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## **Origin : a 60 GHz radio-over-fiber home area network project**

Camilla Kärnfelt, Michel Ney, Daniel Bourreau, Adonis Bikiny, Gaetan Guevel, Yannick Paugam, François Gallée, Joffray Guillory, Anna Pizzinat, Benoît Charbonnier, et al.

### ► **To cite this version:**

Camilla Kärnfelt, Michel Ney, Daniel Bourreau, Adonis Bikiny, Gaetan Guevel, et al.. Origin : a 60 GHz radio-over-fiber home area network project. International symposium on Green Radio over Fiber & All optical Technologies for Wireless Access Networks (GROWAN 2011), Jun 2011, Brest, France. hal-01381709

**HAL Id: hal-01381709**

**<https://hal.science/hal-01381709>**

Submitted on 14 Oct 2016

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## FUI8-ORIGIN (Optical-Radio Infrastructure for Gigabit/s Indoor Network)

### Authors

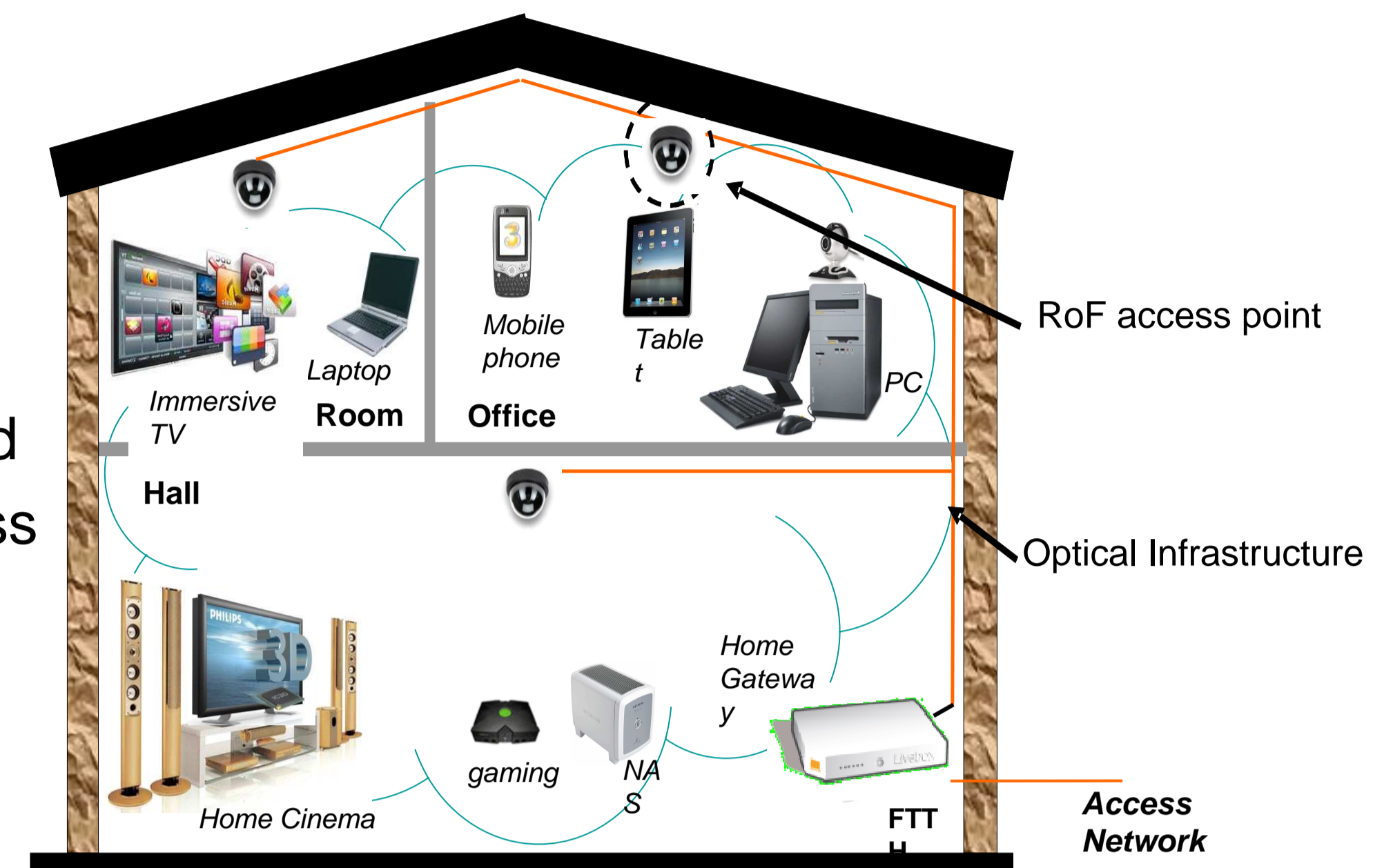
C. Karnfelt<sup>1</sup>, M. Ney<sup>1</sup>,  
 D. Bourreau<sup>1</sup>, A. Bikiny<sup>1</sup>,  
 G. Guével<sup>1</sup>, Y. Paugam<sup>1</sup>,  
 F. Gallée<sup>1</sup>, J. Guillory<sup>2</sup>,  
 A. Pizzinat<sup>2</sup>, B. Charbonnier<sup>2</sup>,  
 S. Meyer<sup>2</sup>, O. Bouffant<sup>2</sup>,  
 G. Delas<sup>2</sup>, H.W.Li<sup>3</sup>,  
 E. Tanguy<sup>3</sup>, M. Brunet<sup>3</sup>,  
 G. Lirzin<sup>3</sup>, A. Chousseaud<sup>3</sup>,  
 C. Algani<sup>4</sup>, A-L. Billabert<sup>4</sup>,  
 J-L Polleux<sup>4</sup>, C. Canepa<sup>5</sup>,  
 G. Gougeon<sup>6</sup>, V. Gouin<sup>7</sup>

