



World's first Licensed Shared Access with Carrier Aggregation pilot
January 2016 – June 2016
Paris, France

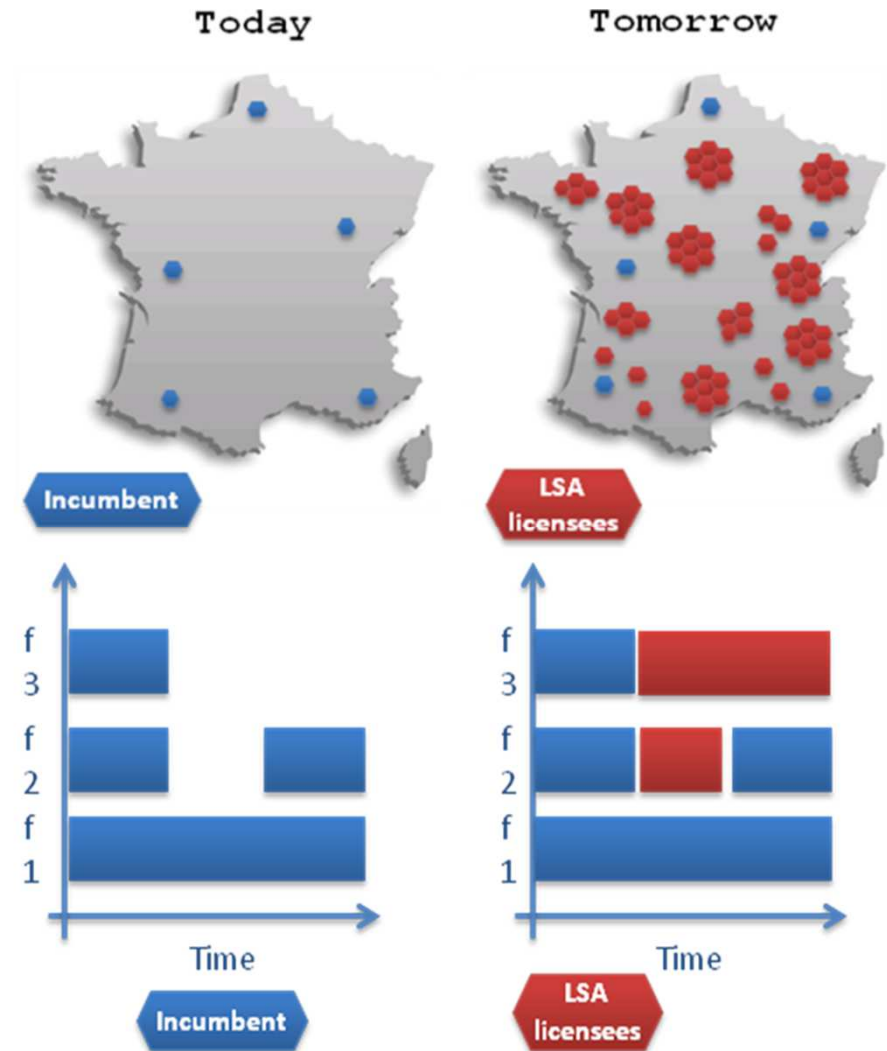
Participants



Fundamentals (1) About Licensed Shared Access



- LSA is a third and complementary way of authorizing spectrum access [in addition to traditional licensed and license-exempt]
- LSA provides new sharing opportunities under a licensing regime, while safeguarding incumbent (Tier-1) spectrum usages
- A key feature of LSA, compared to license-exempt access, is the exclusive spectrum usage among LSA licensees (Tier-2)
- LSA is applicable globally and concepts are technology and frequency agnostic



