



9TH EUROPEAN CAVE RESCUE MEETING 2011

ORFŰ, HUNGARY, 2ND– 4TH OCTOBER 2015

DIGITAL DATA ON TWISTED PAIR CABLE FOR MEDICAL LIFE SUPPORT APPLICATION

CORPO NAZIONALE SOCCORSO ALPINO E SPELEOLOGICO

COMMISSIONE TECNICA SPELEOLOGICA



MAIN TARGET

Information handling during cave-rescue operation is a crucial key-point in order to be successful

The proposed system aims to:

- ✓ Improve support for rescue operations, normally supplied by analog phone line made available through cave
- ✓ Improve medical data integrity/correctness during outside transfer
- ✓ Extend data type that can be transferred outside: pictures, voice record, video, data record and so on
- ✓ Improve privacy and protection of sensitive data

PROJECT GUIDELINE

System design was based on a few key points:

- ✓ Should transmit digital data over existing hardware channel (standard phone twisted pair cable)
- ✓ Should be scalable with respect cave length/depth
- ✓ Should use some standard communication technology
- ✓ If possible, should use freeware computer software

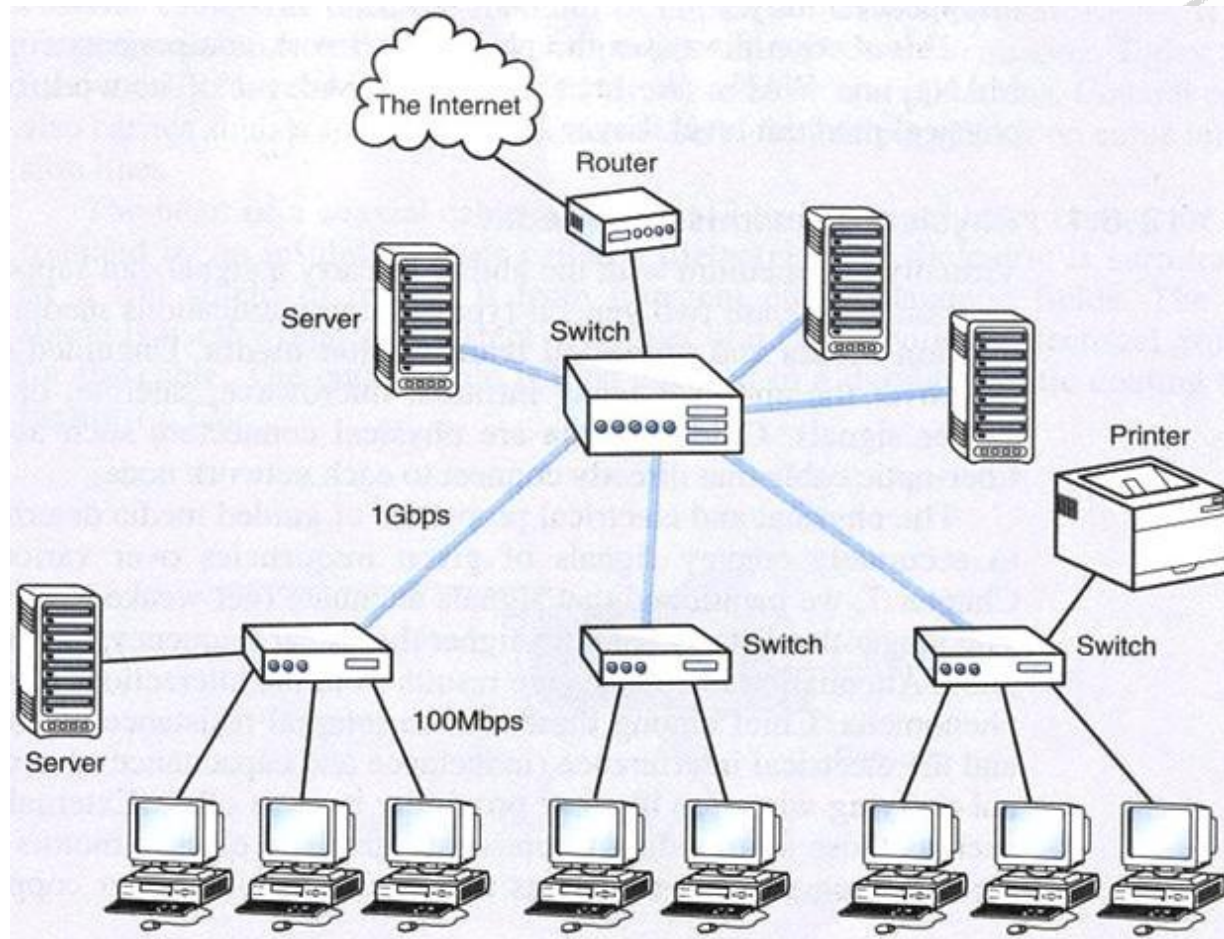
SYSTEM DESIGN

A possible solution could be to use an Ethernet network between an external computer at cave outside base-camp and an internal computer located as near as possible to the stretcher / medical staff