### Partners

- 1) Télécom Bretagne, Microwave department, Lab-STICC UMR CNRS 3192, Brest
- 2) Orange Labs, Lannion
- 3) IREENA, Nantes
- 4) ESYCOM, Paris
- 5) ACOME, Mortain
- 6) SIRADEL, Rennes
- 7) NIJI, Rennes

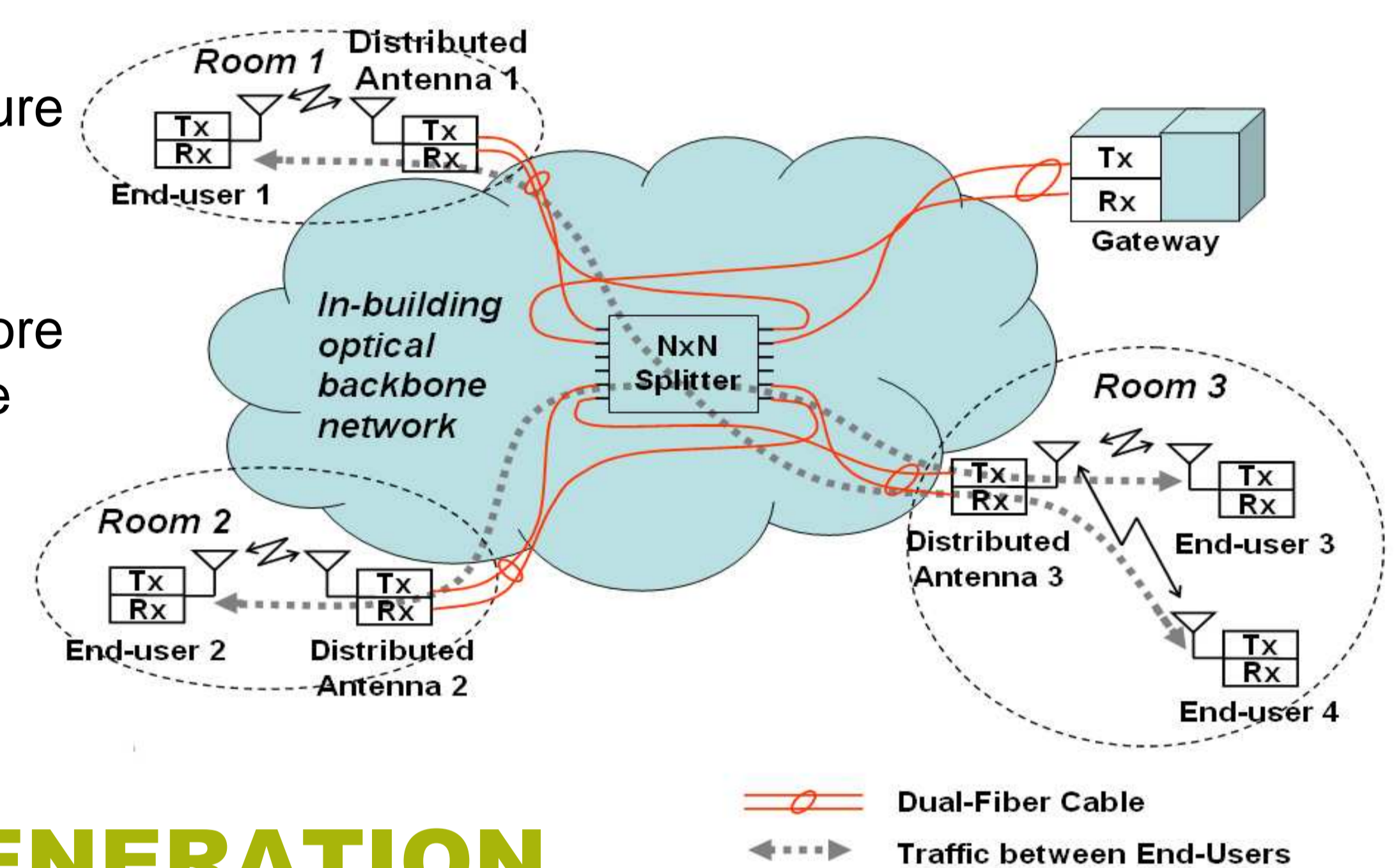
## 60 GHz IN THE HOME

- Multiservice and multiuser system for the future home
- Multi Gigabit/s capacity
- 60 GHz standards for wireless use are now being finalized and adopted
- 60 GHz indoor implies limited coverage (i.e. one room), need of low-loss infrastructure to dispatch signal across walls
- Multipoint-to-Multipoint (Mpt-to-Mpt) system architecture



