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# RemoteRF: An Open-Source, Shared Global Testbed for Wireless Sensing and Communication

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**RemoteRF**  
remoterf.net

## Motivation: Broaden SDR Access Across The Globe



### Cost

Device costs often range from \$100s to \$10,000s.

### Complexity

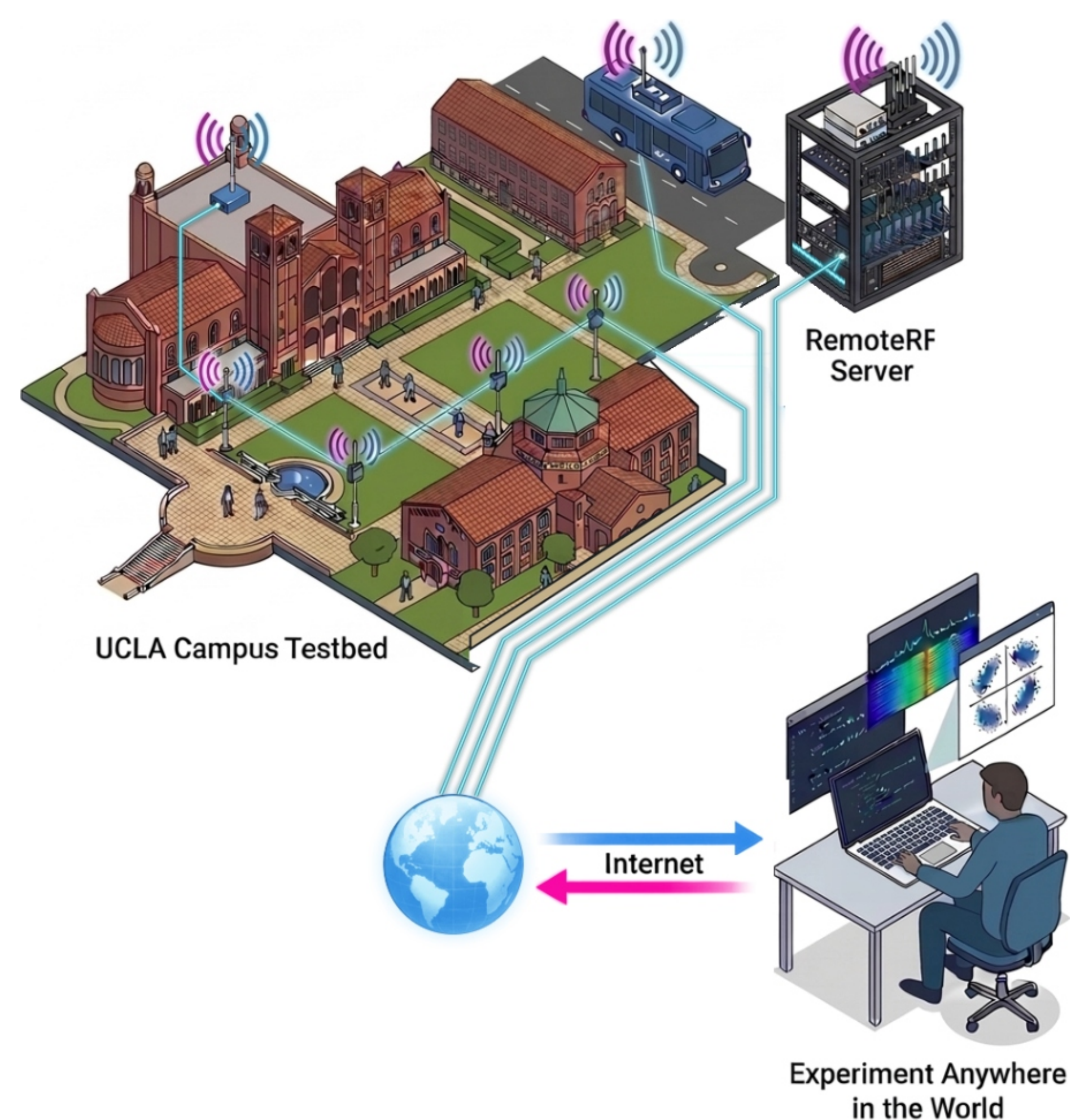
Setup, dependencies, and interfacing create friction.