Fundamentals (2) About the Pilot



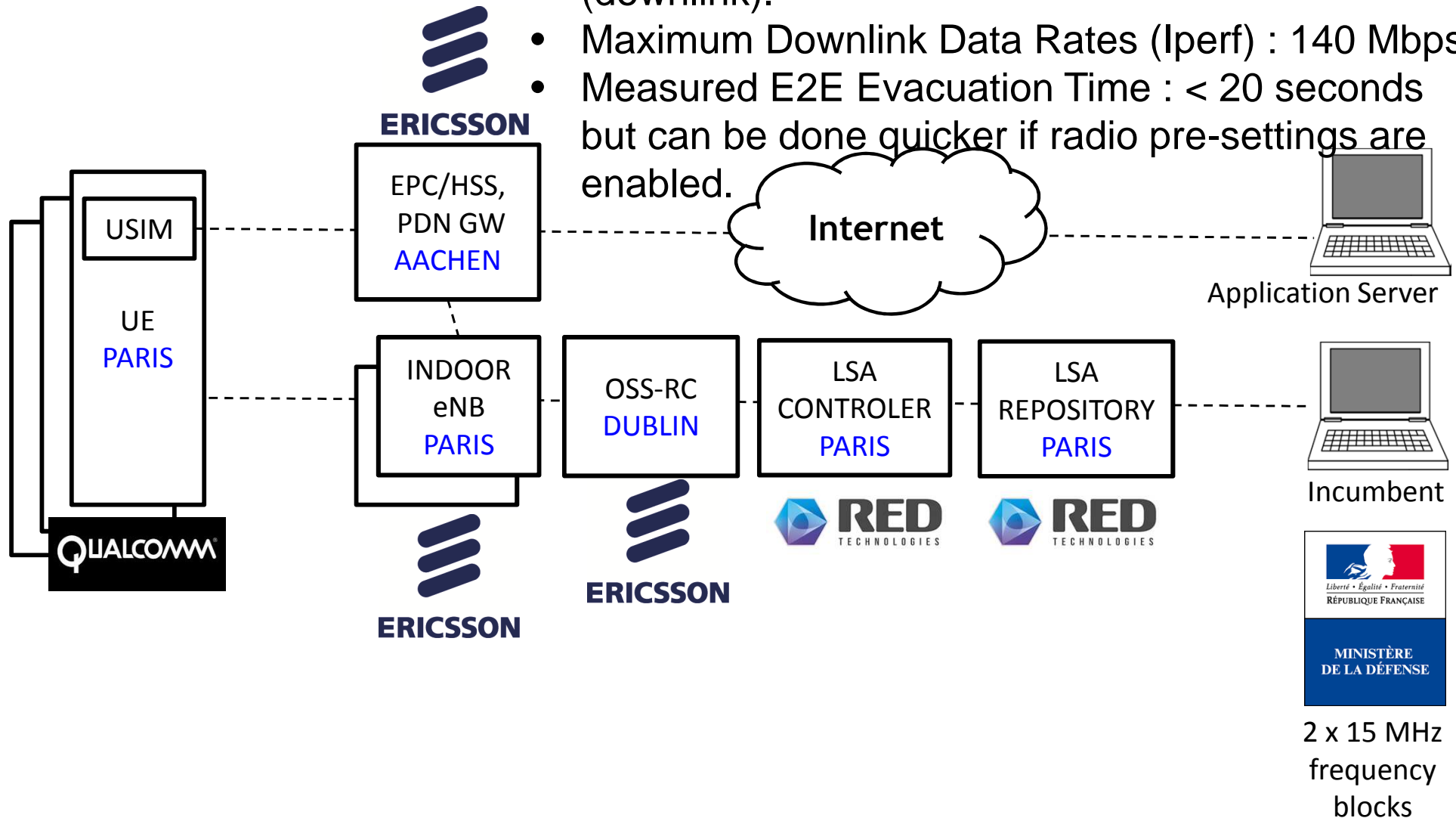
- The LSA pilot uses frequency blocks on **IMT TDD Band 40** (2300 – 2400 MHz)
- The allocation of channels follows E-UTRA Channel Bandwidth per 3GPP TS 36.101 i.e. **2 x 15 MHz**
- The LSA pilot is **operating indoor on-field conditions** with commercial eNBs (Radio DOT™) and User Equipment (equipped with Qualcomm® Snapdragon™ processors⁽¹⁾)
(1) Qualcomm Snapdragon is a product of Qualcomm Technologies, Inc.
- The LSA repository and LSA Controller interoperates through the **LSA-1 interface as per ETSI standards**
- Incumbent spectrum usage is emulated
 - **Governmental Telemetry** protected by **Restriction Zones** (defined by Iso-EIRP limits)
 - **Wireless Camera** and **Tactical PMR** protected by **Protection Zones** (defined by a maximum allowed aggregated received signal strength)