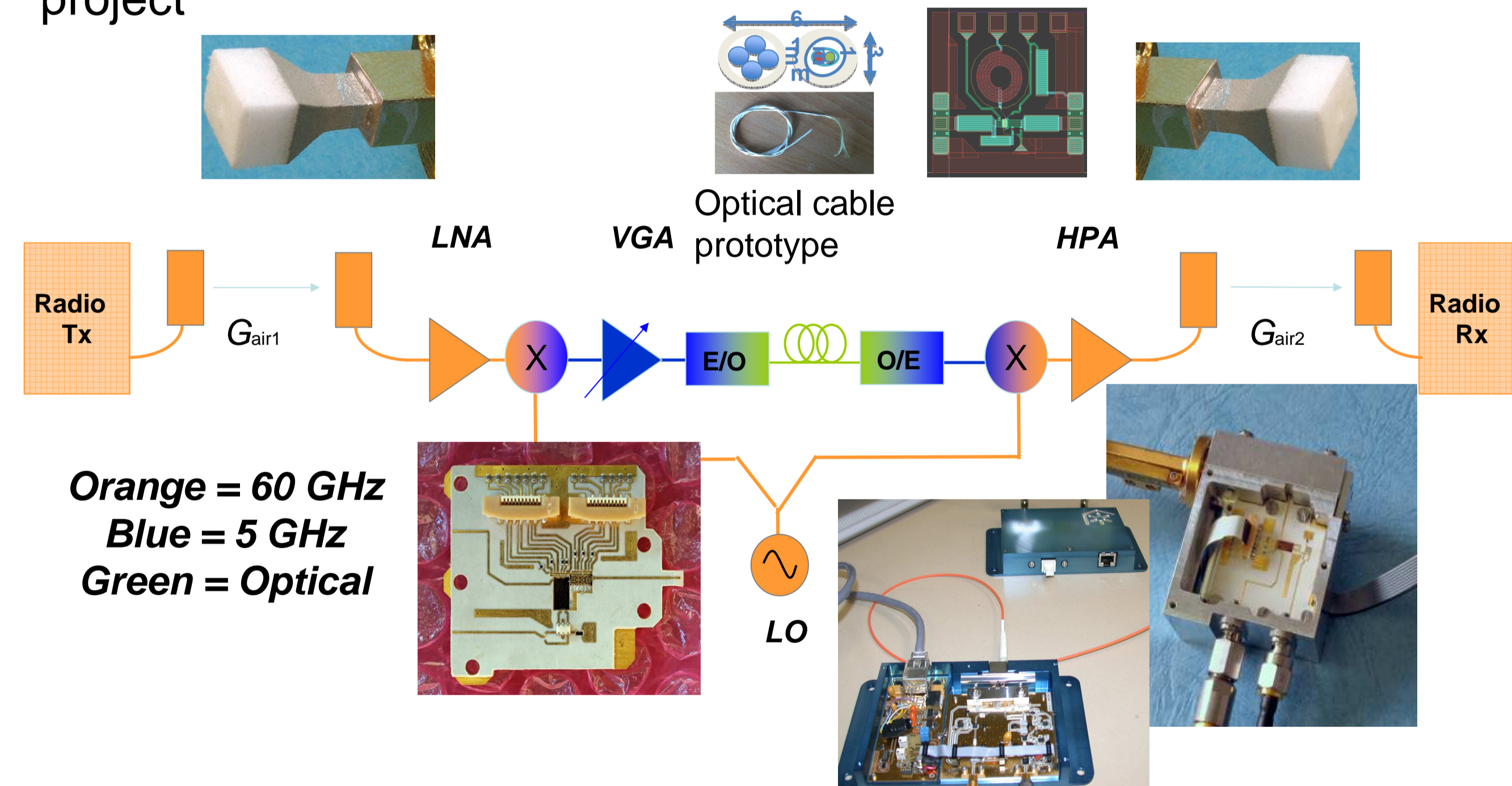
## ORIGIN SYSTEM ARCHITECTURE

- To dispatch the signal to all rooms a low cost HAN RoF infrastructure is proposed
- The HAN RoF infrastructure is transparent to different standards
- The received 60 GHz radio signal is down-converted to 5 GHz before its transfer on optical fiber and then up-converted to 60 GHz before wireless transmission
- Reduced electromagnetic radiation and power consumption (access points only activated when needed)



## HARDWARE DEVELOPMENT : 1<sup>st</sup> GENERATION

- VCSELs, photodiodes, cables, antennas, mm-wave and cm-wave TX and RX modules
- A pre-industrialized demonstrator (6 rooms) will be implemented and tested at the end of the project



Transmission result for first RoF prototype.  
 • Protocol IEEE802.15.3c High Speed Interface mode

