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

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

Authors

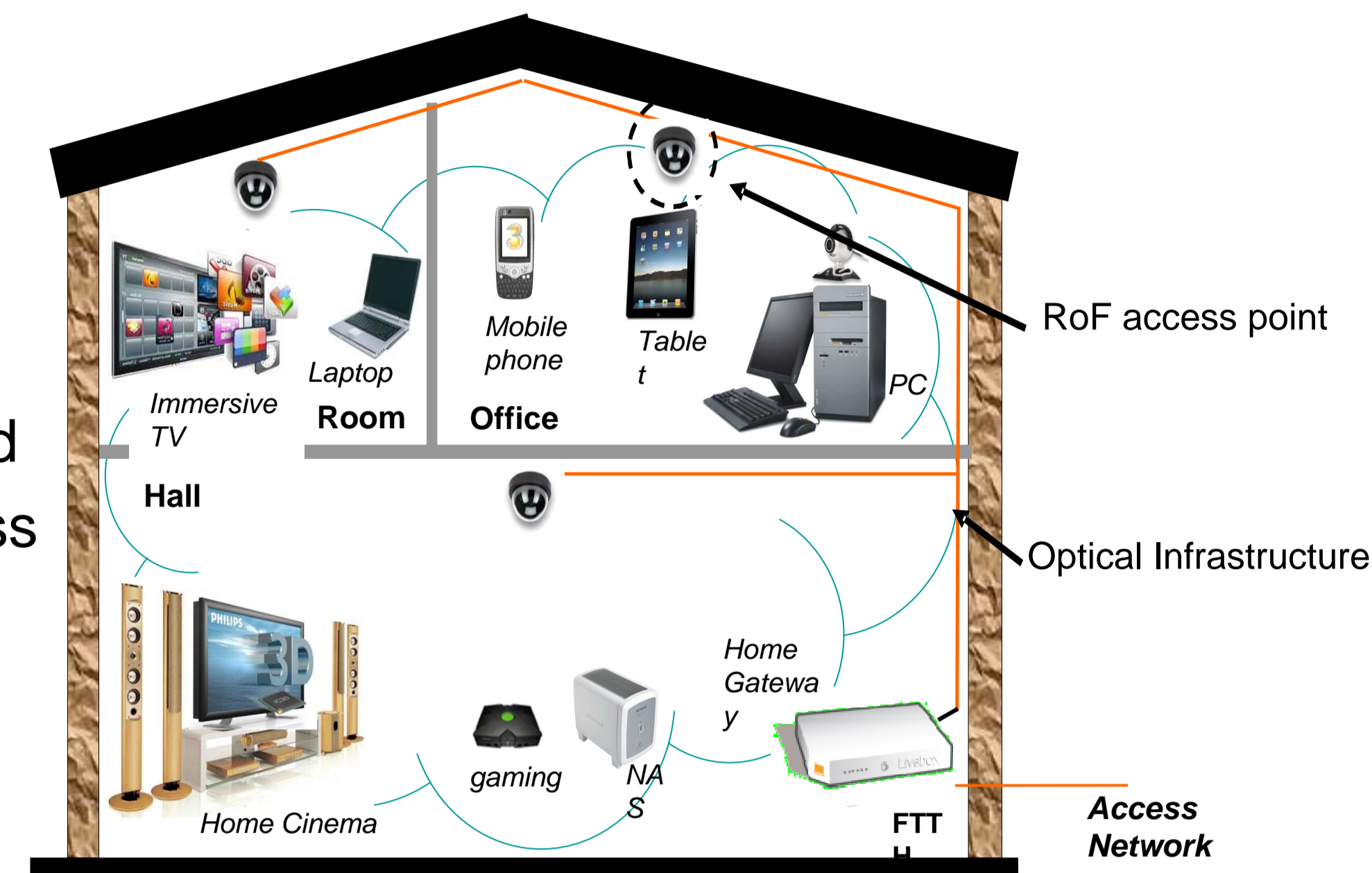
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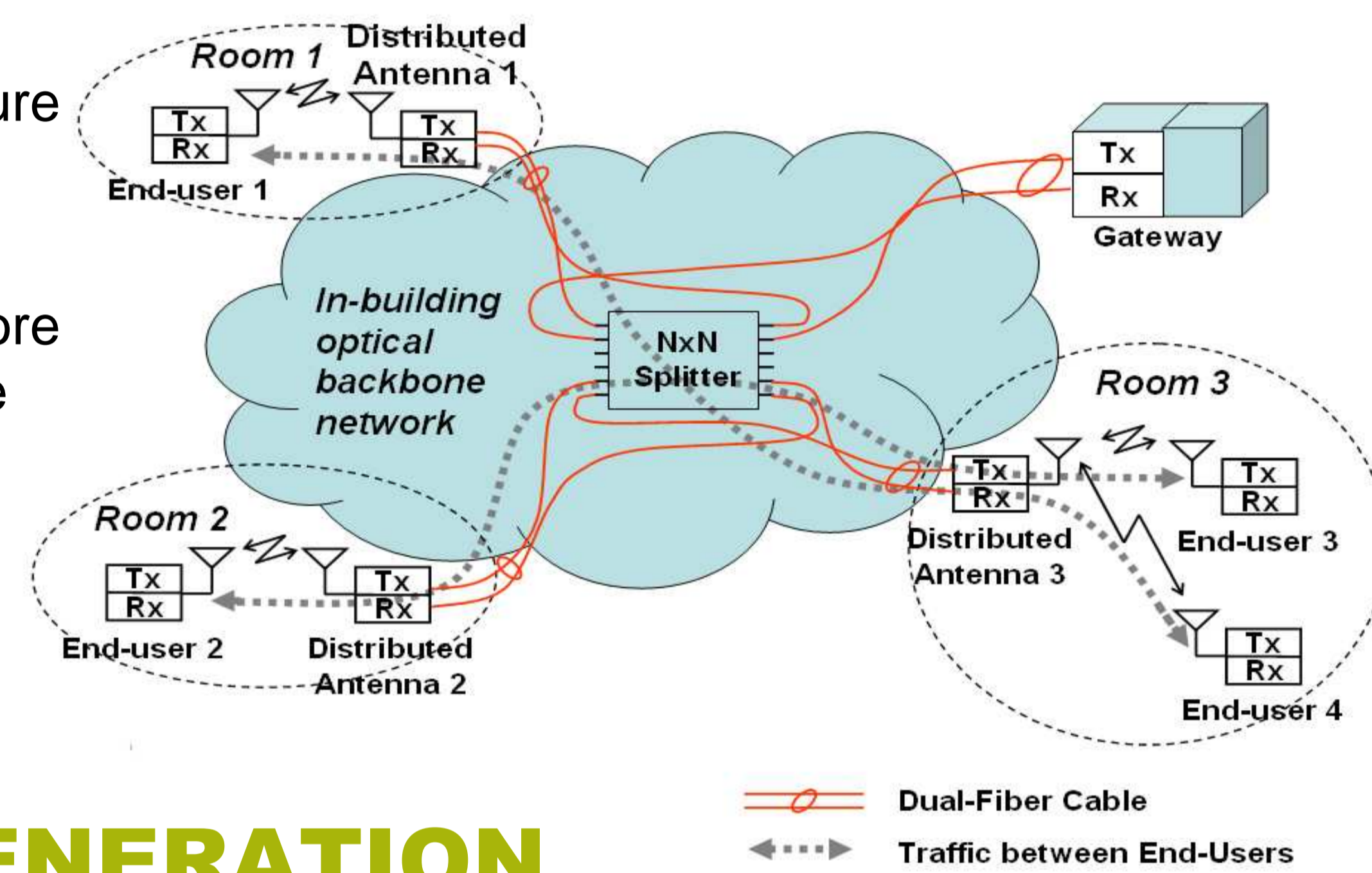
60 GHz IN THE HOME

