

***FranceTelecom R&D***  
***White paper on sat+wifi experiment***

**Bernadette VILLEFORCEIX**

**FranceTelecom R&D**

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## **"High speed internet for eveyboby"**

These experimentations have been started according to the program launched in 2003 by Thierry Breton, CEO of FranceTelecom, to provide high bit rate access to "white areas" where ADSL is not present.

### **Introduction**

SAT+WiFi experimentations in rural environment

This white paper describes a bi-directional broadband access composed of a satellite link coupled to Wifi access developed by FranceTelecom in order to provide high bit rate access to areas not covered by terrestrial ADSL technologies.

About 10 experimentations have been launched in France in rural environment, providing IP access by sharing an IP satellite access in a village through a Wifi distribution. The aim of these experimentations is to provide service cost and performance comparable to terrestrial technologies for both forward and return link.

The following features of the architecture will be presented : service offers, partnership, equipment, network structure, security and supervision.

### **Commercial service offers** : 2 possible rates

The internet access service is available in 2 offers : 128/64 and 512/128Kbps (Fwd link/Rtn link bit rate). These two offers are targetered for residential, SOHO customers and also for enterprises and public institution.

<b>Forward Link</b>	<b>128</b>	<b>512</b>
<b>Return Link</b>	<b>64</b>	<b>128</b>

The service is composed of a classical internet access (web browsing, e-mail ...) and also of specific local community services dedicated to :

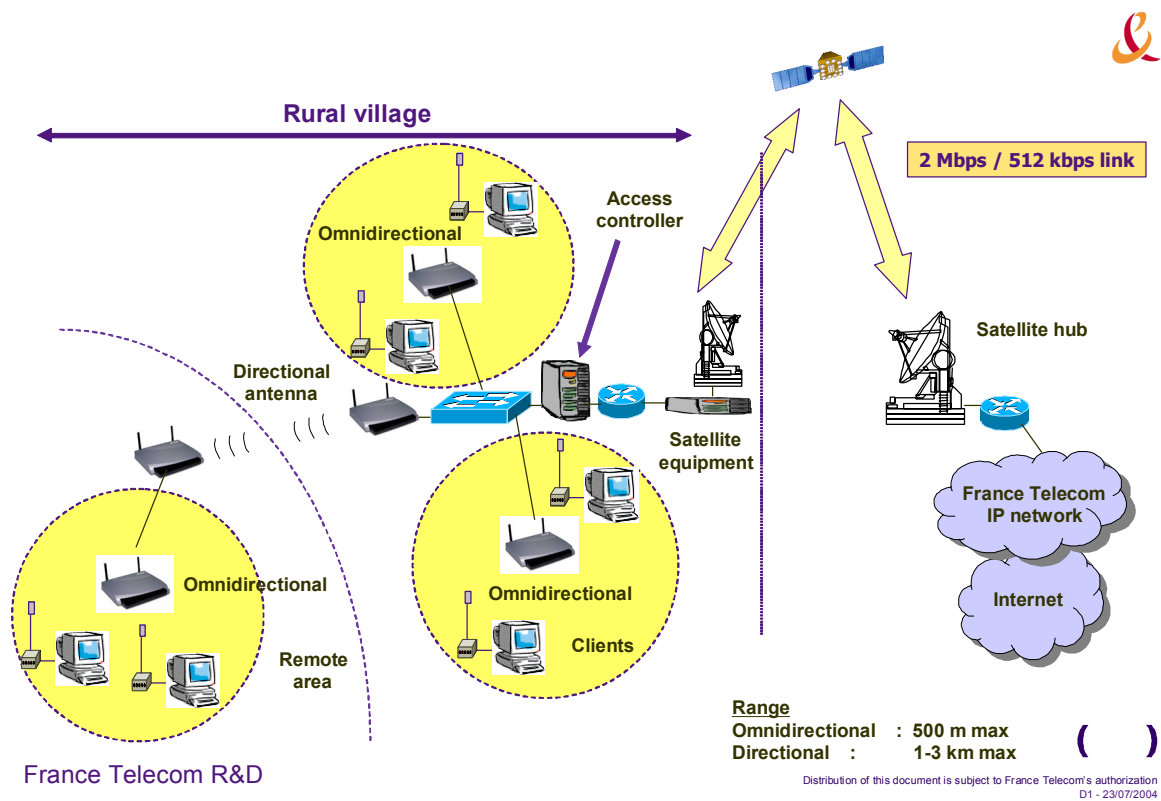
- send messages in a community as post it messages on a board
- inform community in a broadcast scheme through a service of events notification
- discuss in a forum to exchange opinion on the experimentation

All these services are available via an internet portal.

### Experimentation presentation

The targeted customers of the experimentations in rural environment are residential customers, local collectivities, small and medium size companies.  
The deployed network architecture is composed of a high rate satellite access coupled to a Wifi infrastructure to cover a wide area in a village; several access points form a distributed network linked to the interactive satellite terminal to provide broadband access.

The network architecture is presented in the following figure.



### Overview of the architecture

Deployment of the architecture consists in installing a high bit rate satellite access in the village. Behind the satellite link, a WiFi infrastructure is set up to cover several areas.

Actually, in rural environment, there is a need to have an extension of WiFi access points because some customers are located out of coverage of the access point. The solution for solving this technical problem is to install WiFi bridges to extend the connections to distant users.

A first area is covered by an access point located near the satellite terminal; an extension of the AP is set up by a WiFi bridge where directive antennas allow middle distance connections (a few kms).

At client side, the customer premises is connected to an adapter Wireless/Ethernet so that an individual customer can plug in his computer to the adaptor or in case of small size enterprises, a private LAN or wireless LAN is connected to the distributed WiFi network through a router .

### **Network equipment**

Behind the satellite terminal, a Wifi distributed network composed of access points and bridges are connected to a router, an access controller and a switch to provide internet connection to customers.

Access points serve end customers and bridges perform linkage to the satellite terminal.

The switch connects the access points, the access controller allows to switch authentication requests, assign IP address and manage bandwidth and the router manages address translation between satellite terminal and local part of the network.

### **Security**

Internet network access at client side is performed by authenticating on the controller in secure HTTP connections, the controller supports S-HTTP for that task. HTML documents are individually marked with certificates.

On wireless radio links, security is done by using WEP (Wireless Equivalent Privacy) , waiting for a new secure protocol WPA (WiFi Protected Access) to be activated. This new solution is based on the TKIP code and will be used in both access points and customer equipment.

### **Administration**

In case of malfunction, the maintenance center has the capability to test links as far as the router/access controller behind the satellite terminal, by establishing terrestrial connections, HTTP or telnet, to the failure equipments.

### **Enhancement activities**

Several tracks are led to improve the overall performance of the satellite internet access :

- security with the integration of WPA
- connection optimisation for efficient utilization of the satellite bandwidth
- improved management of the network by integrating terrestrial and satellite architecture in terms of IP address allocation and authentication.
- optimisation of the target architecture to reduce cost of high speed access for prosumer/residential market.

**Use cases**

The principal feedback of the experimentation is the important volume of traffic on the return link manily due to peer to peer applications. The consequence is that the ratio between forward and return link is practically symmetrical and this involve the integration of mechanisms in order to have a fair management of the satellite bandwidth.