

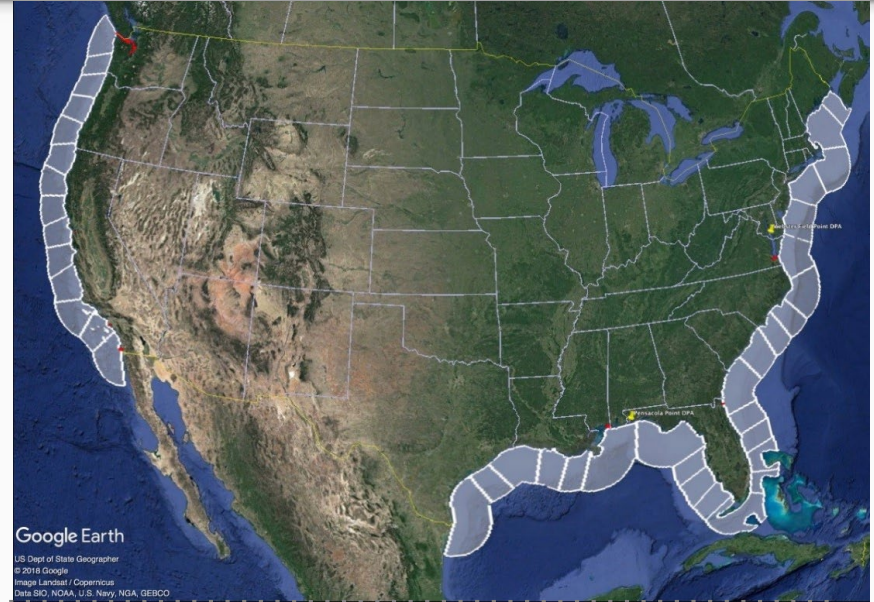
Licensed Shared Access (LSA)
evolution deploying
US CBRS protocols and
sensing the secondary user

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Background

Most spectrum proposals so far either use administrative spectrum assignment information available from the national regulatory authority or carry out sensing in vast areas or at the location of the secondary user.



Fast response

The administrative information must be maintained and it may not be well suited to fast response spectrum use.



Man-made obstacles

The administrative information based interference protection relies on propagation modeling, and in the current spectrum sharing systems the geographic information does not take into account individual buildings or other large man-made obstacles between the primary and secondary user.



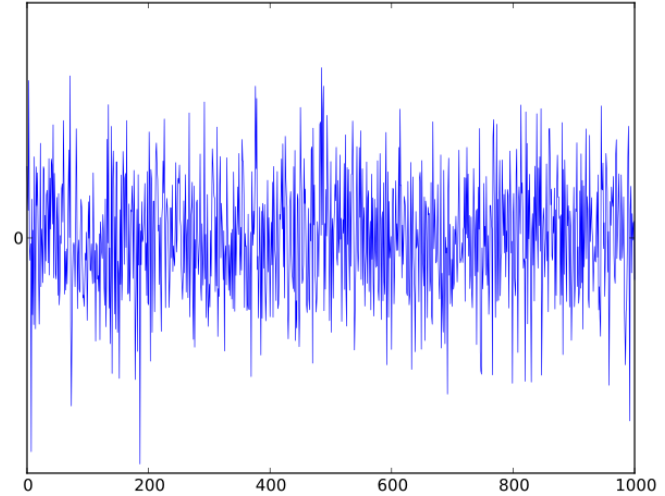
Sensing location

Sensing at another location than in the primary user location introduces error compared to the measurement at the primary user receiver antenna.



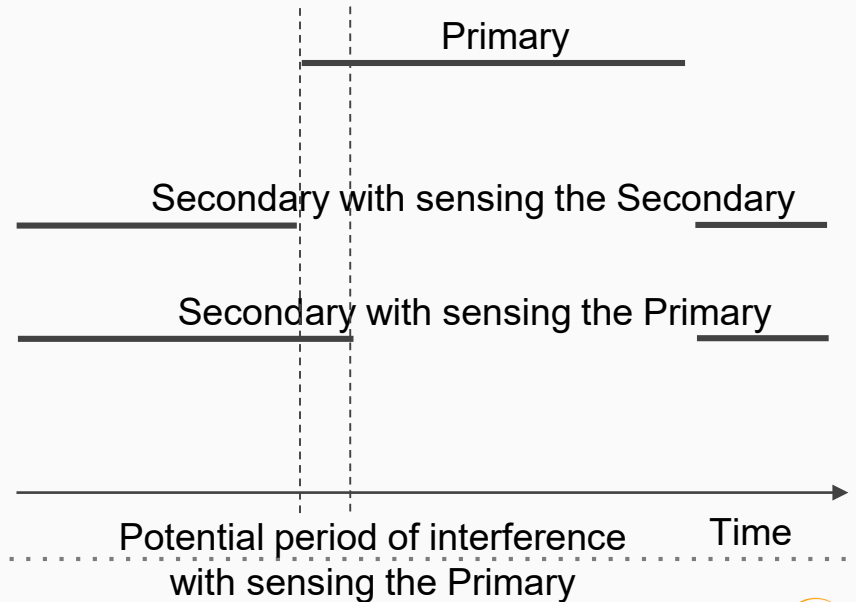
Low primary power levels

Sensing primary user power levels, which are lower or similar as the secondary user power levels, the secondary use may significantly interfere the sensing of the primary signal.