E2E System components & set-up

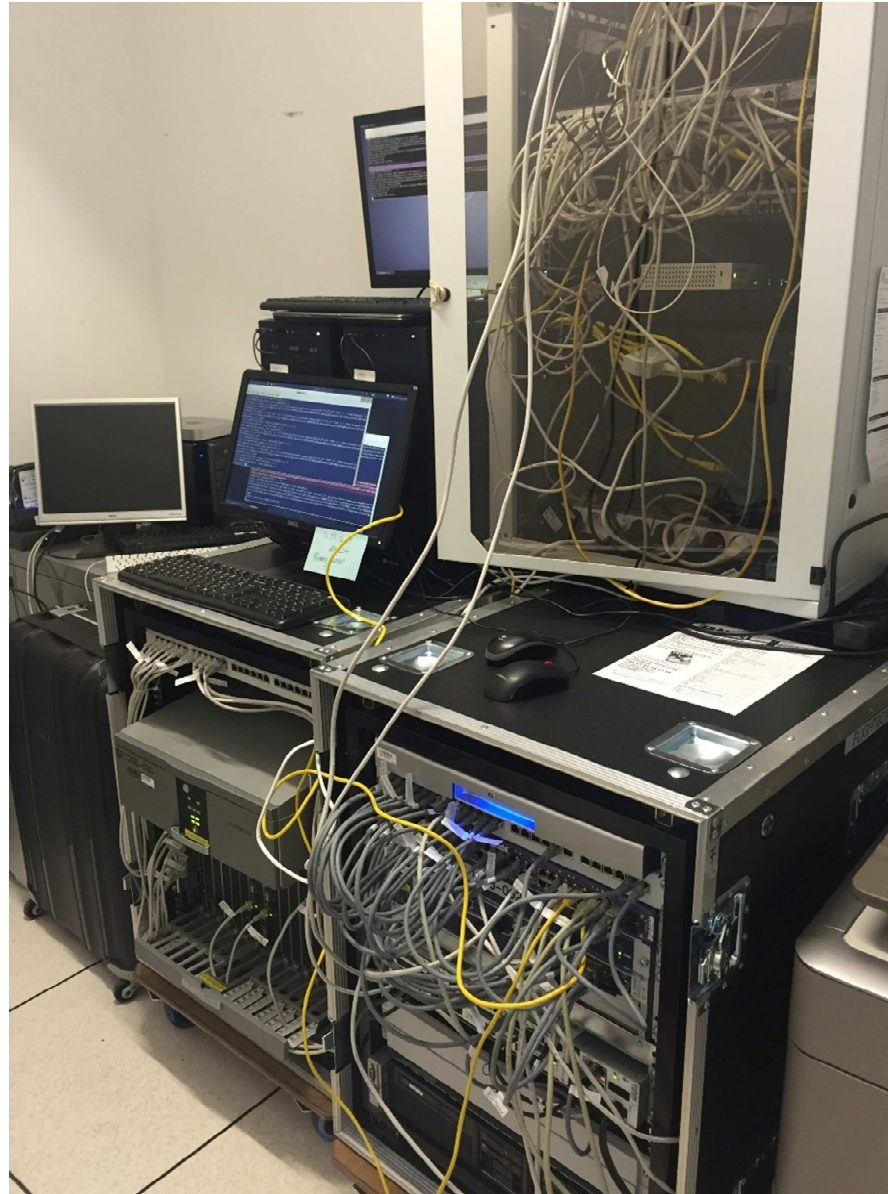


Performance Measurements

- UE CAT (Snapdragon 820) : LTE Category 12 (downlink).
- Maximum Downlink Data Rates (Iperf) : 140 Mbps.
- Measured E2E Evacuation Time : < 20 seconds but can be done quicker if radio pre-settings are enabled.



