**Reviewer #3:**

**(A)** The primary objective of the paper is to design a Fresnel lens that achieves higher antenna gain with a larger diameter lens, which is impractical using a traditional plano-convex lens. However, the experiments were conducted with a smaller lens size, which could easily be built with a plano-convex lens. Could the authors justify why these experimental design parameters were chosen? Why not larger diameter Fresnel lens than 30 cm? Was it for cost-effectiveness or you wanted to compare with existing results? You project the similar results to the larger aperture lenses?

Response：

In the current terahertz wireless transmission research, most of the experiments we focus on use 30cm plano-convex lenses, and we have a lot of experience in using 30cm plano-convex lenses. Therefore, we choose to design and compare at a 30cm aperture more for comparison with existing results. In theory, a large-aperture lens will give the same result, but considering the difficulty of making and installing a large-aperture lens (mainly reflected in the lens alignment step), there may be some errors.

**(B)** The authors designed and constructed a 30 cm Fresnel lens-based antenna, which was tested with a 300 GHz Terahertz signal over a 50-meter wireless link. They report a signal gain of 45 dB, which they compare to other works that use a 30 cm aperture-based plano-convex lens system over a separation of 850 meters, achieving a gain of 65 dBi.

Questions: (i) Please standardize the gain units (45 dB and 65 dBi) to allow for an accurate comparison. (ii) Could the authors explain the differences in gain between their experiment and the reference (Li et al., 2023)? In the manuscript, the transmitter and receiver are separated by 50 meters, while in Li et al. (2023), the separation was 850 meters. Given the shorter distance in your experiment, could the actual projected gain be less than 45 dB? Please clarify this in the text.

Response：

(i) dBi is a unit of relative antenna gain, which indicates the gain of an antenna relative to an isotropic antenna (ideal point source). Our experiment is to measure the gain of a lens antenna relative to that of an antenna without a lens, so we use dB to express it. The relevant information in the article has been changed.

(ii) In Li et al (2023)., the antenna gain they calculated is the sum of the gains of the lens and the horn antenna, minus the loss caused by the coupling efficiency. In

theory, the gain of the Fresnel lens is the same at long distances, but the antenna coupling efficiency decreases at long distances, which will cause certain losses. Therefore, the actual gain may be smaller, and improvements in this area require advances in collimation technology solutions.

**(C)** I suggest revising the abstract to make it more concise and better aligned with the manuscript's content. For example:

Line 10-11: "As the aperture increases and the focal length decreases, the thickness and mass of the plano-convex lens increase rapidly." This is not universally true. Are the authors referring to practical limitations in manufacturing large-aperture lenses? While a shorter focal length can allow for a wider field of view and increased signal gain, is this what you mean? This section could be clarified to avoid multiple interpretations.

Line 15-16: "The experimental results show that the Fresnel lens can amplify the signal in the terahertz band." Consider rewriting this as: "The experimental results demonstrate that the Fresnel lens can be used for long-distance Terahertz communication with larger aperture diameters, overcoming the limitations of traditional plano-convex lenses."

Response：The relevant paragraphs have been modified.

**(D)** The introduction is supported by appropriate and sufficient references, but the references should be cited throughout the text where relevant, rather than only at the end of the paragraphs.

Response：

The meaning is that this paragraph comes from information shared by multiple references or is a summary of multiple references.

**(E)** Figures:

Figure 5: The caption needs more detail. Indicate that the angle of incidence decreases with flux. Additionally, please discuss why the Fresnel lens exhibits higher sidelobes compared to the plano-convex lens.

Figure 8: The figure caption is misplaced. It should be located directly below the figure, not after the "Experimental Validation" section heading.

Response：

The higher sidelobes of the Fresnel lens are due to structural losses, which are described in detail in Section 2.3.

Figure 8 has been adjusted, it may be a word format problem.

**(F)** Add references for the following statement:

Line 56-57: "Typically, assuming structural losses are negligible, doubling the effective aperture of a plano-convex lens results in an approximate 6 dB increase in antenna gain." Please add a reference. Signal gain should increase with the square of the aperture size ($D^2$).

Response：

This conclusion comes from the formula derived in Section 2.5 and can be directly derived from Formula 12.