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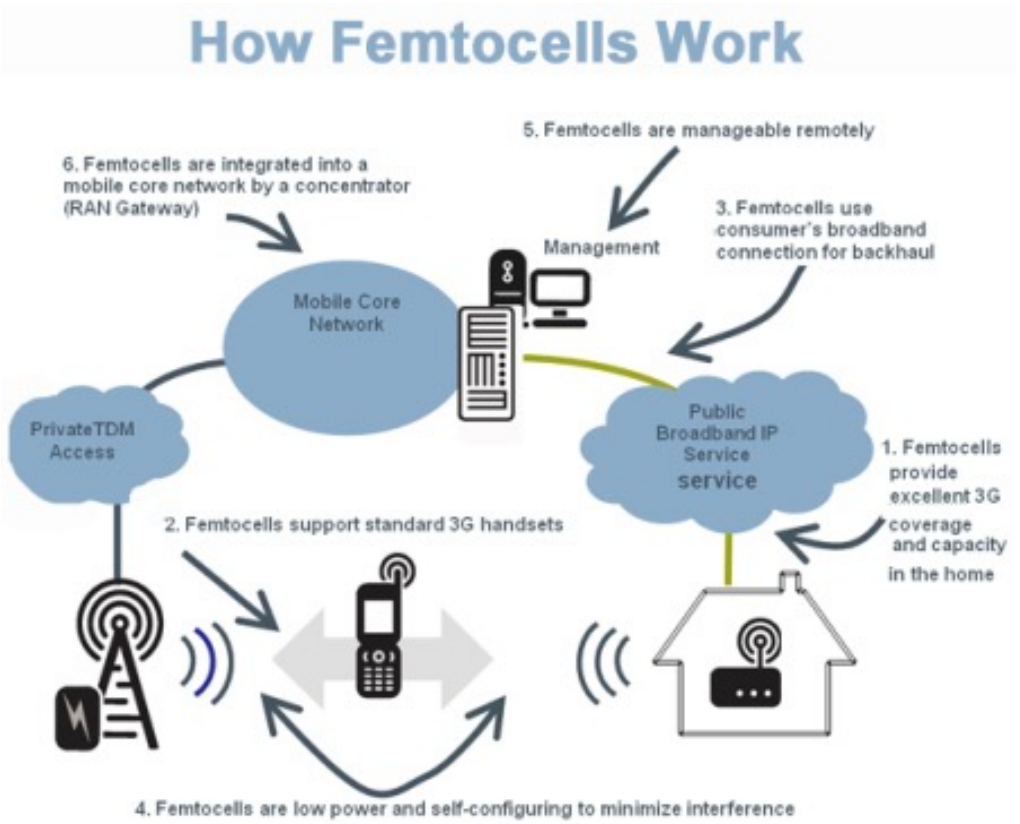
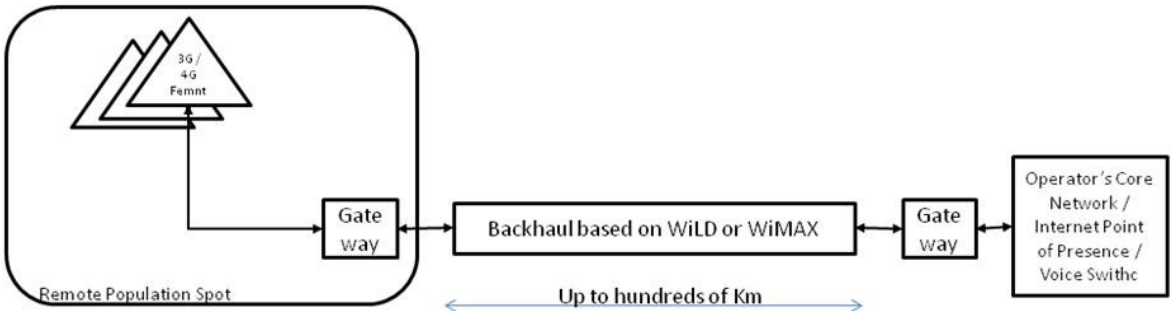
Connecting the Jungle and Other Remote Parts of the World

The modern world is mobile and connected. That is, you can always text or make a phone call to someone with a cellphone. However, this rule might not apply to some truly isolated and rural areas, such as the Amazon jungle, which is inhabited by small and low-income populations. Those areas lack the most basic facilities for signal transmission. Because of the high costs of building classical access and backhaul infrastructures, the cellular companies usually tend to overlook these areas.

To fill this void, European Union's TUCAN3G project is bringing 3G wireless service to previously unconnected regions of the world. It's simple, cheap yet powerful. The TUCAN3G solution utilises new wireless technologies to create access networks based on 3G femtocells. Femtocells are small, low-power cellular base stations that act as repeaters capable of boosting signals. The femtocells work via solar energy, thus eliminating the need for costly energy infrastructures that are simply not feasible in remote areas. For instance, installing a classical access station could cost upwards of EUR(euro) 40 000, whereas a femtocell can be bought for just EUR 500. On top of this, femtocells are easy to install and can be maintained with a simple reconfiguration performed remotely.



To be more technical specifically, TUCAN3G proposes a scenario where the wireless access network consists of distributing multiple 3G femtocells with a wireless backhaul over given rural areas. On each of these areas, a gateway will be in charge of linking the transport and access network segments, along to properly design the transmissions over the wireless backhaul, which are performed with a different Radio Access Technology (RAT), like WiFi or WiMAX. Provided a reliable transport network, femtocells guarantee all the requirements of rural communications deployments: being inexpensive, sustainable, energy efficient, self-organized and long-term self-sufficient.



Backhauling is a very important part for 3G femtocells. The successful operation of 3G femtocells in remote areas is conditioned by the availability of low-cost backhauling that meets certain requirements. The transport network proposed in TUCAN3G for connecting the femtocells to the core operator's infrastructure may be a rural WiLD (WiFi over Long Distances) network, a WiMAX network, or even a hybrid network with either of those technologies and a satellite communication link.This transport network needs to be optimized to meet all the requirements imposed by the access network (availability, bandwidth, maximum delay, etc.) with minimum resources. The advantage of TUCAN3G is directly due to the efficiency and low cost of the transport network because femtocells in remote areas are expected to generate low incomes to the operator.

TUCAN3G proposes 3G technologies to provide mobile voice service to rural areas, while 4G technologies will also be a matter of study in order to know how TUCAN3G concept will evolve beyond the lifetime of the project. For now, the project only provides voice and limited data-connectivity, while high-speed data-connectivity can be achieved with 4G technology. When the traffic demand increases, larger volumes of data traffic are an issue and 4G technology becomes affordable. In the future, the project might be named TUCAN4G.

To technically prove the feasibility of this project, the project chooses a very remote part of Amazon rainforest as its demonstration platform. It installs the femtocells in six villages along the banks of Napo river. Using the femtocells, the locals are able to communicate with relatives and negotiate the price of crops they are selling.

However, until now, the femtocells are only limited to a small range. The villagers can not make phone calls to the outside world. To overcome the limit, the project convinced local governments to support the development of small, mobile rural operators connected to the Telefonica backbone(a Spanish telecommunication company), thus ensuring ongoing connectivity for the villagers. Furthermore, a South American development bank has committed over EUR 700 000 towards expanding the program to another 15 villages.

Perhaps the biggest achievement of this project is to show the development of sustainable, long-term cellular solutions for remote villages with less than 250 residents is economically viable. The potential of the TUCAN3G project is huge, both commercially and technologically. Maybe one day, this project will bring the real universal connectivity.

Works Cited

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