Pilot test lab at RED Technologies premises

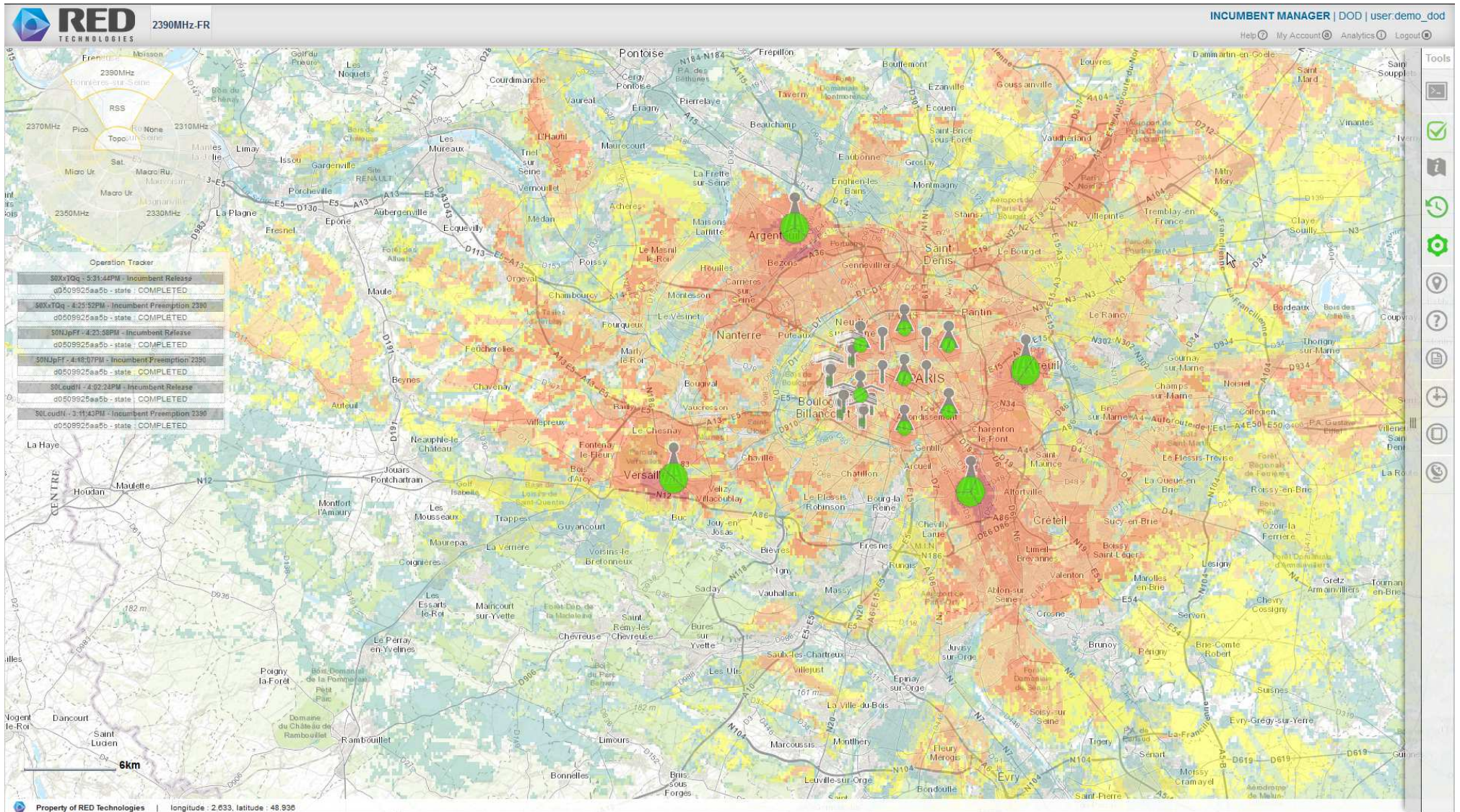


(eNobeBs) Ericsson indoor Radio DOT System

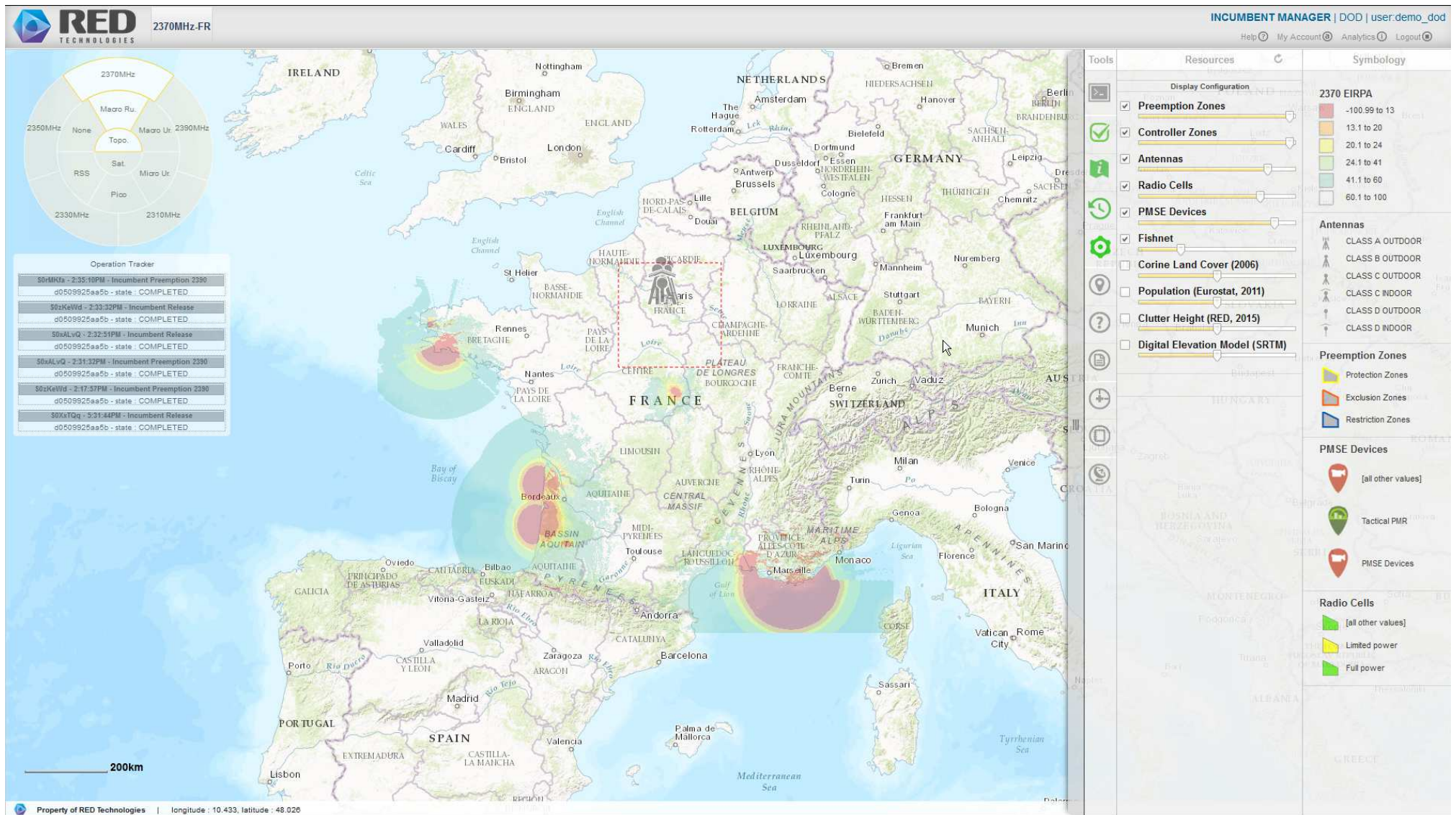