### Coordination

Challenging to control distributed devices.

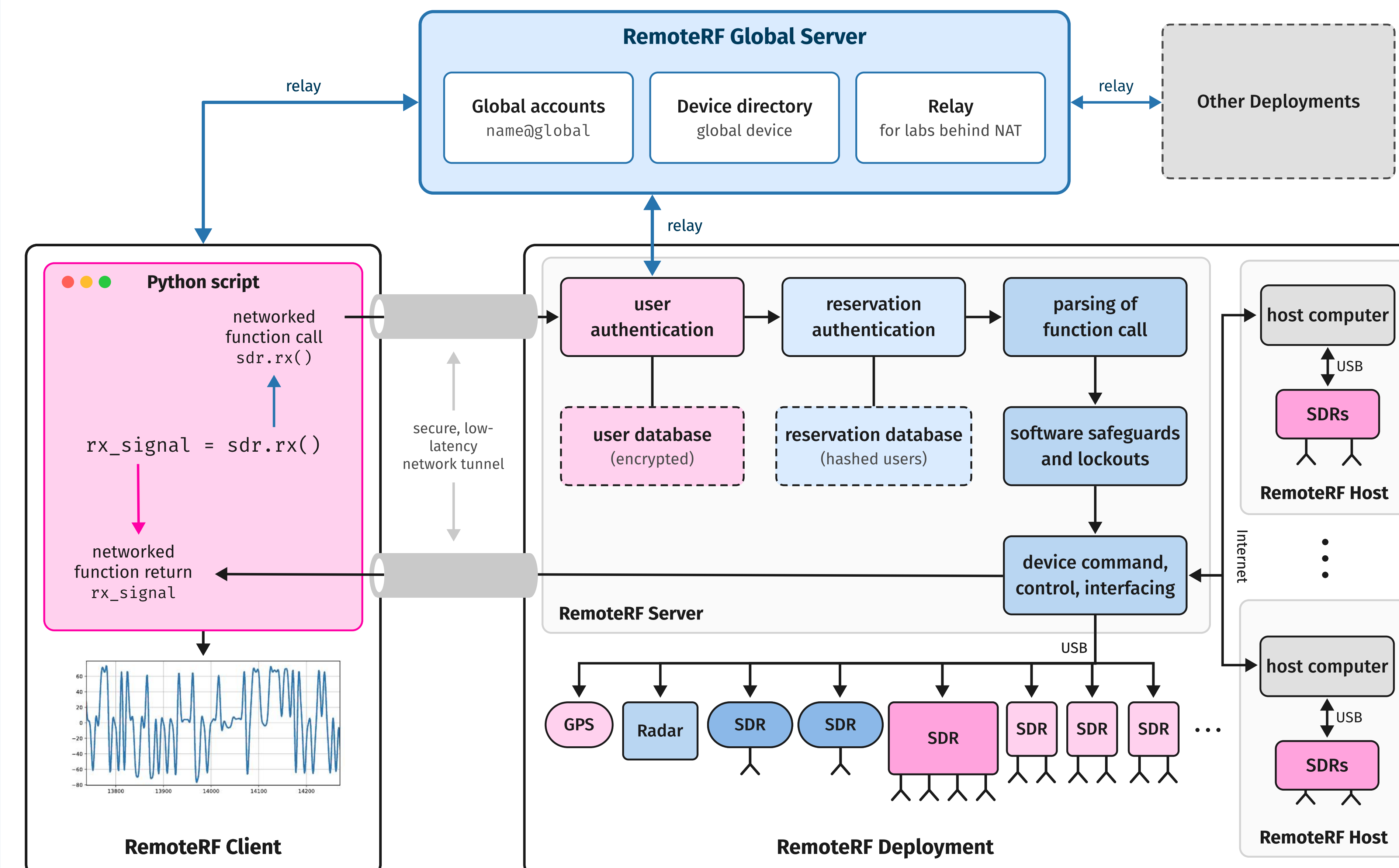
RemoteRF lowers these barriers to entry through the creation of shared testbeds that can be remotely accessed over the internet.