- 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



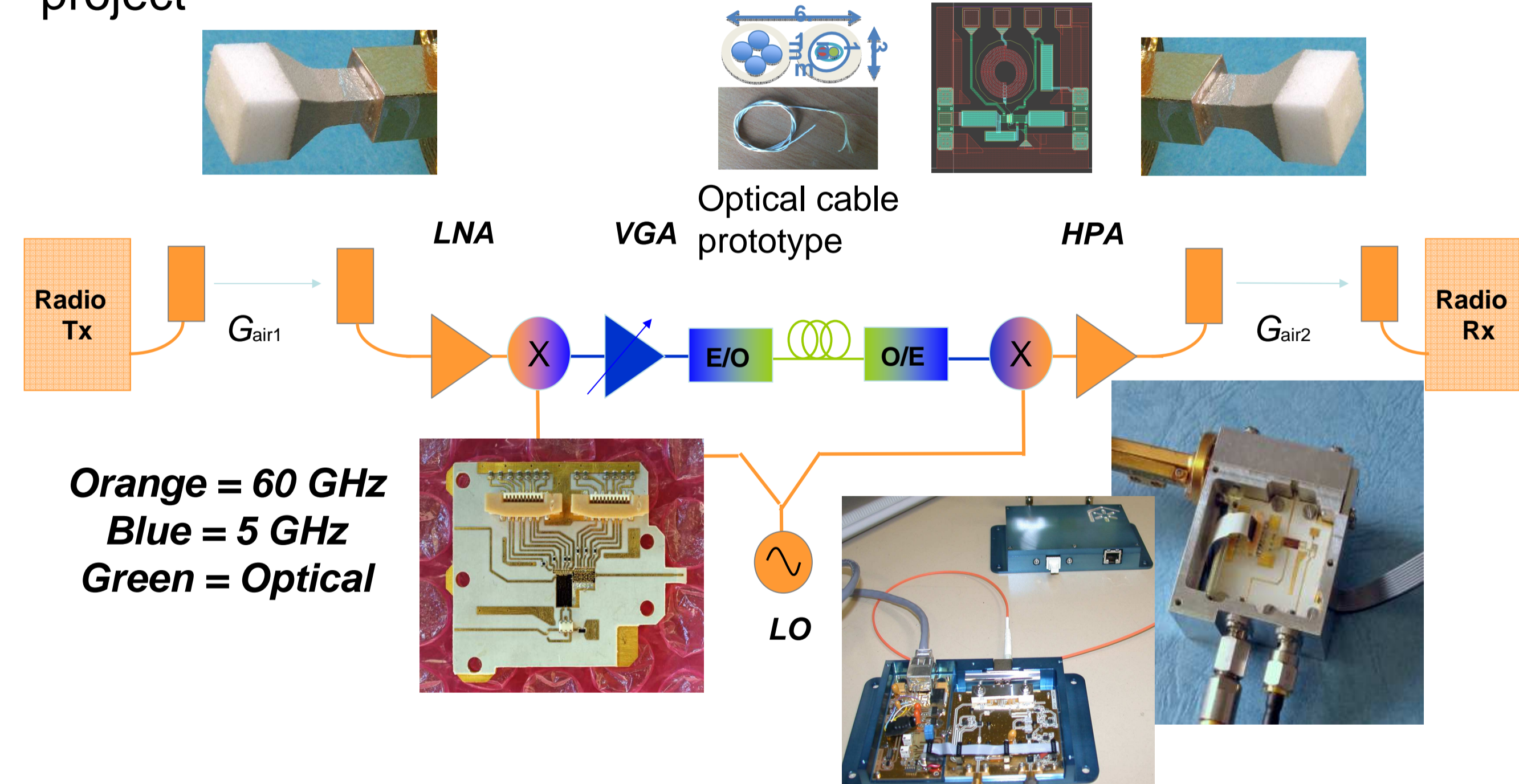
ORIGIN SYSTEM ARCHITECTURE

- 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 : 1st 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

Direct transmission (coaxial cable)

