Identity Management in SCIFI

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SCIFI

- SCIFI (Sistema de Controle Inteligente para redes sem Fio) is a system for building large scale wireless networks, founded by RNP (R&D program)
- It is comprised of a open source software controller, replacement firmware for off-the-shelf wireless routers based on OpenWRT, two identity management systems, and a monitoring system.
- The two identity management systems are a federated, hierarchical system used in eduroam and the system used for visitors, which is fairly complex due to the desire of allowing the users to self-register coupled with security and legal requirements.

SCIFI and WifiUFF

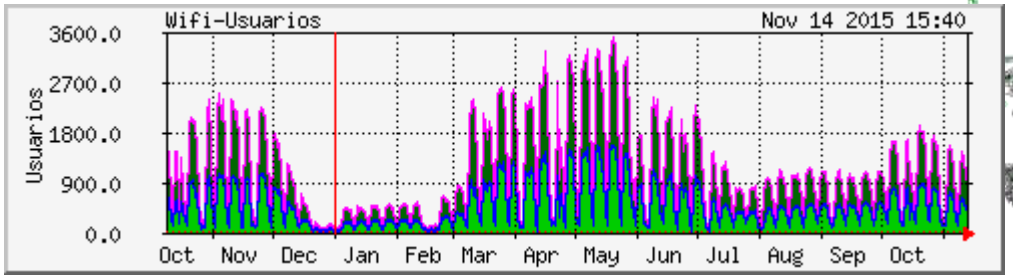
SCIFI is the main element of WifiUFF, the wireless network at Universidade Federal Fluminense (UFF).

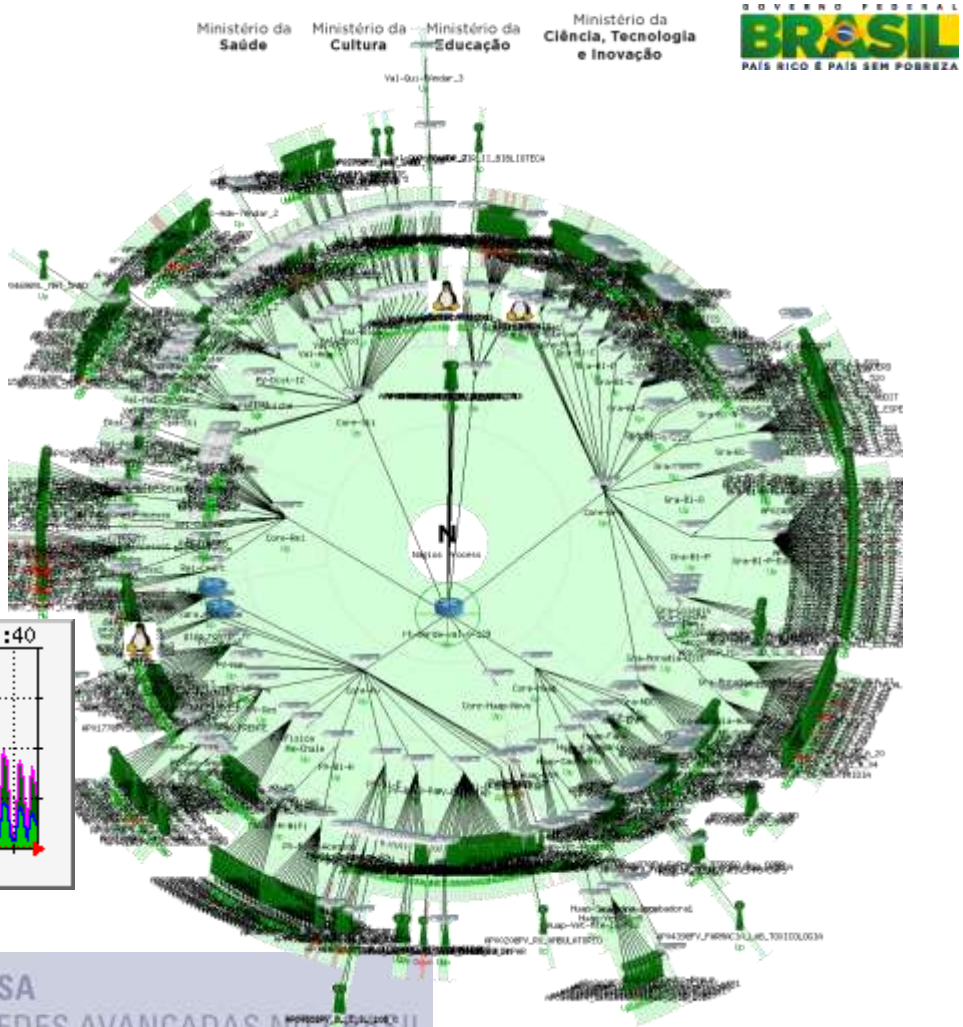
UFF is now the largest federal university in Brazil in number of undergraduate students, with 55 thousand students. There are 92 buildings in campi in Niteroi and several other locations in Brazil, most in the state of Rio de Janeiro.