## Envisioned Solution

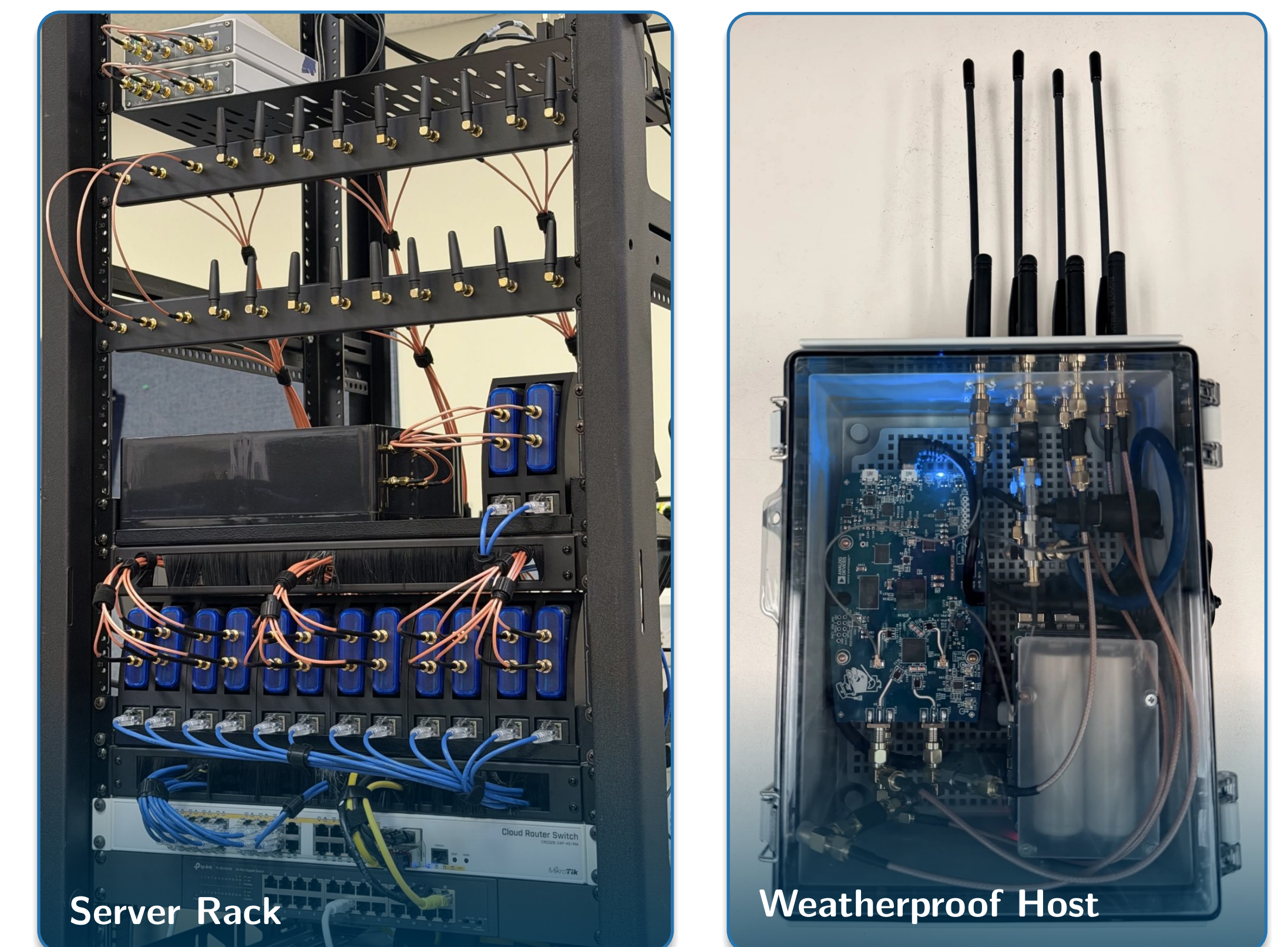


We envisioned a platform that would allow large-scale testbeds of distributed SDRs to be seamlessly accessed over the internet.

## System Architecture



## UCLA's RemoteRF Deployment



A single server at UCLA provides 24/7 access to multiple devices, some of which are distributed across campus via weatherproof hosts.

## Reported Impact By The Numbers

|                                       |                                      |                                  |
|---------------------------------------|--------------------------------------|----------------------------------|
| <b>250+</b><br>students & researchers | <b>7,000+</b><br>device reservations | <b>4,000+</b><br>hours of use    |
