Creating Value Added Weather and Climate Services through Innovative Public Private Partnerships

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Presentation outline

- Introduction
- Presentation of Telecel-faso
- MWL data processing and Rain estimation
- Example of Rain MAP
- News : RainCell Arica first Workshop in ouagadougou(March 30-31,2015)

Introduction

The African continent is characterized by exponential growth of mobile telecommunications networks after the 1990s.

- Over 40% growth every year since 2000 for Mobile Phones
- With 16 million in 2000, Africa had 500 million mobile subscribers in 2012 for a total estimated population of 1.07 billion, this number is estimated at 600 million subscribers in 2016.
- The total cumulative investment in ýxed and mobile telephony should spend $ 78.8 billion in 2008 to $ 145.8 billion this year, 2015.

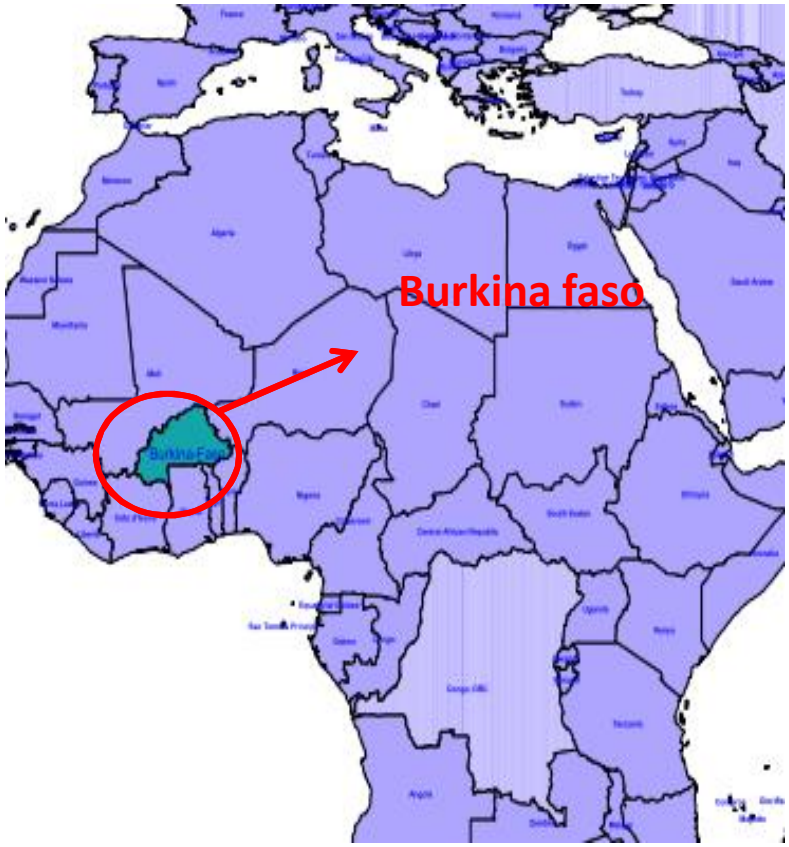
- with more than 200 operators including transnational Mobile Phones (Vodafone, MTN, Orange, Airtel, Moov, etc.) the 2G/3G and 4G services are provided to the subscribers.

- The architectures of networks are NGN / IMS and facilitates the introduction of new services at the application layer. The main providers of telecommunications equipment are: Huawei, Ericsson, NSN, Alcatel, Aviat (Microwave), Ceragon(Microwave) etc.

This development of telecommunications sector in the African continent has opportunity in many domains:

- ❑ Reduction in the banking rate with Mobile Money service
- ❑ Digital Divide reduction, the progression of the teledensity, the access for the Mobile Broadband services
- ❑ The Digital TV signal Transport using the transmission Network and broadcasting on the mobile phone
- ❑ The access to the e-learning, e-government, telemedicine, Remote monitoring of wildlife