Time perspective

Also from time perspective, it is better to decrease the power levels of the secondary users to non-interfering levels before primary spectrum access begins.



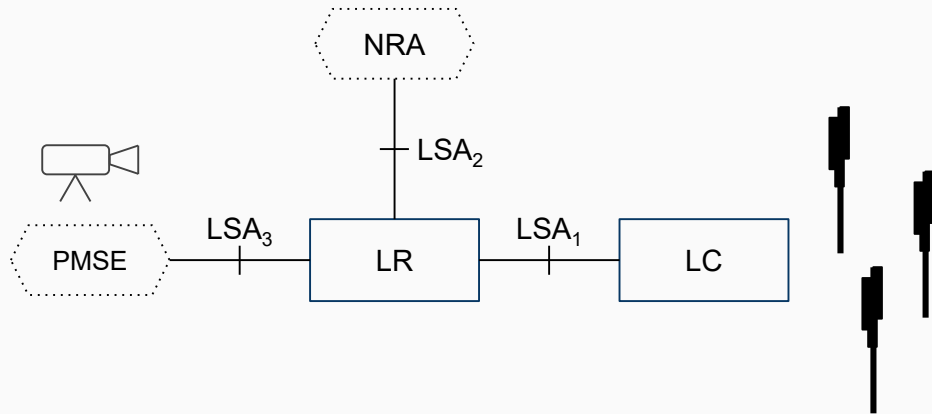


The solution

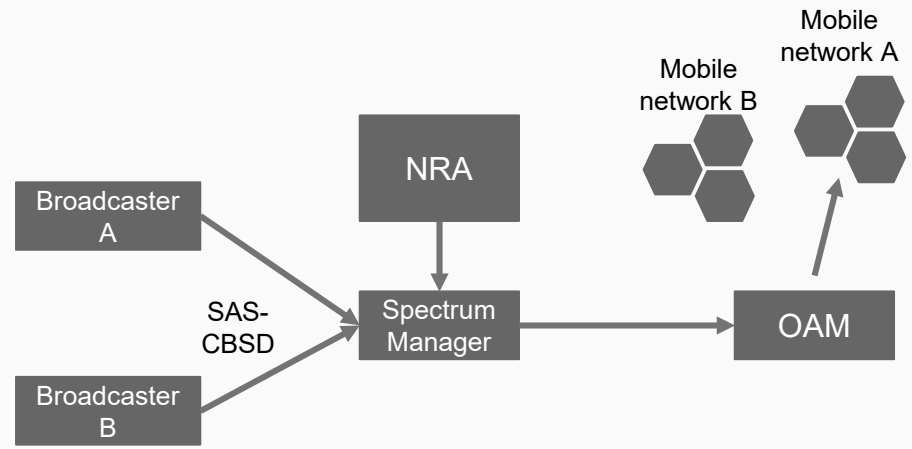
All these issues are solved when the sensing takes place at the receiver antenna of the primary user just before the primary use begins.



In this study, the sensing at the primary user location is tested on 2.3 GHz band where a mobile operator is the secondary user and PMSE wireless camera communication is the primary user.



The actual mobile operators, broadcasters, and national regulatory authority participate in the pilot setup.



The mobile network uses commercial basestations, core network and network management system.

Protocol methods

sm_method_name	JSON Array Name of Request Message	JSON Array Name of Response Message
sensorRegistration	sensorRegistrationRequest	sensorRegistrationResponse
sensorReport	sensorReportRequest	sensorReportResponse
sensorDeregistration	sensorDeregistrationRequest	sensorDeregistrationResponse

Sensor Report

```
{
  "sensorReportRequest": [{
    "sensorId": "5695F6BE-092D-41CE-817F-
393F662B6193",
    "measReport": {
      "rcvdPowerMeasReports": [{
        "nodeName":
"LTE_ID_1",
"measFrequency": 2300000000,
"measBandwidth": 10000000,
"measRcvdPower": -21
      }],
      "nodeName":
"LTE_ID_2",
"measFrequency": 2301000000,
"measBandwidth": 10000000,
"measRcvdPower": -21
    }
  ]
}
```



Sensor Report

```
{
  "sensorReportRequest": [{
    "sensorId": "5695F6BE-092D-41CE-817F-
393F662B6193",
    "measReport": {
      "rcvdPowerMeasReports": [{
        "nodeName":
"LTE_ID_1",
"measFrequency": 2300000000,
"measBandwidth": 10000000,
"measRcvdPower": -21
      }],
      "nodeName":
"LTE_ID_2",
"measFrequency": 2301000000,
"measBandwidth": 10000000,
"measRcvdPower": -21
    }
  ]
}
```



Summary

An aerial photograph of the Arc de Triomphe in Paris, France. The monument is centrally located and surrounded by a bright yellow glow that extends to the edges of the surrounding roads and buildings. The city's dense urban landscape is visible in the background.

Sensing secondary user at temporary location of the primary

- Fast response
- Man-made obstacles
- Receiving antenna of the primary

Future work



Trials