| <b>86%</b><br>first-time using SDR    | <b>92%</b><br>improved understanding | <b>83%</b><br>increased interest |

RemoteRF is used extensively in undergraduate and graduate courses, independent projects, and wireless research at UCLA.

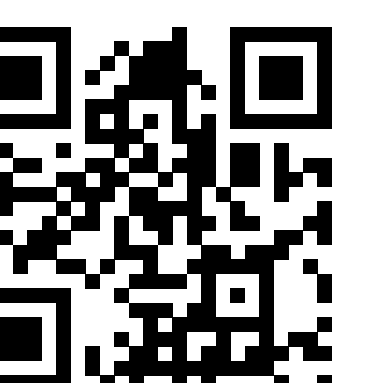
## Latency and Overhead

|                        |         |
|------------------------|---------|
| On the server          | 11.2 ms |
| Campus, direct         | 13.5 ms |
| Off-campus, direct     | 25.5 ms |
| Off-campus, via Global | 80.8 ms |

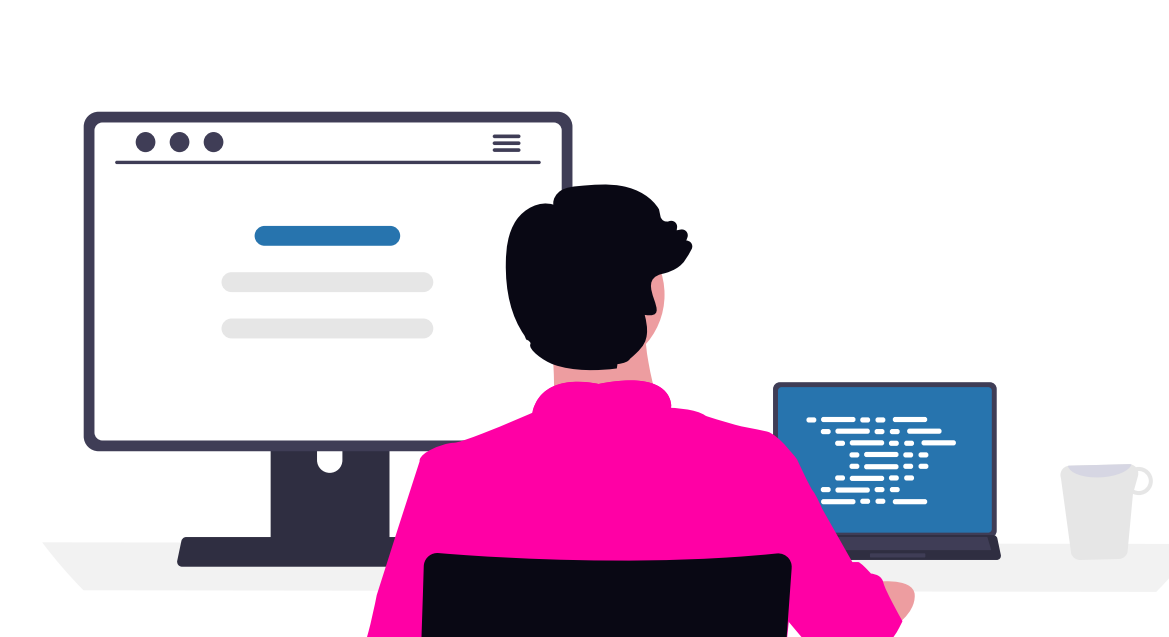
Median time per device call, measured overnight to the UCLA deployment. Even through the Global relay, the overhead per call is faster than a blink.  
an eye blink ≈ 100 ms