Presentation of Telecel-faso

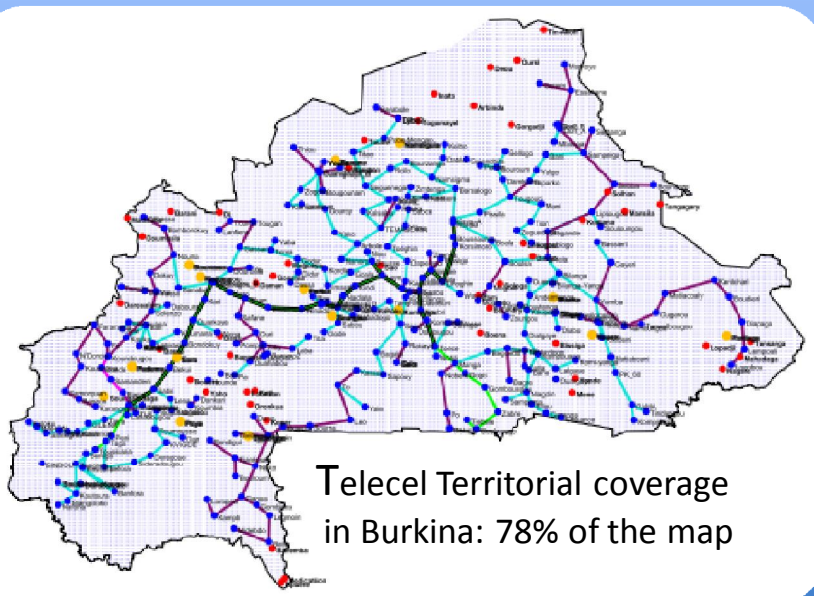


- To beginning, Burkina-Faso is a West-African Country
- Burkina Faso Area:274, 000 Km²
- Population of Burkina-Faso:

17, 402, 958 of persons

Telecel-Faso is a mobile phone company among Temob and Airtel created in 2000. It provides voice and data services to these subscribers. The network architecture is in NGN type. In Burkina-Faso, Telecel has:

Telecel Transmission Network on the Map of Burkina



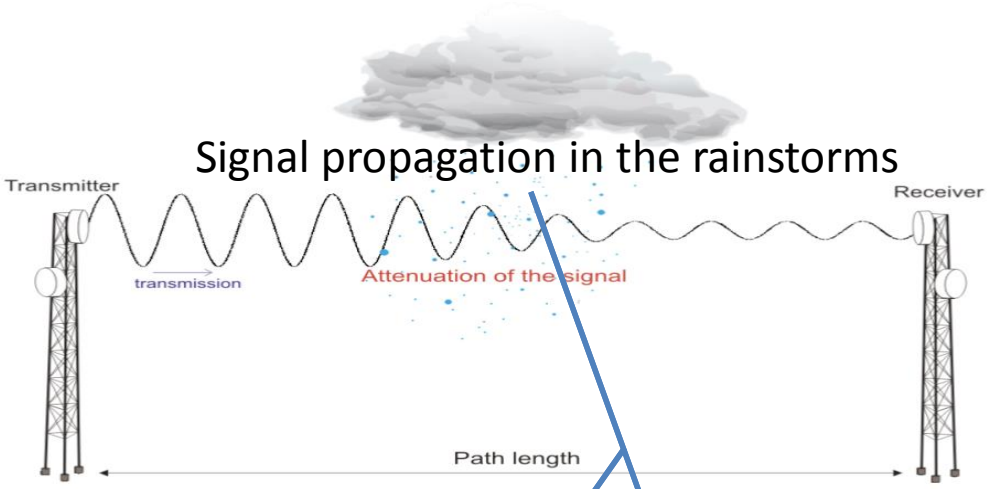
Telecel Territorial coverage in Burkina: 78% of the map

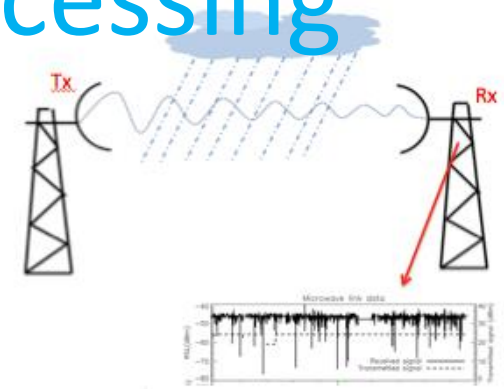
- Number of subscriber: 3000000
- market share: 25%
- Coverage rate: 78%
- MWL frequence use are 7GHz and 13GHz

During The last years, Telecel has collected the microwave link node data for LAME after a partnership

