Freedom of information builds up in an open and affordable network infrastructure

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The Organization for Security and Co-operation in Europe (OSCE) includes in the Helsinki Final Act of 1975[1] a set of guiding principles between participating states in the area of Freedom of Information. In the Act, the participating States commit to respect human rights and fundamental freedoms, including the freedom of thought, conscience, religion or belief, for all without distinction as to race, sex, language or religion.

As part of the Helsinki Final Act and followed later by different agreements in summits and meetings, the participating States made their aim to facilitate the freer and wider dissemination of information of all kinds and work for the improvement of circulation of oral, printed, filmed and broadcasted information.

The work of the OSCE's Representative on Freedom of the Media focuses on specific cases of violations of freedom of expression and identifying problems that are characteristic of more than one state, such as, for example, censorship.

For historical reasons the work carried by the OSCE has concentrated in the improvement of working conditions for journalists and traditional media as radio and television. But, with the growth of Internet as a set of interconnected transport media and services, a new space for the dissemination of information is also growing. At the same time that traditional media needs to adapt to the challenges of a more decentralized technology, traditional approaches to combat censorship and promote freedom of information should also be reconsidered.

The Internet that is commonly simply described as *"a network of networks which transmit messages to one another using a common set of communications protocols"* has, among others, the property of being designed based on an "open architecture" model. In the Internet the content (applications) is separated from the transport medium via a logical layer (TCP/IP). By contrast with traditional broadcasting media, the content delivery is completely dissociated from a broadcasting schedule and applications work with independence of the transport media.

What it seems as a simple property in a technical design [2] it leads to a set of complete new scenarios. Traditionally, by controlling (licensing) the use of a certain transport medium, controls were applied to the content. For example, radio stations or newspapers were required to obtained licenses to broadcast certain type of content and the content could be monitored closely as it was broadcasted geographically in a certain time.

As a result of this transformation, similar controls want to be applied to the "transport media" that is attached to any Internet gateway itself. For example, currently it is a common practice among Telecommunication carriers to *lock* their customers to a given service as a requirement for obtaining access to a certain transport medium or some governments for example only provide Internet licenses to service providers that do not host a given information.

The way that the Internet has been designed and deployed during the years confronts the traditional mechanisms that enabled control over the content. The dissociation between transport media and a given-content or the possibility of sending very different kind of type of messages once having access to a transport medium makes the Internet the most powerful communication tool up today.

> In countries where the transport media is under the control of a single governmental Telecommunication Operator, a simple mechanism to control the content passes through making available the physical transport media linked to an Internet gateway.

Based on the arguments presented before we conclude that: "full and affordable access to the "network" infrastructure (i.e. an Internet gateway) is a fundamental requirement to ensure freedom of information".

In the latest years a new technology, known as Wireless LAN [3], has enabled new actors (than the national telecommunications operators) to deploy network infrastructure in metropolitan and rural areas.

The following section describes some of the relevant aspects of Wireless LAN and reflect about the risks and opportunities of this new emerging technology. Rather than focusing on mere technological aspects, we argue how a new generation of open wireless standards can bring the Internet's open architecture to the wireless world.

Infrastructure based on IEEE 802.11 (Wireless LAN)

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 reduce the production costs 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 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 a frequency range that is normally allocated for the experimental 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 both 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. polling extensions for multipoint solutions with presence of hidden nodes, enhanced quality of service for voice over IP, etc).

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 developed 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.

In April 2002, another IEEE standard called 802.16 was approved, it focuses on broadband wireless access in metropolitan area networks (WirelessMAN) [4]. The

new standard is expected to bring low cost and more bandwidth efficient products for broadband outdoor wireless access in the next years. Time will show what will be the final role of IEEE 802.11b in indoor and outdoor environments, but what we can not deny is the benefits and opportunities that provides today.

When with less than 2000 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.

Infrastructure investment generally consists of large capital-intensive projects that provide the backbone of the distribution system for the rest of the economy, usually it includes roads, bridges, highways, and airports that support the transportation of people but also the optical fibers and other communication equipment. There is a considerable risk of underestimating the need of investing in long cycled public fixed network infrastructure by trusting the private sector to grow its infrastructure by using short term solutions with bandwidth constraints as wireless links. That is the case of many metropolitan and rural areas of developing countries were the new Internet service providers use technologies as Wireless LAN as local loop, acting as a hinder for investments in fixed infrastructure.

The benefits of market or user-driven wireless infrastructures as the Wireless LAN should not undermine the government's role in investing, regulating, and maintaining a country's infrastructure.

Summary

The open architecture of the Internet confronts the traditional mechanisms of control over the content and the communicating parties. The strong dissociation between the transport media and any given-content made the Internet a very powerful communication tool at the same time that reinforces the importance of having full operational access to an Internet gateway.

In the case of the Internet, the first effective mechanism of censorship before any other is to simple restrict the access to the physical transport media.

New emerging technologies, as Wireless LAN (IEEE 802.11), enable deployment alternatives to the monopoly of network infrastructure. Wireless LAN, while not being designed for outdoor use, has taken a very important role in the decentralization of network infrastructure in both developed and developing countries.

Open wireless standards are not only bringing new technical opportunities at very low cost but also bringing the Internet model to an area that it was restricted to traditional telecommunication operators. It is still uncertain if the growth of private investment in wireless infrastructure will slow down even more the required structural investments in fixed backbone networks.

In any case, keeping the network infrastructure *open* and affordable are necessary conditions to facilitate the freer and wider dissemination of information of all kinds.

About the author

Dr. Alberto Escudero-Pascual is Assistant Professor at the Royal Institute of Technology (KTH). 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 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 projects in Laos and Vietnam (2003) with the support of the Swedish International Development Agency (SIDA). http://www.it.kth.se/~aep

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