Greener wave.

We shape electromagnetic waves

Reconfigurable Intelligent Surfaces and MTS based Antennas

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Bonjour! Nous sommes Greenerwave!

Et nous contrôlons les ondes électromagnétiques

Good Morning! We are Greenerwave!

And we shape EM Waves

Since 2015, a French startup based in Paris!

More than 80 passionate and motivated employees!

+13 patent families and 200m² of laboratory!

More than 10 international partnerships!

+ 20 billion € market to conquer

Institut Langevin ONDES ET IMAGES

ESPCI PARIS cnrs

We work in and target different businesses

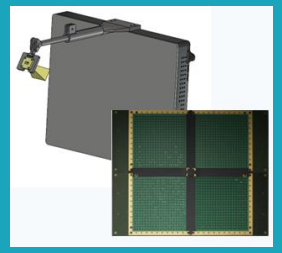
SATCOM

Beamforming @mmWave

DGA · Commission européenne · cnes · eutelsat · NTT Communications

5G/6G

(RIS) Reconfigurable Intelligence Surfaces



AGC

Radar 4D

High resolution imaging radars

PLASTIC OMNIUM

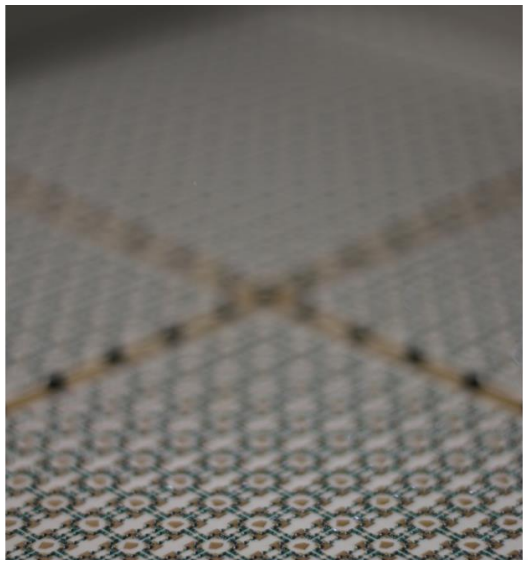
RFID

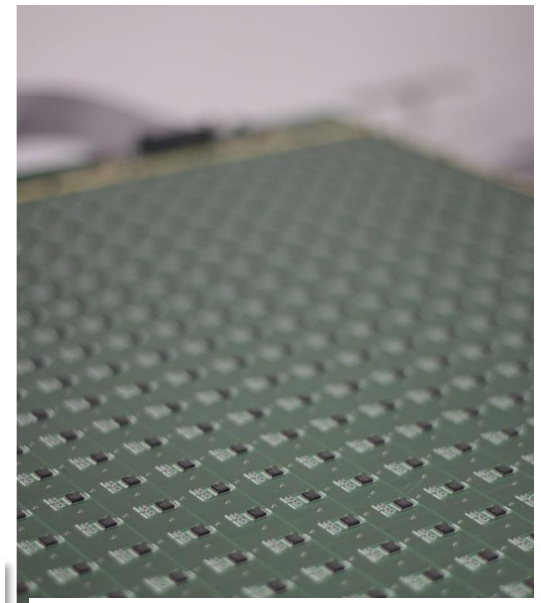
High performance smart sensors

STELLANTIS

1-A- Reconfigurable Intelligent Surfaces for Connectivity, ISAC and others

SNS Call Objective 3:
Enabling Cell-free exploitation by presenting a new way to shape the wireless channel

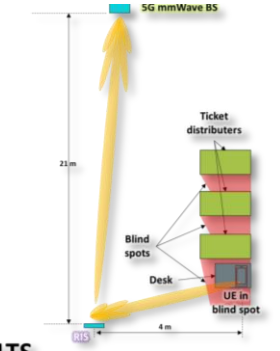


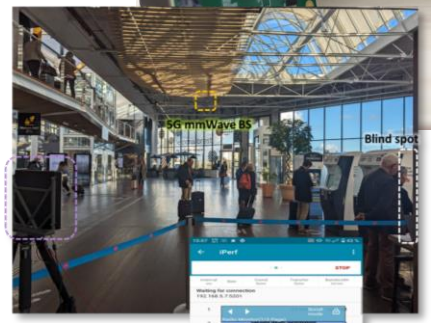


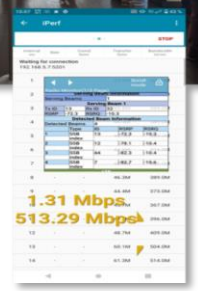
- Validate the operation and identify KPIs of the RIS in the targeted frequency range in a real environment using an operational 5G FR2 network.

