

The Wi-Fi opportunity: Broadband Wireless Access in developing countries.

Alberto Escudero-Pascual
Royal Institute of Technology, IMIT
S 164 40 Stockholm, Sweden
aep@it.kth.se

One of the roles of the Institute of Electrical and Electronics Engineer (IEEE) is to promote industry standards. The participation in the IEEE standardization processes is open to any individual with independence of their industrial affiliation. The aim of IEEE Standards is to represent a broad “consensus” adopted among different industry vendors and academics in how to implement different technical solutions. One of the motivations behind open standards is to lower the costs of production by expecting a widely mass adoption of a certain technology while guaranteeing interoperability between different vendors.

The IEEE approved in 1997 the first of a family of the Wireless Local Area Network (Wireless LAN) standards. The first standard, IEEE 802.11, was soon followed by another IEEE standard called 802.11b in 1999. In order to guarantee interoperability between different implementations of the IEEE Standard 802.11 a new organization called Wireless Fidelity (Wi-Fi) was also launched.

The IEEE Standard 802.11b was designed to operate in an indoor environment and to deliver a maximum of 11 Mbps using a technique called Direct Sequence Spread Spectrum (DSSS). The standard operates in 2.4 Ghz, in the frequency range that is normally allocated for experimental the Industrial, Scientific and Medical (ISM) radio band. The ISM Band is often unlicensed which means that it is not required to obtain a license from the national government to operate the radio equipment under certain power restrictions.

Although it was initially conceived as a short range, low power wireless technology for indoor use, it took very little time to see WLAN-based products in point-to-point (PtP) and point-to-multipoint (PtMP) outdoor solutions in metropolitan area networks (MAN) and rural areas.

The possibility of using Wi-Fi to carry backbone Internet traffic, including data and voice, at very low cost in comparison with the existing traditional telecom equipment drove vendors and users to find innovative approaches to overcome the IEEE 802.11b native problems in outdoor environments. In very short time, different vendors have already added extensions to the protocol to overcome the lack of performance in some particular scenarios (e.g. hidden node, small packets size in Voice over IP (VoIP) in radio links).

The Wi-Fi-based solutions are spreading in the same way that happened with the revolution of the open standards and the personal computer some twenty years ago. The truth is that while Wi-Fi is far from being the best radio technology for long distance point-to-multipoint radio links, Wi-Fi represents to the radio what the open architecture represents to the personal computer. The reasons for the fast growing of IEEE 802.11b as part of basic data infrastructure in both develop and developing countries can be found in: the low cost of the radio equipment due to its mass production, the possibility of an easy integration with personal computers and operative systems, the existence of a certified interoperability between vendors (Wi-Fi) or the possibility of finding a very favorable regulatory framework in comparison with other radio technologies and related services.

When with less than 1000 USD it is possible to link two villages situated 10 kms from each other and provide both data and voice services, Wi-Fi is not only bringing new technical opportunities at very low cost but it also challenging the traditional telecommunication markets and its regulators.

Examples of Wi-Fi projects

Sweden

The non-profit organization Nora-Wireless is connecting Ås school with the town of Nora using a 8 kms dedicated radio link. <http://www.nora-wireless.org>

Vietnam

The Ministry of Science and Technology (MoST) and the Royal Institute of Technology (KTH) with the support of the Swedish International Development Agency (SIDA) are using Wi-Fi to connect different research institutes with the Vietnamese Scientific Network (STENET) in Hanoi. <http://csd.ssvl.kth.se/~csd2003-team3>

Laos

The National University of Laos (NUOL) and the National Agriculture and Forestry Research Institute (NAFRI) connect to each other using a Wi-Fi dedicated radio link in the city of Vientiane. <http://csd.ssvl.kth.se/~csd2003-team1>

About the author

Dr. Alberto Escudero-Pascual is researcher at the Royal Institute of Technology since 1999. In 2002 he obtained his PhD in the area of privacy in the next generation Internet. Since his arrival to Sweden, Escudero has been involved in design and deployment of different wireless initiatives including the KTH/SU IT University wireless infrastructure(2000), a broadband wireless access in the city of Nora (2001), the neutral access network StockholmOpen (2002) and lately in two wireless projects in Laos and Vietnam (2003) with the support of the Swedish International Development Agency.

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