Currently, WifiUFF has 453 access points, 415 at Niteroi city. A two year plan is in place to reach four thousand access points to cover the whole University. The installed base already has more than thirty thousand unique users weekly, with peaks of 3,500 simultaneous users.

Monitoring

- 450 access points
- 3500 simultaneous users





Security in Wireless Networks

Privacy, one of the elements of security, is not free on wireless networks

- Wired networks naturally protect user access by requiring access to the facility to eavesdrop (snoop) communication
- Wireless traffic can be received by anyone that is tuned to the channel, sometimes many miles away from the source

To provide privacy, a “security” protocol is used

- in fact, as the two initial protocols (WEP and WPA) could be broken, nowadays only WPA2 - IEEE802.11i should be used

Privacy is harder on enterprise networks

- an identity management system should be used, as a pre-shared key (PSK) is too easily leaked, does not protect one user from another, and does not provide tools for auditing (it is very hard to know who used the network)

Implementation of Identity Management at WifiUFF

WifiUFF has three SSIDs: Eduroam, CadastroWifiUFF and VisitantesUFF

respectively *for eduroam*, user registration and visitors.

each single radio access point has these three "virtual wireless networks", each of which is mapped to a different VLAN on the wired network, and treated differently

The SSID eduroam uses WPA2 Enterprise, and allows every person who is registered in the identity database at UFF (students, professors and staff) to use the network, as well as users that belong to the Eduroam federation.

The SSID CadastroWifiUFF is an open access network, and allows users that do not have an ID to register to use the visitors network

The SSID VisitantesUFF uses WPA2 Enterprise, and implements the visitors network, using the login and password that the user gets at the end of the registration process

eduroam authentication

eduroam uses WPA2 Enterprise

the authentication process is divided in two parts

first the user gets a local link which allows access to a RADIUS server. This is the front-end which will get the login/password pair and possibly forward it to a back end where it will be authenticated

the back-end at UFF is an LDAP server, which is used for authentication of all services at UFF, minimizing the effort to create a user database. If the student has an IDUFF, which is required for signing up for classes, the student automatically has a wireless ID

the radius server checks the “realm” of the user ID. If it is local (no realm or @uff.br) it uses the local backend server. If not then it sends the authentication request up the hierarchy to be authenticated at the home realm of the user. Therefore, each user is authenticated at its home network.

successful authentication opens a global link, and the user gets access to the Internet

Requirements for a visitor system

The three main requirements for the system to allow access to the network to people that are not in either UFF's or eduroam identity databases is that:

1) they cannot do it anonymously, that is, if any misuse is detected the person can be identified;
2) the same security used for eduroam should be granted to those users;
3) the process should be self-driven, that is, the user himself should be able to register and get access without having to go to a specific place or talk to the University staff.

Why not use a portal system (Captive Portal)

Captive portals are often used for implementing network access for visitors

They are easy to implement, and do not require a two step process

- once identified on the portal, the user is granted access, and does not need to change networks (SSIDs)

Unfortunately, they are not safe

- it is very easy to circumvent access restrictions by cloning the MAC of an authorized user
- all traffic is open (no cryptography), there is no privacy (security)
- unless a form of proof-of-ID is used (e.g. a credit card) there is no way to guarantee the user is really who he is claiming to be

Visitor access implementation

Visitor access is as follows:

1. the user associates to the open "CadastroWifiUFF" network and accesses any web page
2. the user is redirected to a page that allows registration to the network

   the page also has the manual on how to configure the system if the user already has an ID
3. the user receives a login/password pair via SMS
4. the user is guided to configure its device and change SSIDs (to "VisitantesUFF")

   there is a messaging system that allows the user to leave messages even without Internet access. The user may also send SMSs to get help

The SMS is the confirmation that the user has access to the phone that was registered, and serves as the identity. In Brazil all cell phones are registered. In the US or other countries that allow anonymous cell phones the system would have to be changed.

Conclusions

A wireless network with no security is easy to implement, but the risks outweigh the trouble to do it right

eduroam is a state-of-the-art security solution (IEEE 802.1x and IEEE 802.11i), and should be used whenever possible

A network for visitors should have the same level of security eduroam grants

SCIFI has all the tools to install EDUROAM and a visitor system that is fairly complete, secure and that has been production tested

SCIFI may be found at http://github.com/scifi

A turnkey system using a virtual machine is available at http://wifi.uff.br to make testing easier before taking the plunge

Thank you!

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