Element	Description
LSA BS Type	Indoor Ericsson Radio DOT System
TD LTE Access	Band Class 40: 2300MHz (2300-2395 MHz)
EIRP	2 x 50 mW
BS Antenna Pattern	Omni directional
Typical cell area per dot	500-800 m ² range (30-50 m distance range)
Bandwidth	2x15 MHz

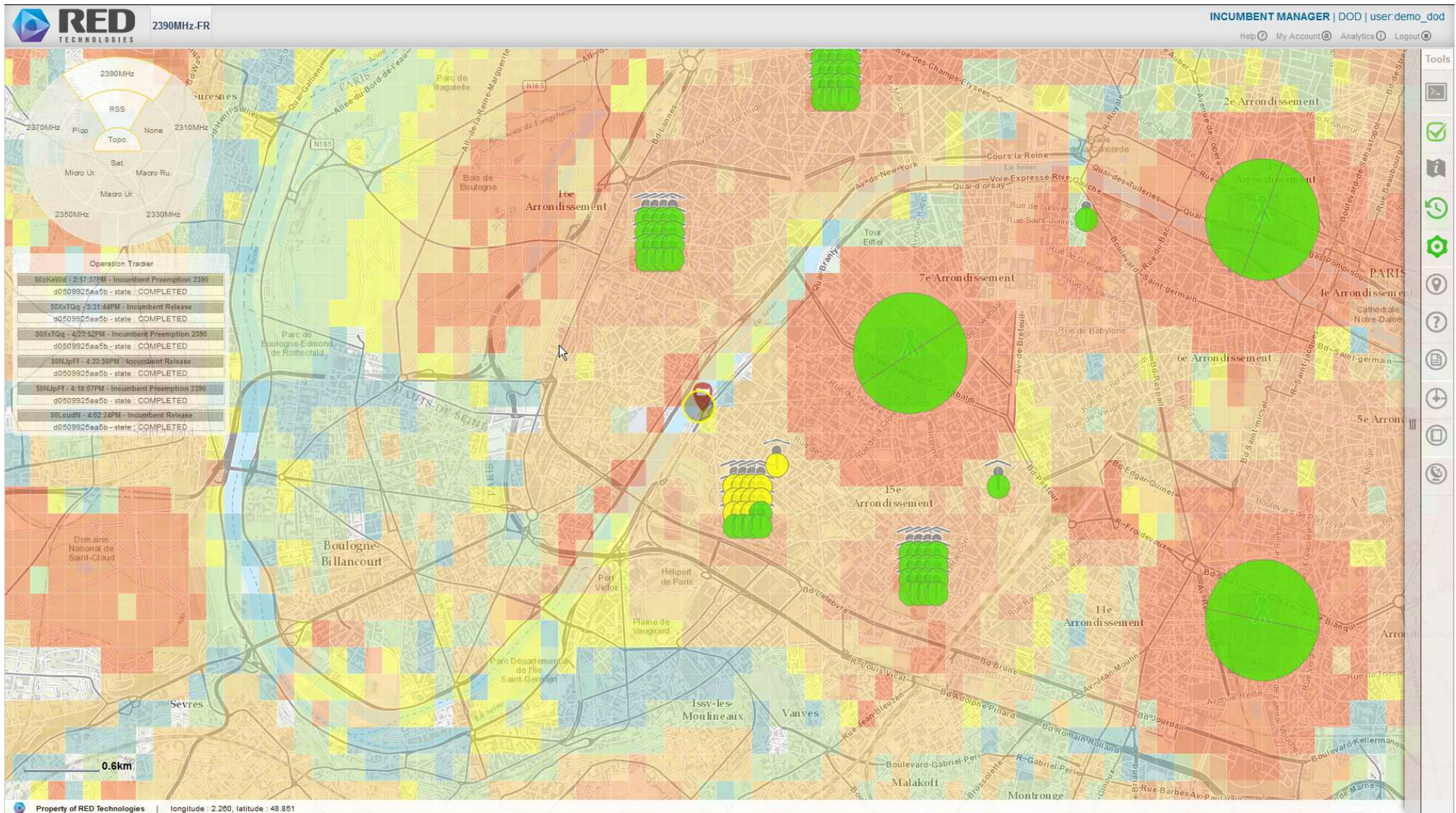
LSA Licensee (Tier-2) LTE Mobile Network



