Practical Implementation of Live Uncompressed 4K Video Transmission at 140 GHz Using Photonics Technologies

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***Abstract*— We present a photonics based Terahertz wireless communication system operating at 140 GHz and we achieve an error-free transmission of 6 Gbps over a link distance of 30 cm. We then design and demonstrate a practical model for the transmission of live uncompressed 4K video using the THz communication system. Finally, we study the video quality by analyzing each pixel frame by frame.**

I. INTRODUCTION

EDHOLM'S law of bandwidth states that the required data rate in the communication sector is doubled every 18 months. To meet the demand in wireless communications, several experiments have been carried out in the Terahertz (THz) range (0.1-10 THz). In most experiments, transmission of uncompressed High-Definition (HD) videos has been demonstrated whereas only few works reported 4K and 8K transmission using fully electronic or partially electronic based communication system [1-2]. For many indoor applications, a link distance of only few meters is already sufficient. Using an electronic based approach adds complexity to the system due to the frequency multipliers. In this talk, we will present a communication system based on difference frequency generation and we will demonstrate the transmission of live 4K video. Finally, we will perform a video quality analysis.

II. EXPERIMENTAL SET UP

The schematic of the THz communication system is shown in Fig. 1. Fig.2 presents the experimental set up. One of the two Distributed Feedback (DFB) lasers operating in the C-band is intensity modulated with the pseudo random bit sequence (PRBS) data, amplified using Erbium doped fiber amplifier (EDFA) and mixed in the photomixer to generate the THz wave at 140 GHz. The THz signal is directly demodulated by the Schottky detector and the baseband signal is pre-amplified using the low noise amplifier.

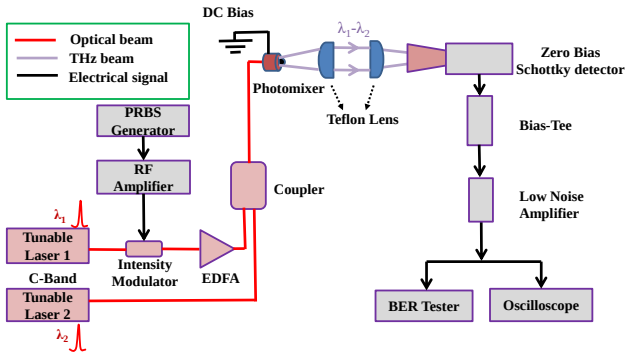

Fig.1. Schematic of the Terahertz wireless communication system operating at 140 GHz.

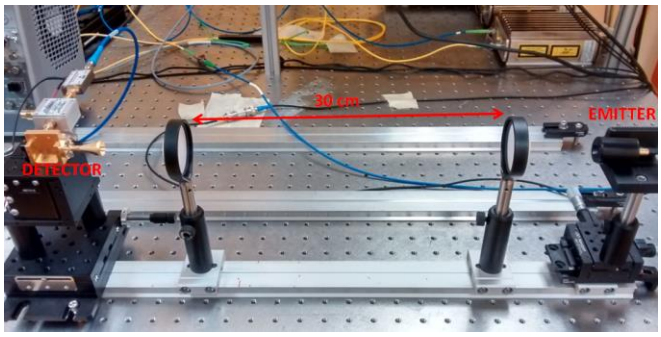

Fig.2. Terahertz wireless communication set up.

A 4K video camera with both optical and electrical outputs will be used as the source. The electrical signal is used to record the video at the transmitter end and the optical data is used for the transmission in the communication system presented in Fig. 1. The design is shown in Fig. 3.

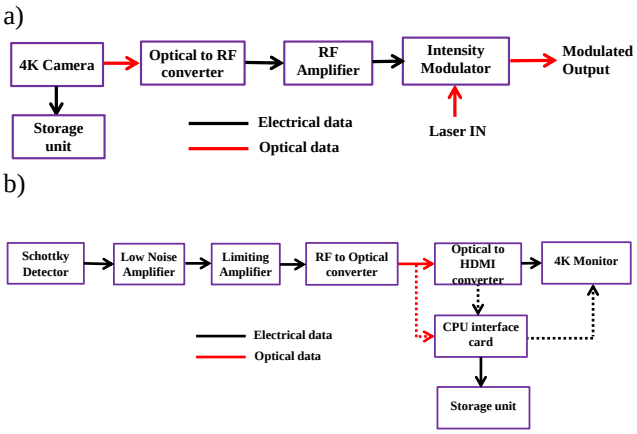

Fig.3. a) Transmitter and b) receiver design for 4K video communication.

In the receiver module, in addition to displaying the 4K video, we will also record it for video quality analysis purpose.

CONCLUSION

A Photonic based wireless communication system operating at 140 GHz has been designed. The model for 4K transmission is being implemented and we will present the result during the presentation.

REFERENCES

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[2]. H. Takahashi, T. Kosugi, A. Hirata, and K. Murata, "Supporting Fast and Clear Video," *IEEE Microwave Magazine* vol. 13, pp. 54-64, 2012.