	NA	5	7.5	10
Free space dist (m)	NA	5	7.5	10
EVM (%)	5	19	22	25

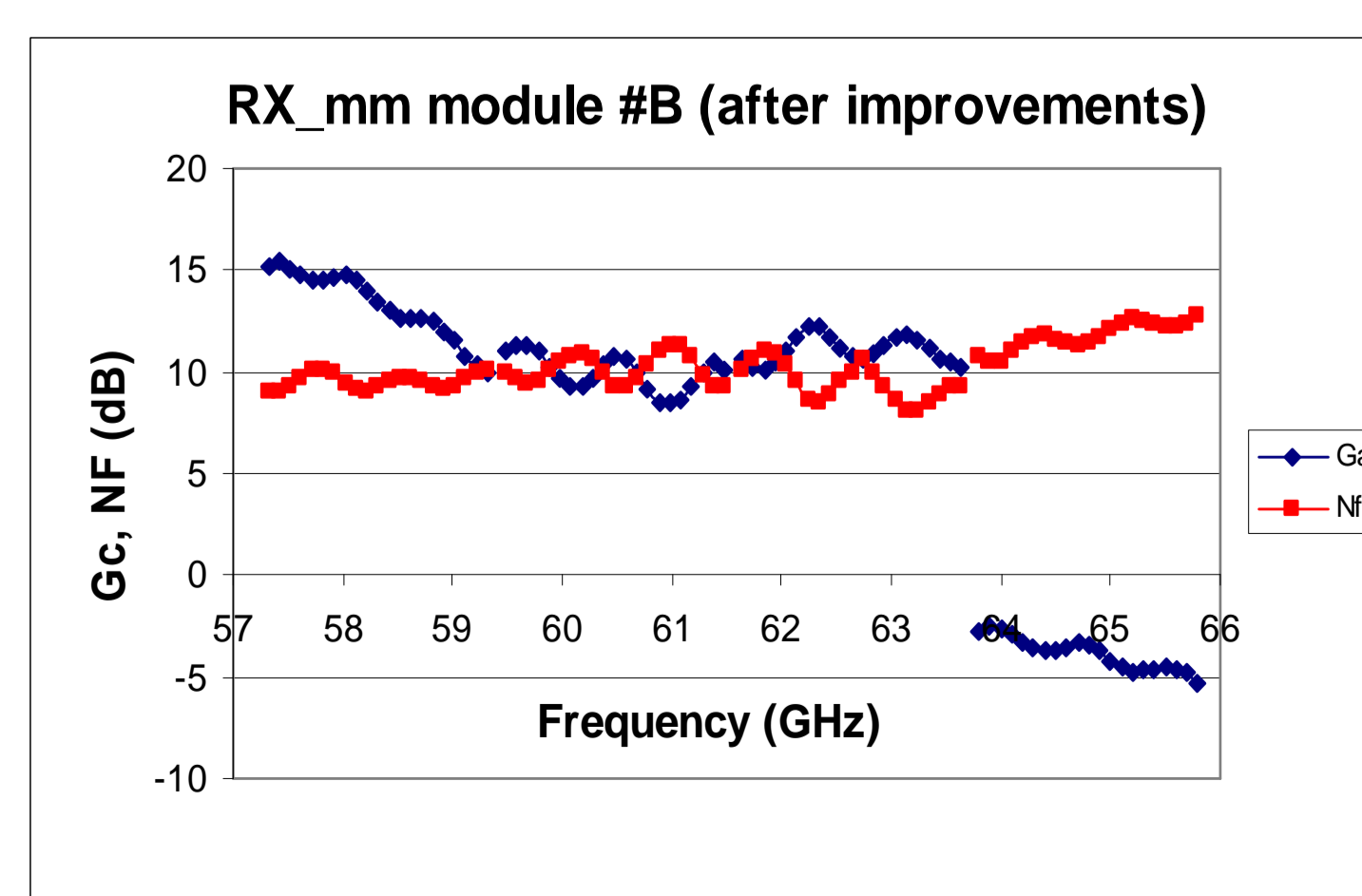
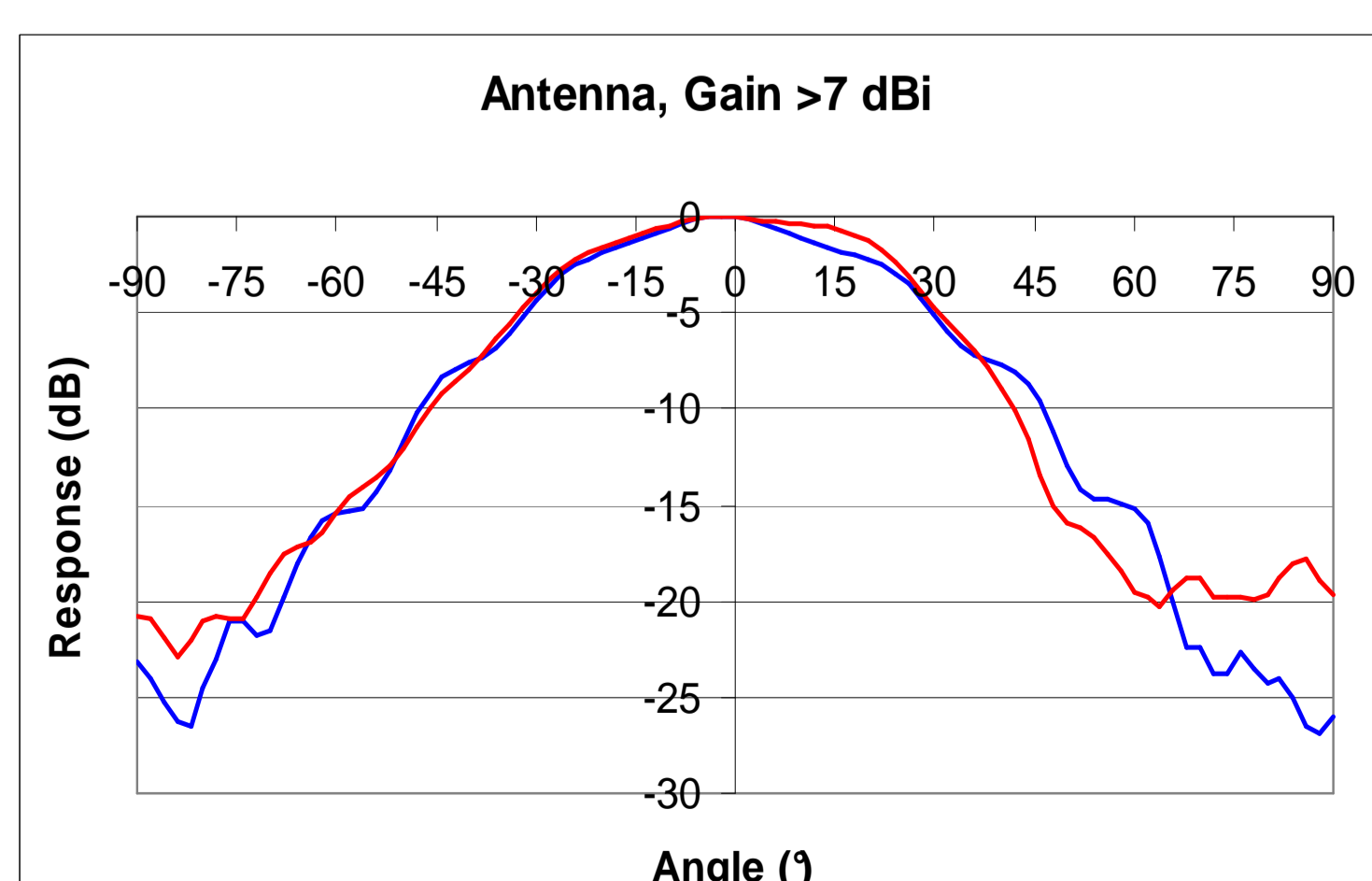
## MILLIMETER-WAVE MODULES

### Antenna

- Low cost foam technology
- >7 dBi Gain at 60 GHz
- Return loss > 20 dB from 57 to 65 GHz

### RX/TX modules

- Rogers 4003 substrate
- MMICs with chip-and-wire technology
- DC management
- Antenna interfaced by waveguide



### Further work:

#### 2<sup>nd</sup> and 3<sup>rd</sup> generation

- RX: Improve NF
- TX: Improve LO rejection
- Minimize modules
- Further integration between cm- and mm-wave parts

