## **Poster:** Securing IoT through coverage-bounding wireless communication with visible light

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## **Trend in Wireless Communications**



#### **Trend in Wireless Communications**

## New frequency band: arger bandwidth + Simpler designed some complex is complex in the second sec **3G 4G 5G 5G**

## **Visible Light Communication**



#### Advantages compared to RF:

Much larger bandwidth

Signal processing is easier

Energy efficient

Devices are cheaper

#### Secure: light can be bounded by walls

Coverage-bounding wireless communication with visible light



# A step further: Coverage-bounding wireless communication with visible light

HODOR: coverage-bounding and visual wireless communication

- Coverage-bounding: the wireless communication range is controlled accurately in 3-dimensions
- Visual: the communication coverage and process are visible to user
  → an important and user-friendly side-channel for securing IoT





## **Realization methods**

#### **Physical methods**

Visible light is directional Visible light can be blocked easily



#### **Software-defined methods**

Dynamically change the the parameter settings of TXs, receivers, and program the surroundings.





### **Simulation results**

Setup: a grid of 4 transmitters in an area of 3 m X 3 m Result: coverage-bounding by using blockages Result: coverage-bounding by leveraging interference from neighboring transmitters





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#### **Experimental result**

**Based on our DenseVLC testbed [1,2]:** TX8 (desired), TX12 and TX32 (interfering transmitters)

**Result:** can bound the communication range as desired





[1] A Cell-free Networking System with Visible Light. IEEE/ACM Transactions on Networking, 2020.[2] DenseVLC: A Cell-Free Massive MIMO System with Distributed LEDs. ACM CoNEXT, 2018.

Coverage-bounding wireless communication with visible light

#### Conclusion

**Proposed** the concept of coverage-bounding wireless communication

**Proposed** two categories of preliminary methods

**Evaluated** with simulation and experiments



