere between a very restrictive 0 to 5 dB that some find desirable to use to protect their systems and a somewhat relaxed number of 25 dB that others prefer. A 15 dB figure seemed to evoke less emotion when mentioned than any other number. The number was not intended and does not in any way claim to be the "one and only" number to be used. It is basically a point at which both sides of the coordination process can begin talking. Certainly some shields, particularly those specifically designed as RFI shields, will provide more loss. Others, mainly the so-called incidental shield that is used because it is there, may provide less loss. In some cases, the shield will be totally ineffective because the interfering signal is reflected from an unexpected direction.

Basically, the discussions within the Working Group seem to center on the fact that each case must be examined individually. This means that the shield proponent must provide sufficient information for other coordinators to review and consider using in their analyses. Scaled drawings are helpful but in any case the information should be clear enough to evaluate the situation involving the extremities of the antenna. In addition, a description of the material of which the object is constructed of is helpful. A Xerox copy of a photograph generally does not provide sufficiently clear information. The photograph itself would be more helpful.

Responding coordinators, provided with appropriately detailed information on shielding, should review it and not simply say -- "15 dB is it!" For instance, the construction techniques used in a 40 story building make it likely that a beam aimed at the core will be attenuated more than 15 dB. In like manner, a wooden slat fence is not likely to provide the same shielding effect. This possibility of "sneak" paths should also be considered.

In summary, the Working Group believes that the 15 dB loss figure for earth station shields provides a basis to begin discussion and is high enough to provide some benefits to the designer while being tight enough to provide some protection to satisfy other coordinators. The key is exchange of information.

It may be possible to refine the number if the Working Group receives additional information The group would appreciate receiving input from the membership in general. Comments or contributions may be sent to:

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