

# Adventures into Regional WISP

ITNOG8

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# About me

- Network engineer at Fastnet Spa since 2003
- Born in Mexico and living in Italy for 20+ years
- Previously worked for Telecoms in Mexico and Canada
- Enjoy to participate on projects related to Network Technologies and Open Source
- On ITNOG3 talked about Syslog Analysis
- As Hobbies I play Basketball and follow my kids on their sports activities



# About Fastnet AS8265



- Fastnet Spa is Service Provider from Marche Region since 1995
- From last year, we are part of Fiberwide group of companies
- Network backbone with 100Gbps links to Rome and Milan
- Provider of cloud, colocation and backup services
- Managed Service Provider for different types of networking technologies and data centers

# About the WISP project WIMARCHE

*Disclaimer: The content of this presentation is based on my experiences and opinions. NOT my employers or other organizations involved.*

- <http://wimarche.it> project promoted by all Province offices from Marche Region
- Project started back in 2009 to provide Fixed Wireless connectivity to areas without Broadband Internet
- The network was deployed using public funds. The Province officers used a contest procedure for the contract assignment to build and manage the network.
- Fastnet participated as part of a group of 5 companies divided by Province
- The contest was awarded in 2011 but operations started in 2013 due to lawsuit from incumbent ISP
- There were 3 tasks assigned to Fastnet: Provide a Configuration plan, Manage Ancona Province Network sites and host the Network Monitoring Systems at our data centers.
- Ancona Network is near 50 sites, The entire network 200+ sites

# Starting point for us

Site planning and system integration was already done by an external company.

Time consuming tasks were done: site surveys, permits, power supply contracts, site hosting agreements, and initial installation.

The site equipments consistent per site:

- 1 router
- 3 to 5 access point radios 5GHz
- 1 to 5 point point radios 5Ghz or 17GHz
- Batteries
- Power unit
- Power injectors
- Remote power control device



# First Steps - Network design

- MPLS VPLS Overlay network for service delivery
- Naming convention for devices
- Single SSID for access
- SSID's for point to point links
- Addressing blocks per province with numbering per site ID
- OSPF/LDP multi-area (every Province 1 area)
- Every site has a /24 routed an /32 loopback for VPLS tunnels
- Backbone area at NOC, fiber links and license bands between provinces

# First Steps - Network Configurations

- Network configured remote using MAC-Telnet to hop device by device
- Bridge multicast on point to point links to allow OSPF
- 2 redundant VPLS per site per provider
- Every provider has a VLAN assigned that is used on the CPE to send traffic over the SSID
- On the connected site the vlan is part of a provider bridge along with the corresponding VPLS
- The VPLS is terminated at the datacenter where the traffic is sent to providers access router in local or remote dedicated interfaces.

# First Steps - Network monitoring

Noc systems at data center as part of OSP area 0

Noc systems deployment on redundant Debian Linux:

- Zabbix server for monitor
- Syslog servers
- DNS servers
- NTP servers
- Backup configs
- Authentication access with RADIUS+openLDAP



# Network management and challenges

- The management of the network with a VPLS overlay provided stability and simplified the troubleshooting of point to point links.
- At that time of deployment, it was chosen MPLS for better switching speeds. As of today a similar solution would be BGP+VXLAN.
- Another advantage of the overlay network is the high security level of management infrastructure as not being exposed.
- During the last few years dealt with many ISSUES not related to networking

# Power issues

- Battery lifetime
  - Battery replacements necessary every 2-3 years
- Site with solar panel power
  - Outages during winter season on low sunlight or snow
- Fuse and power injector failures
  - Electric supply instability



# Site Access issues

Stressful issues due to inability to access sites for maintenance

- Municipality sites (limited working hours)
- Water towers (stringent requirements for safety)
- Cemeteries (Equipment access complicated, Bring Your Own Ladder)
- TV and RADIO towers (Access limited to few technicians)

# Site Access Document requirements

Site access is complex, some organizations require some or all of this documents:

- DURC (Certificate of social security contributions)
- Chamber of commerce certificate
- Certificate of skills needed to perform the activities, article 47 DPR 445/2000;
- List of materials and tools
- Risk assessment document
- Safety training certificate
- Certificate of skills to work at high altitude
- Operating procedures of activities to be performed at site

## Wireless Issues

- Replacement of 17 GHz free band links by frequency reassignments by AGCOM
- Imminent tear down of 24GHz free band links
- High frequency link degradation in events of heavy rain
- High saturation of 5GHz free band
- Remain as an alternative, the high cost license band or 6 Ghz if fully approved for outside usage

# Strange Troubleshooting Outages

- Wind power
- Missing devices
- Cable cuts
- Ethernet Links flapping due to radio FM
- Fire by:
  - short circuit
  - caused by unknown
- Cable damaged by birds
- Insect nests inside racks
- Lightning



# Alternative networks

- Increasing coverage of fiber access
- 5G tower installations (increasing complaints from citizens)
- Low-orbit satellites (lower cost, broadband bandwidth but to consider high jitter and delay)
- Alternative wireless service providers



# Wimarche Use cases

- Currently the best use case is redundant Internet access to companies already connected in (FTTx/xDSL + FWA)
- FWA to rural areas where there are no alternatives
- Possibility to enable LORA Networks
- Backhaul public wifi where no broadband available



# Conclusions

- Building and maintaining Wimarche has been an important investment in time and resources for the last 14 years. Most of the issues encountered are not related network engineering, but environment/procedural.
- The network requires technology upgrades and increase the number of use cases.

**6GHz free band for outside usage, if approved would help greatly!**

- Wimarche could be used by public offices to help develop economies of towns not covered by any other broadband. Enable small businesses, public libraries, museums, offices, ecc.
- Wimarche is also an alternative network that can be used for redundant access in the Marche region.





# Thank you !

For any additional questions, please send me an e-mail at:

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