Microwave link

Microwave data processing

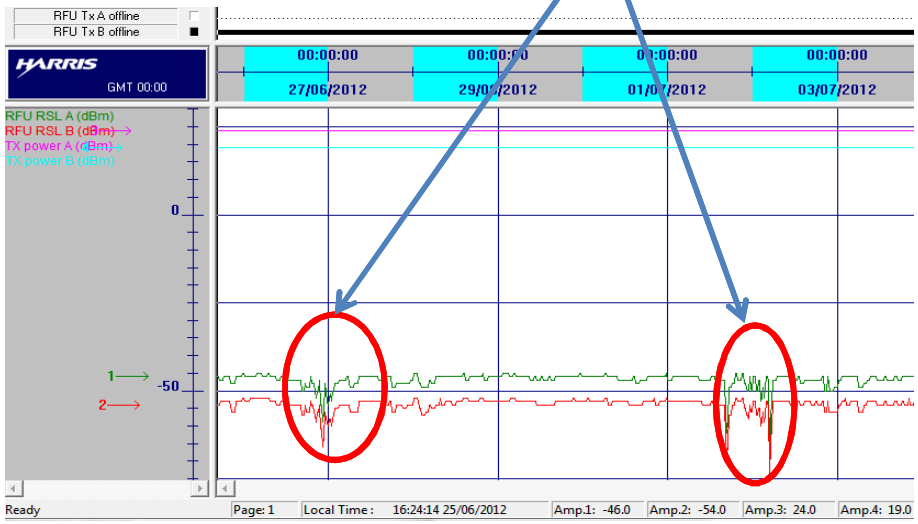




1/ Received signal level (RSL)

2/ Detection of attenuation by rain

3/--- >>> Rain Measurement !



Measuring Rainfall thanks to the data available through the cellular telephone network

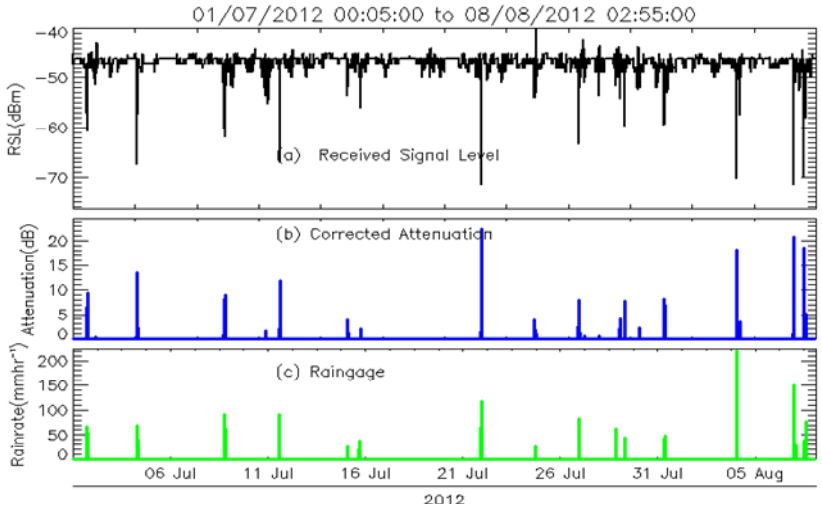
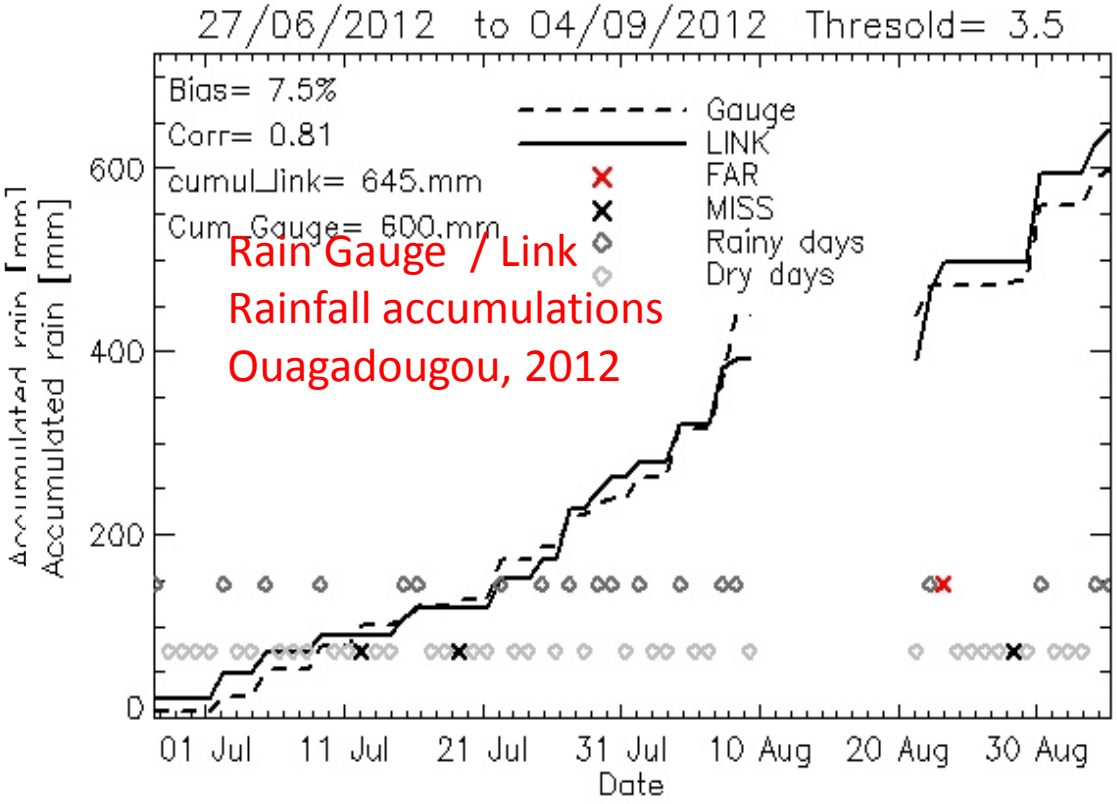