- ✓ Hardware component are easily available at low cost
- ✓ It will be possible to have an internet connection inside cave using an external Access Point
- ✓ Copper-based Ethernet technology have some limitation in maximum cable length (100 m) and on cable type (at least Cat5 UTP cable)

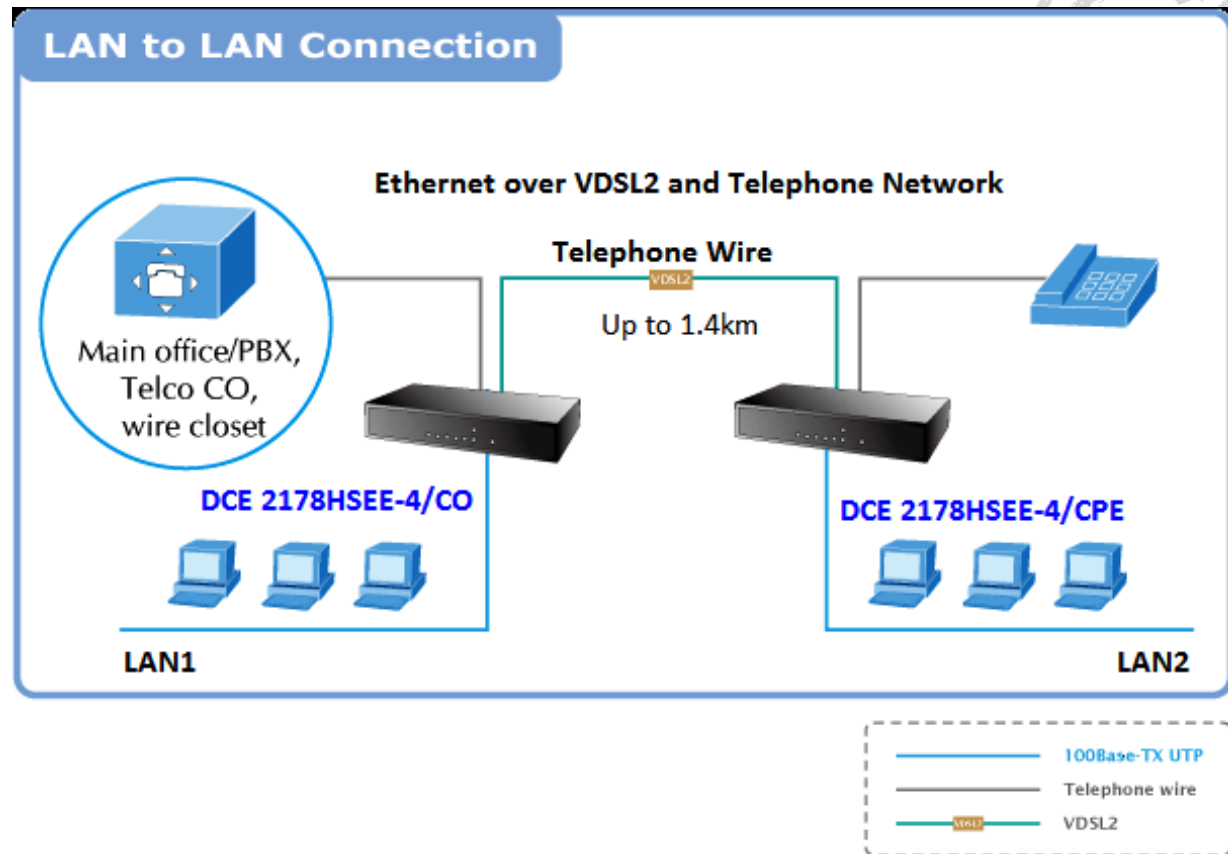
SYSTEM DESIGN

A typical Ethernet computer network

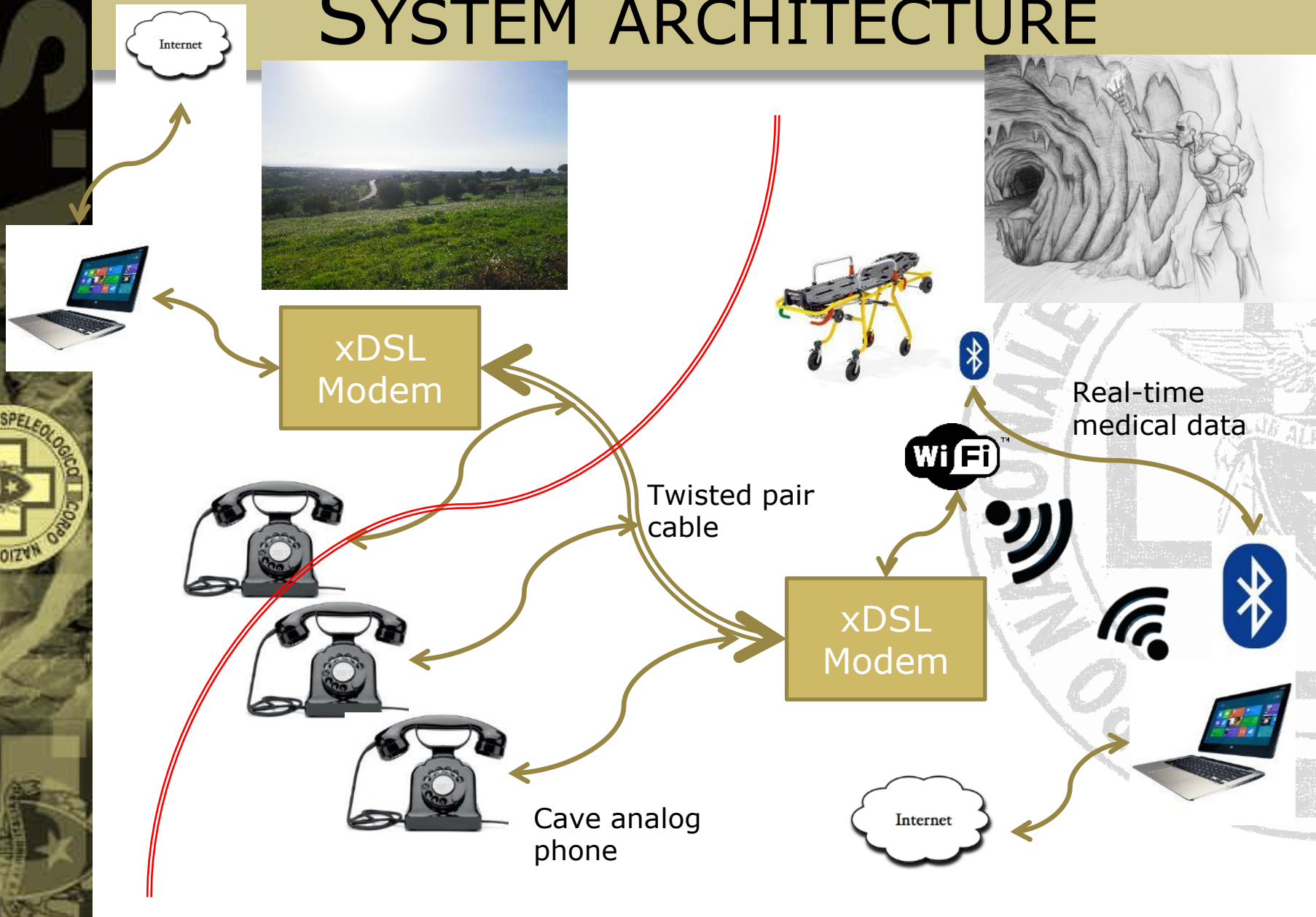


SYSTEM DESIGN

A possible low cost solution able to overcome the "100 m" maximum length and special cable Ethernet limit, could be the use of a couple of xDSL modem



SYSTEM ARCHITECTURE



CONCLUSION

The developed system has been tested in lab and in different real caves conditions. At this time, implemented service are (using freeware available software):

- ✓ Multi-user audio/video live chat
- ✓ File transfer (through FTP or live chat): voice record, pictures, video (e.g. from some action-camera)
- ✓ Automatic in-cave PC WiFi configuration
- ✓ ⁽¹⁾E-mail (through any e-mail client)
- ✓ ⁽¹⁾Skype audio chat

⁽¹⁾ Require Internet connection on the outside computer through smartphone hot-spot, USB internet dongle, LTE modem with hi-gain antenna, satellite phone with data option