## Selected References and Resources

- [1] E. Y. Ge and I. P. Roberts, "RemoteRF: An Open-Source Platform to Democratize Access to Software-Defined Radios in Wireless Research and Education," arXiv:2606.22161, June 2026.
- [2] RemoteRF project documentation: remoterf.net.

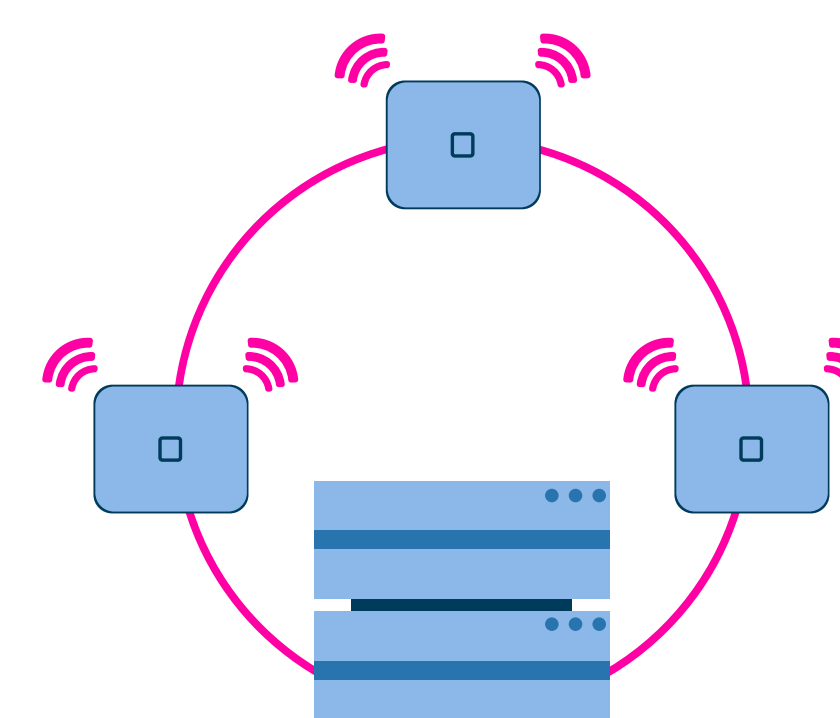


## Why RemoteRF?



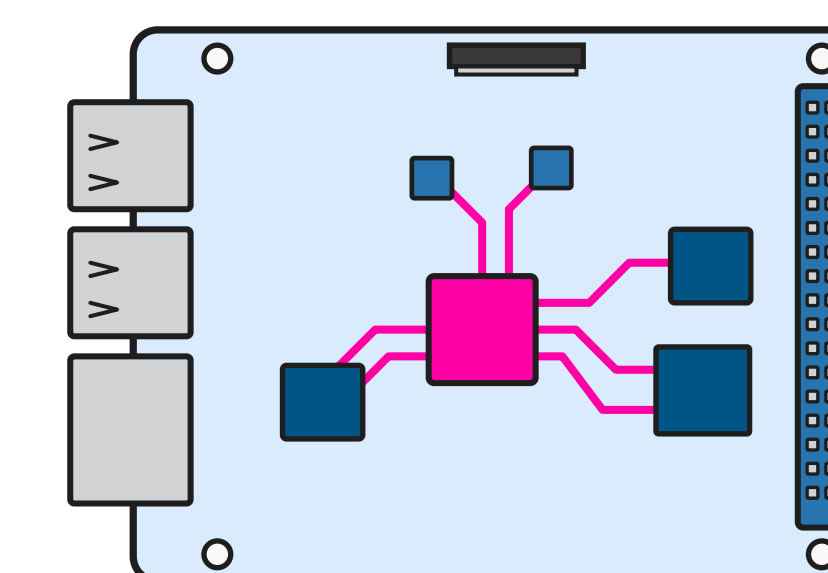
### Anyone, Anytime, Anywhere

Devices are accessible to anyone, at any time, from anywhere with internet access.



### Centralized Control

Add devices in minutes and share them with only your group or the entire world.