Figure 1 : **(a) Received minus Transmitted Raw Microwave Signal level. (b) pat attenuation due to rain. (c) rain rate time series from the gauge situated below the link.**

Rainfall detection

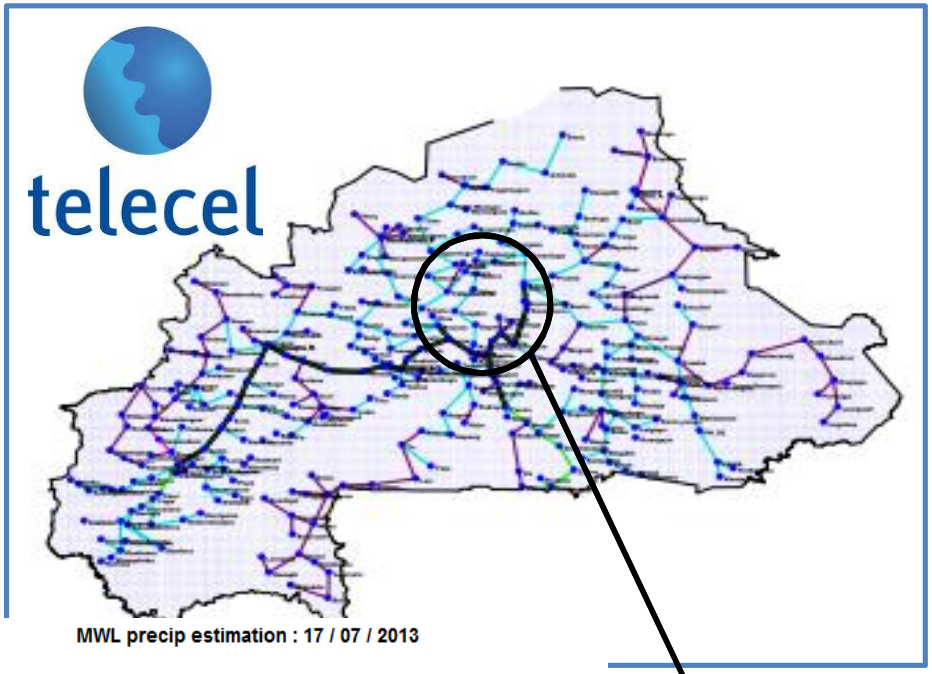


What has been demonstrated thanks to Ouagadougou test bed :

We are able to detect and quantify daily rain with good precision :
-Excellent agreement with the rain gauges (correlation 0.8 for the whole season)
-Probability of detection = 95 % !
-Better or as good as satellite rainfall products !

We are able to provide rainfall at very fine time step (5 min !)