Use case:

- Use the RIS to cover a poorly covered area with 5G mmWave, using narrow beams with high gain to improve the received power and the achieved throughput.







RESULTS

	Without RIS	With RIS
Beam number 13	Absent	present
RSRP of Beam ID 13	-94dBm	-76dBm
Throughput	NA	513Mbps

Press Releases

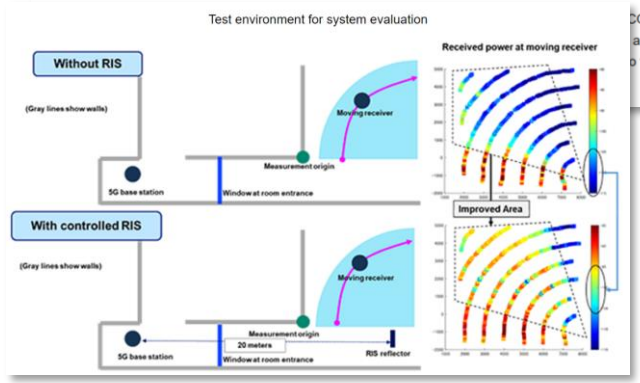
November 12, 2021

NTT and NTT DOCOMO Trial First Use of User-tracking Metasurface Reflector for Extreme Mobile Coverage in Current 5G and Coming 6G Era

— Will enable high-speed millimeter-wave communications indoors —

Print Tweet

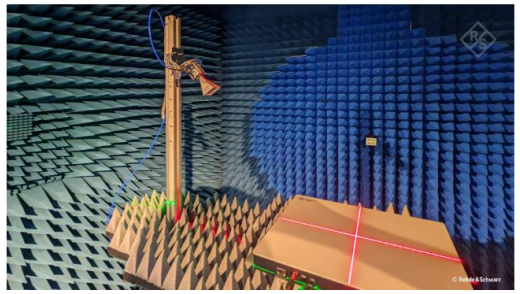
COMO, INC.
a
o follow



Munich / sept. 05, 2023

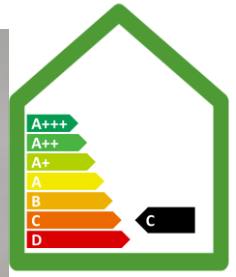
Rohde & Schwarz and Greenerwave collaborate to verify RIS modules and drive 6G research

Reconfigurable intelligent surfaces (RIS) are drawing attention in the wireless industry due to their potential for an efficient 5G mmWave rollout as well as future 6G applications. A measurement campaign by Rohde & Schwarz and Greenerwave recently characterized the configurable radio wave reflection properties of a novel FR2 RIS module developed by Greenerwave with an over-the-air (OTA) antenna test system from Rohde & Schwarz. It is one of the first real measurements confirming that a metamaterial-based RIS can improve the coverage and efficiency of wireless communications performance, especially for 5G FR2. The groundbreaking work will pave the way for further 6G developments.

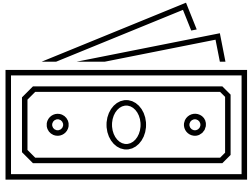


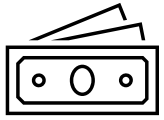
OTA measurements of the FR2 RIS from Greenerwave in a wireless performance test chamber. (Image: Rohde & Schwarz)