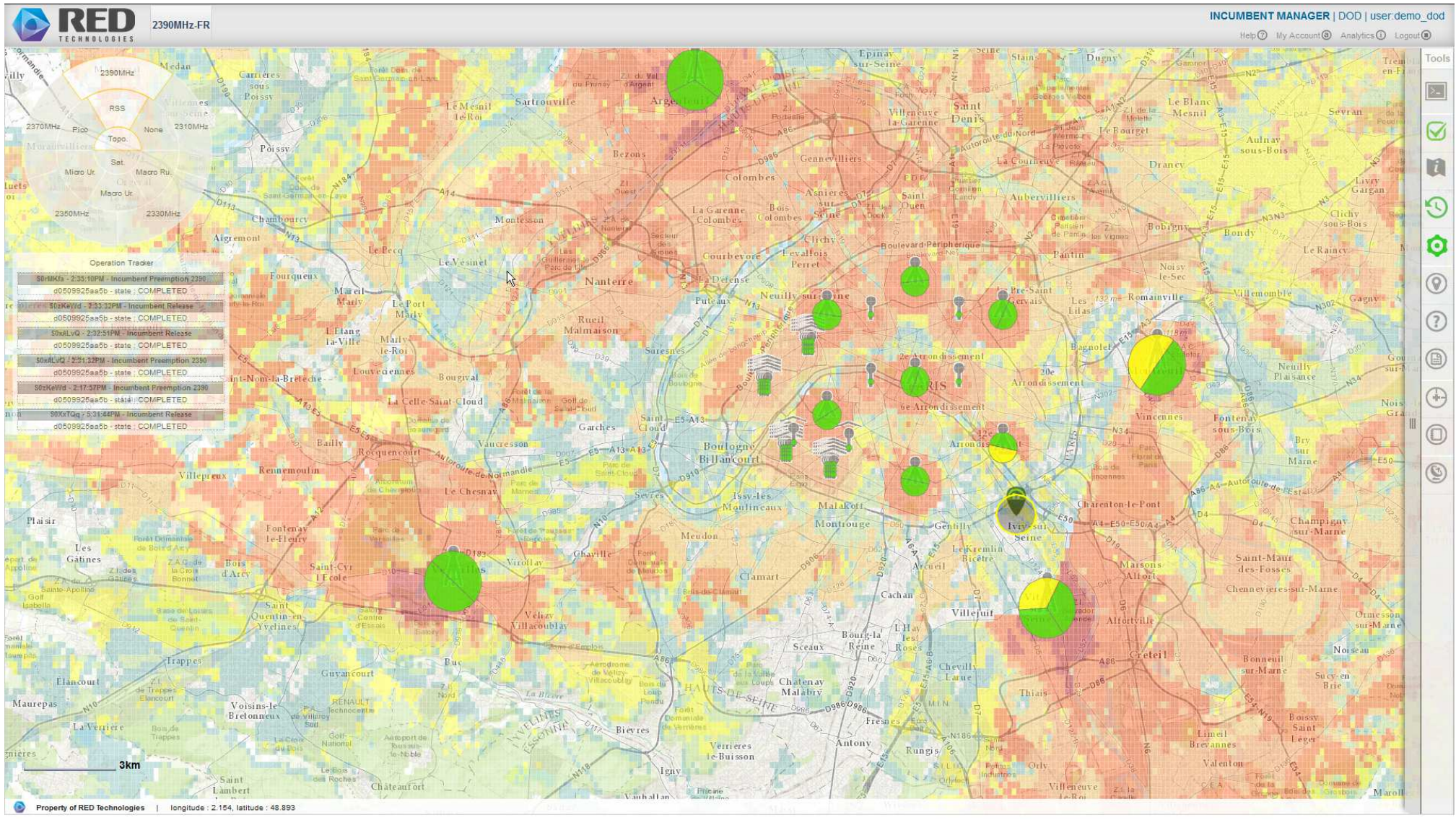
Incumbent (1) Governmental Telemetry



Incumbent (2) Wireless Camera



Incumbent (3) Civil Security Tactical PMR



Results



- It demonstrates a complete implementation of the LSA technology associated with commercial LTE radio and user equipment.

The pilot validated the LSA architecture as defined by CEPT and ETSI and nourishes contributions to standards. Contributions were made based on the experimentation outcomes, and in particular to ETSI TS 103 379, 3GPP TR 32.855, and 3GPP TS 28.302.

- It provides MNOs with an insight into LSA functions through on-site demos.
- It validates timely dynamic pre-emptions to guarantee protection of the incumbent users.
- It validates the association of carrier aggregation with LSA to guarantee service continuity for LSA licensee users.

The pilot went beyond the state of the art as it considers the combination of LTE carrier aggregation with dynamic use of LSA - It demonstrates successfully the complementarity of both technologies.

Takeaway



- RED LSA Repository and LSA Controller easily integrated with Ericsson Network Manager and RAN Radio DOTs.
- It was the 3rd trial on LSA in EU after Finland and Italy; the technology is maturing.
- Intra or Inter band Carrier Aggregation allows for no service interruption (LSA Licensee) when Primary Component Carrier (PCC) is on exclusive frequency block.