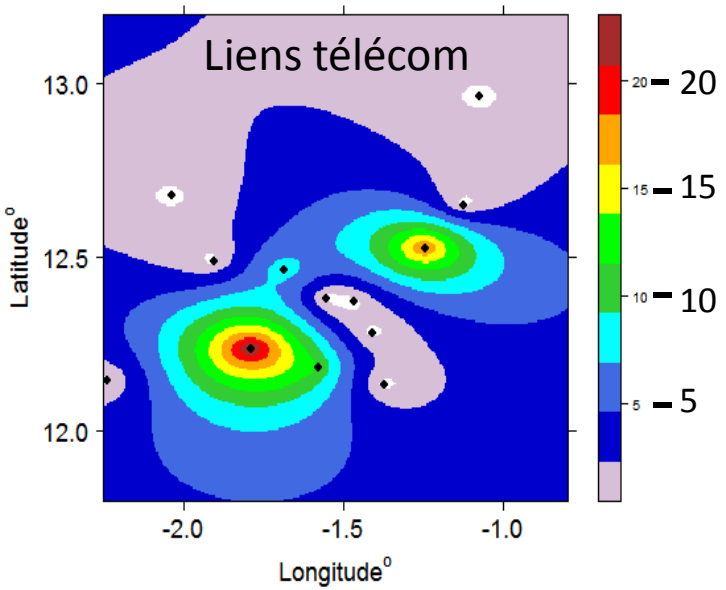
Example of MWL rainfield MAP

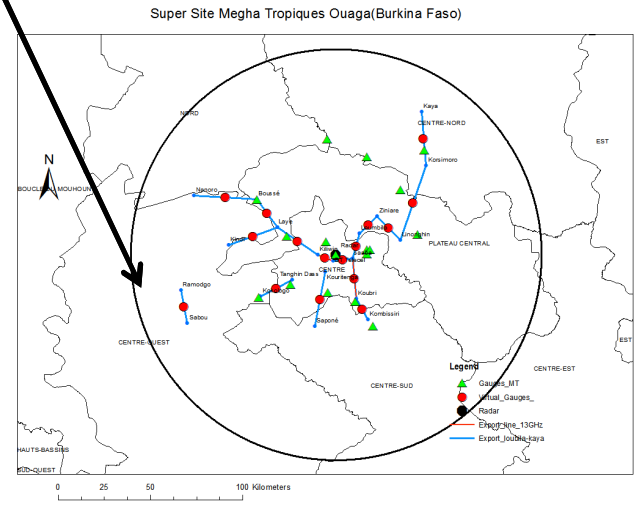


Next step : Rain Maps !!!

-Country wide Rainfall maps

-Fine scale maps over urban Ouagadougou





Partnership with Mobile Telephone Companies

- The processing and the broadcasting of the weather and climate information using the mobile telephone companies requires a win-win partnership

1er workshop international Rain Cell Africa

Ouagadougou
Burkina Faso

30-31 march 2015

Your participation is welcome !

Rain Cell Africa
1rst Workshop
1rst Training School

Rainfall Observation Using Commercial Microwave Links in Africa:
First results, Methods and Prospects.

The *Raincell Burkina Faso* Consortium (IRD, Univ. of Ouagadougou and WASCAL) and partners invite scientists and stakeholders interested in Climate and Water Resources to join leading researchers in the field of precipitation estimation and applications for a workshop. The workshop will discuss current issues in measuring rainfall in West Africa and will introduce a new technique to quantify rainfall with commercial microwave links and discuss its potentials for West Africa. The two days workshop will be followed by a training school where young scientists will learn more details about the method and will get some practice on test data sets.

Contact us by mail : raincell01@sciencesconf.org
And check latest info on : http://raincell01.sciencesconf.org/

WASCAL

Learn more :

Doumounia, A, M Gosset, F Cazenave, M Kacou and F Zougmore, 2014 ; Rainfall Monitoring based on Microwave links from cellular telecommunication Networks: First Results from a West African Test Bed. *Geophysical Research Letters*, 10.1002/2014GL060724.

Press articles :

Washington Post :http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2014/09/04/another-milestone-toward-making-cell-phones-the-future-of-weather-observations/

Science News :
https://www.sciencenews.org/article/cell-phone-towers-monitor-african-rains

AGU blog and spotlight :
http://blogs.agu.org/geospace/2014/07/24/dropped-cell-phone-calls-become-rain-gauges-west-africa/