RoF transmission
 • 100 m fiber (Draka MMF OM3)
 • One free space leap

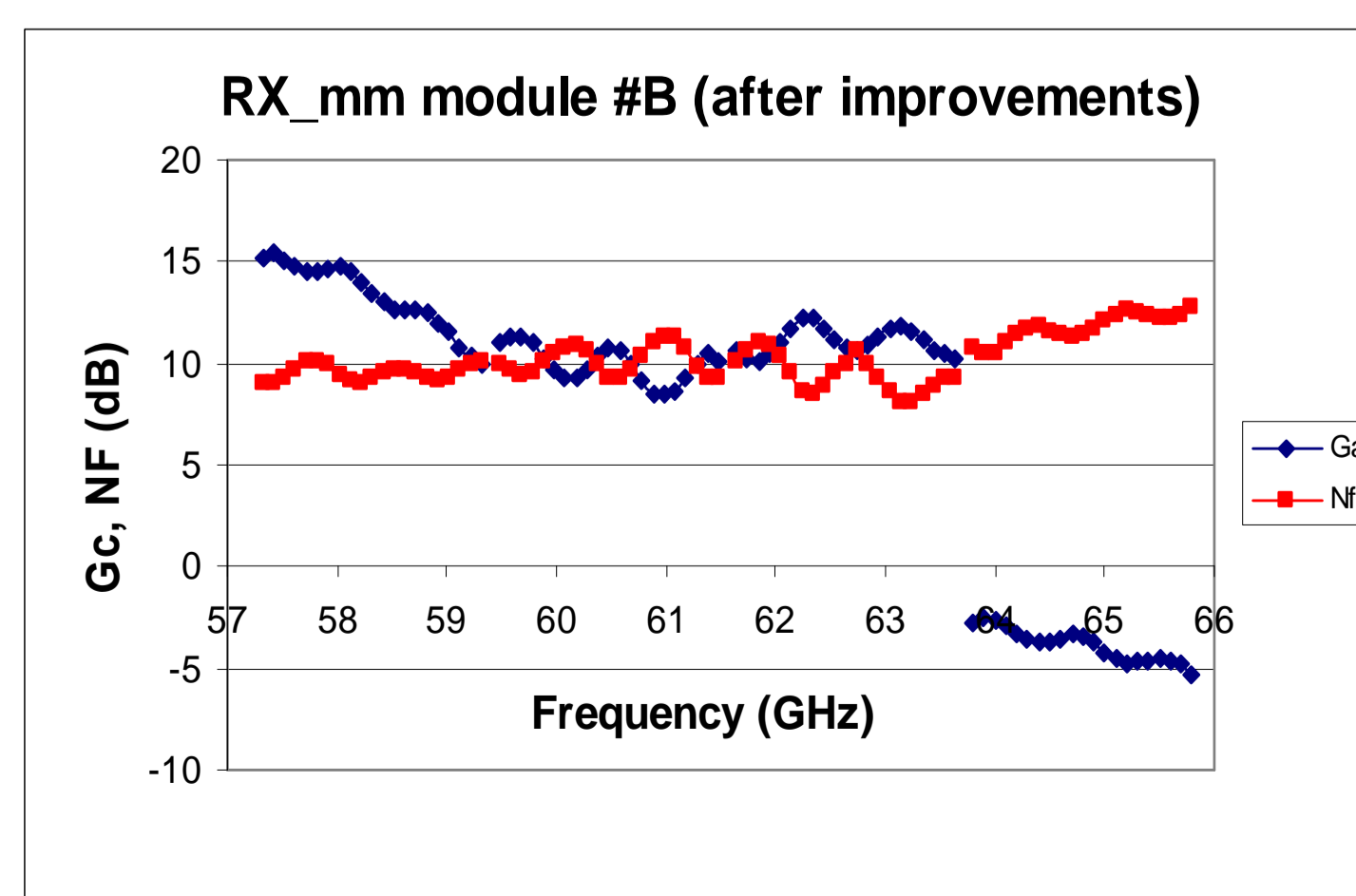
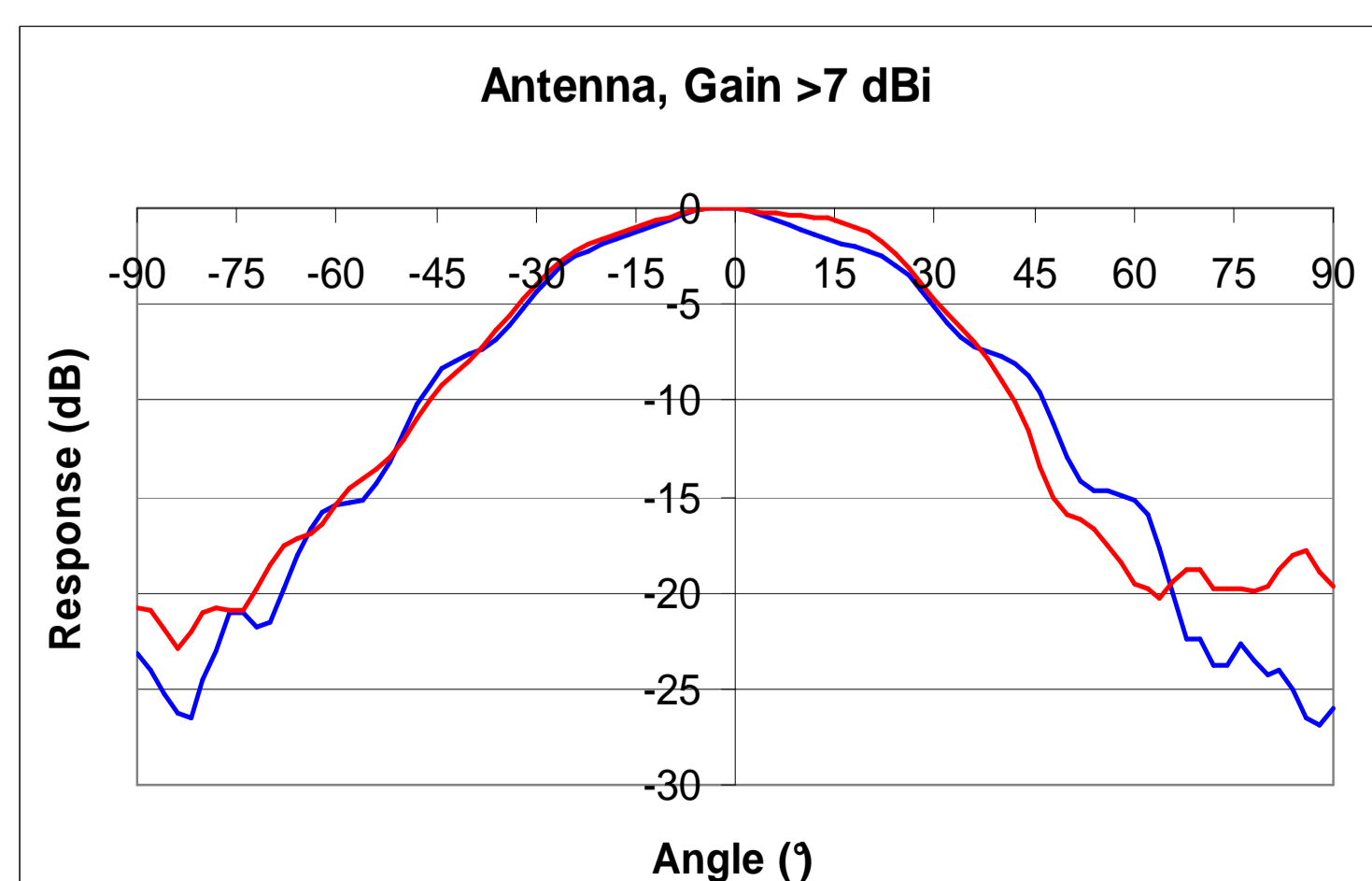
MILLIMETER-WAVE MODULES

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:

2nd and 3rd generation

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