- LSA is frequency agnostic and can apply similarly to other bands such as 3.4 – 3.8 GHz or 3.8 – 4.2 GHz
- LSA helps increasing network capacity in spectrum & accelerates spectrum harmonization.
- LSA has no impact on the operator's desired QoS policies and strategies.
- LSA is fully transparent to UEs

Synergies between LSA (EU) and CBRS (US)

■ Synergies between both approaches :

- Similar nature of Incumbents
- Agnostic to Radio Access Technologies
- Easily transposable to other frequency bands
- Implemented through STANDARDS : 3GPP and ETSI
- Incumbent protection : CBRS can be seen as a potential LSA extension :
 - Exclusion zones > zones around sensors vs LSA exclusion zones
 - Protection zones > PPA vs LSA Protection zones
 - Protection are static and dynamic
 - Protection is based on radio propagation computation
- PAL spectrum user vs LSA spectrum user are comparable, because both require a license to use shared spectrum and both enjoy the privilege to be protected against interference
- Benefit from 4G fundamentals such as Carrier Aggregation, Carrier Anchoring, Self Organizing Networks or Neutral Host Network

CBRS referred to the “Citizen's Broadband Radio Service” defined by the FCC and encompasses the band of spectrum from 3550 MHz to 3700 MHz with a 3-Tier Sharing model

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