1-B- A new RIS is under design: opens up new directives and opportunities



Power Consumption by a factor 10





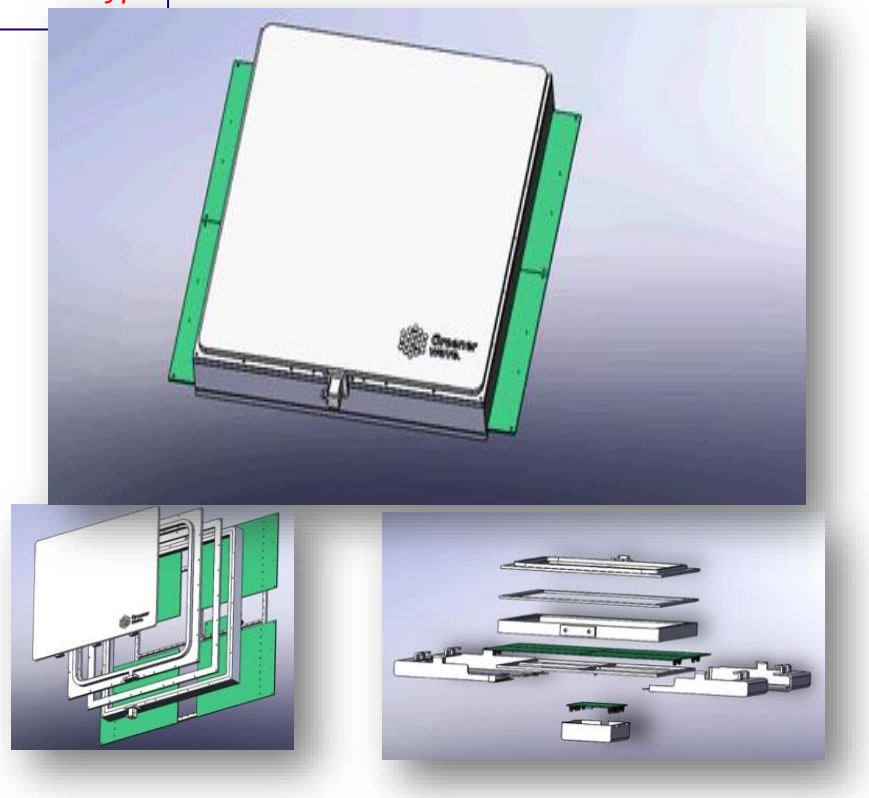
Cost reduction by a factor 4-10

PIN Diode Based RIS

New component Based RIS

2- RIS and Leaky Cavity based Antenna for beamforming

Antenna Prototype



A disruptive and novel way of thinking wave emission

- **Waves are emitted inside a cavity by a simple feed**
- A **metasurface** is used to **passively control**, **only through reflections**, the wave field inside the cavity
- The **cavity leaks** through a transmittance mask, that further fine tunes the emission and radiation pattern

SNS Call Objective 2:
Machine learning and AI models empowers smart and dynamic beam shaping .
SNS Call Objective 4:
Providing key functionalities and technologies for 6G RAN system design.

For the first time:

- Waves are not emitted by a set of sources but by a whole cavity
- Custom ICs are not needed to generate RF signals
- We simply shape electromagnetic waves by using reconfigurable intelligent surface inside the cavity

Transposing the hardware complexity to software, we pave the way to low-cost, low-consumption, ultrafast and ultra-efficient ESAs.