### Distributed Lightweight Hosts

Low-cost, single-board computers connect devices to a deployment over the internet.



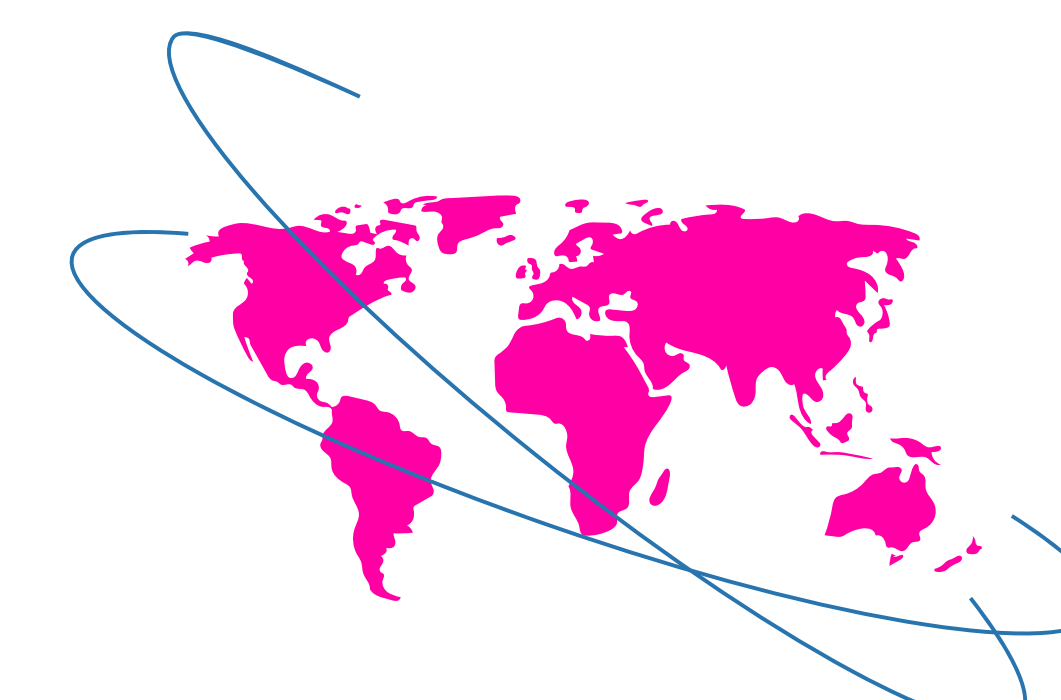
### Dynamic Device Support

Onboard virtually any SDR, radar, camera, or sensor with a simple Python wrapper.



### Safe, Secure, Compliant

Centralized control of transmit power, carrier frequency, bandwidth, and hardware filters.



### A Global Testbed

Deployments can make their devices publicly accessible to anyone across the globe.