2- RIS and Leaky Cavity based Antenna for beamforming

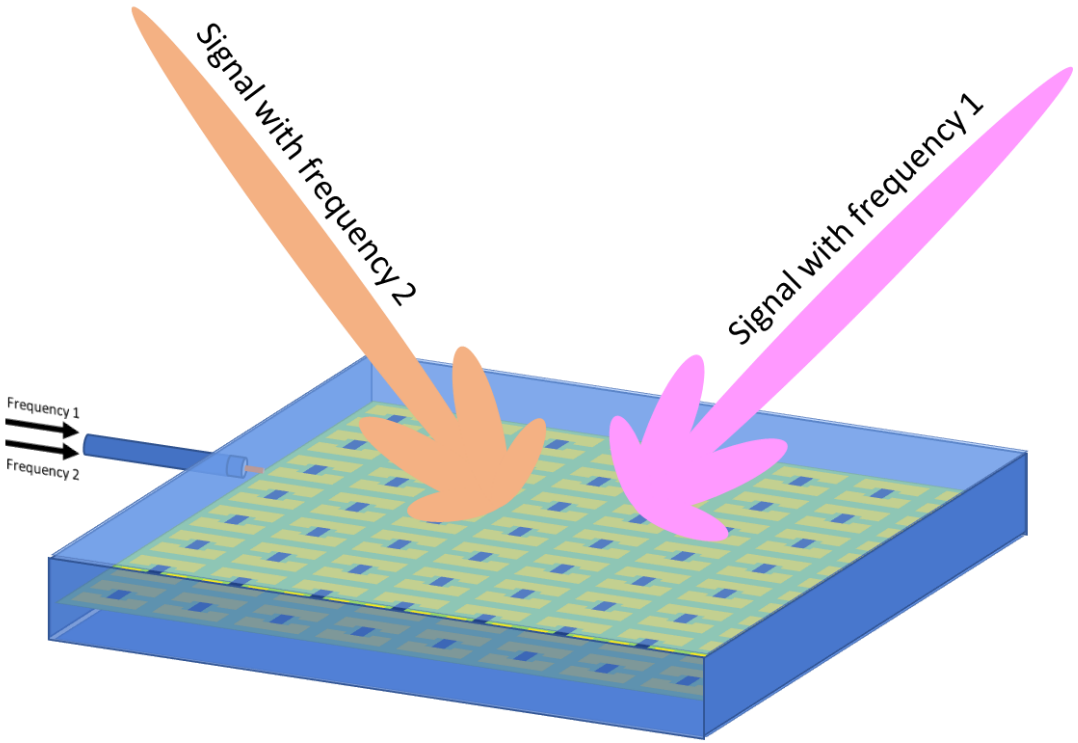
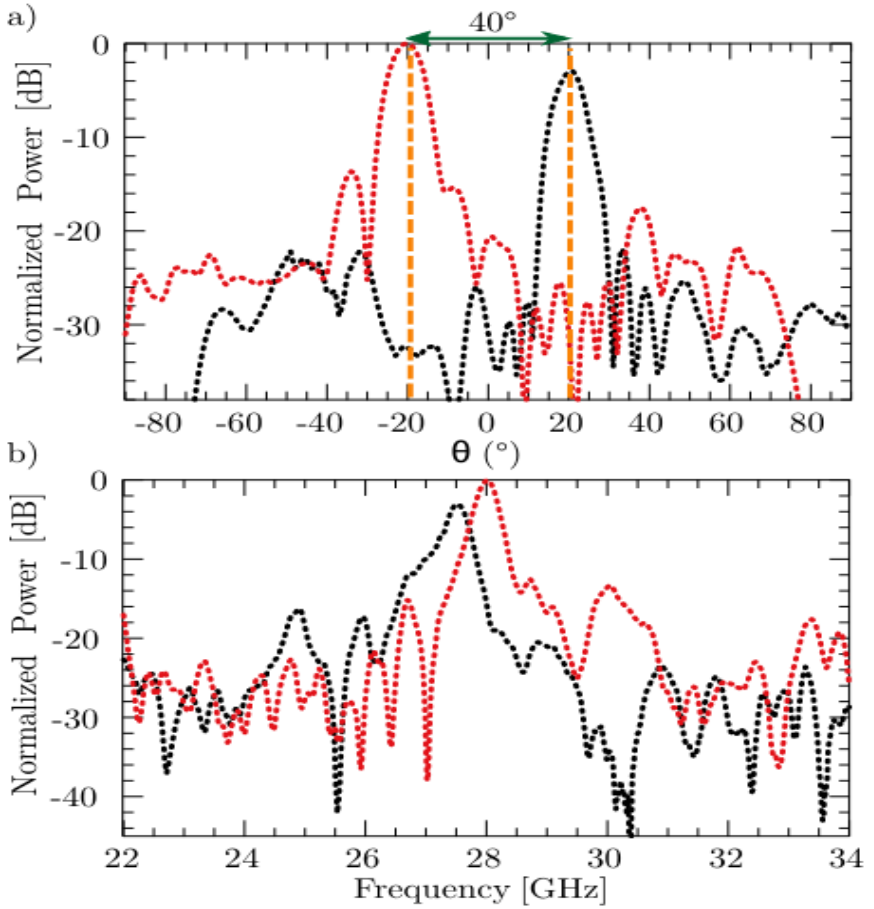


Illustration of a cavity antenna with a single feed, directing two different signals to two different angles



An experimental example of the transmission of two different signals having different frequencies to different directions (angles)

SNS Call Objective 1:
New perspective on Integrated communication and sensing enabled by dynamic wave shaping.

Greener wave.

THANK YOU !