Wireless Network Link between INRNE/BAS and Physics Faculty of the University of Sofia.

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September 15-20, 2003

- Motivation

- Choice of solution

- Implementation

- Conclusions

- Two groups : CMS-INRNE and CMS-SU;

- Great collaboration: numerous common publications;
  Production of RPC chambers for CMS;

- Shared computing resources, situated at both labs;

- Poor communication: extremely low bandwidth between the labs, due to different Internet providers.

- Reasonably good connections to the world from both labs;

- Horrible connection between them - bellow 1kbit/s with constant stalls;

- Great plans (fiber optics, high speeds etc.)
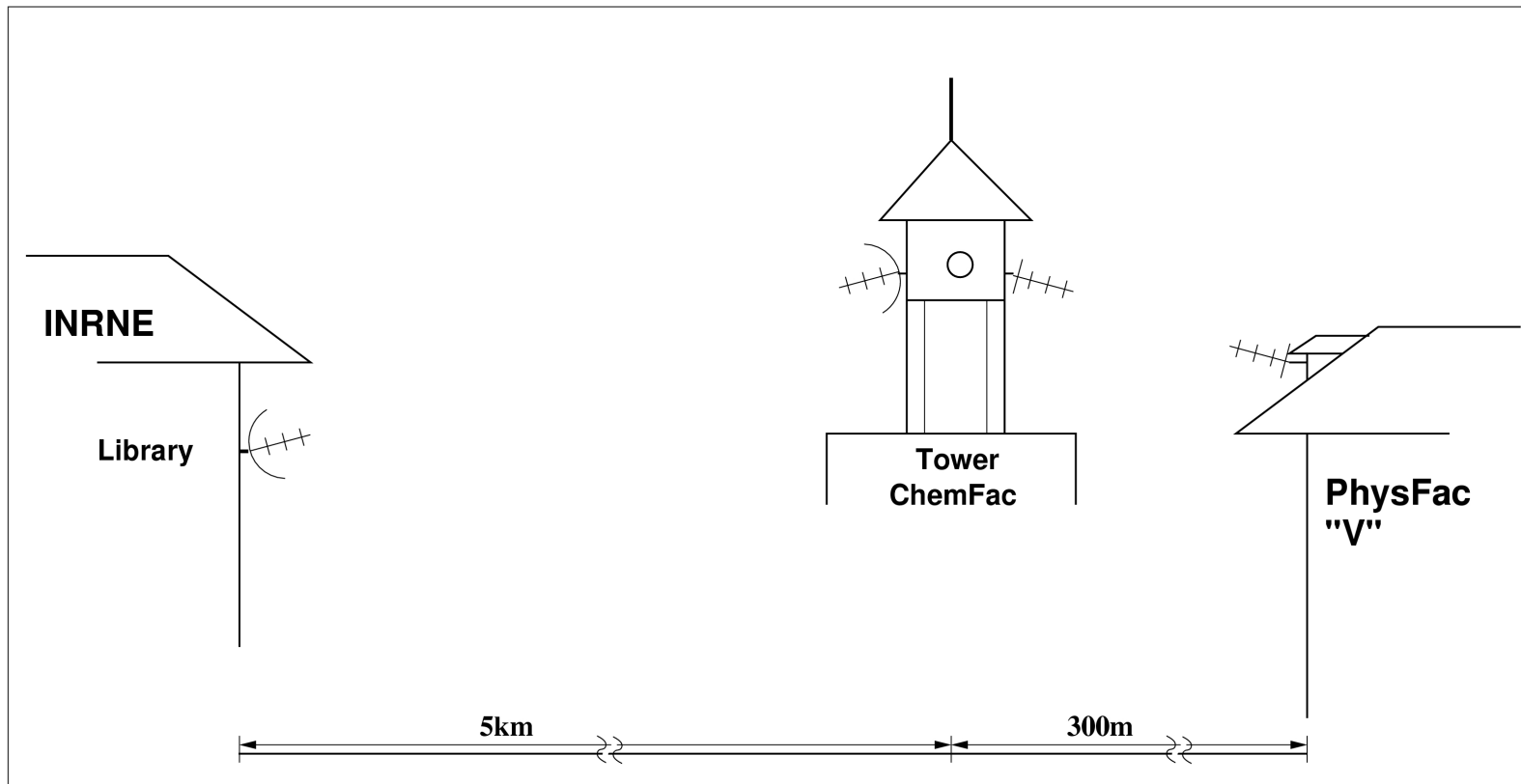 ...for the indefinite future.

"Do It Yourself" Link

Choices:

- Leased line:

  - Pros: Fast, independent of weather conditions.

  - Cons: Expensive, very long installation time, requires subscription fees.

- Wireless:

  - Pros: Cheaper and rather quick to install. No subscription fees.

  - Cons: Slower. Requires direct line of sight. Dependent on weather conditions.

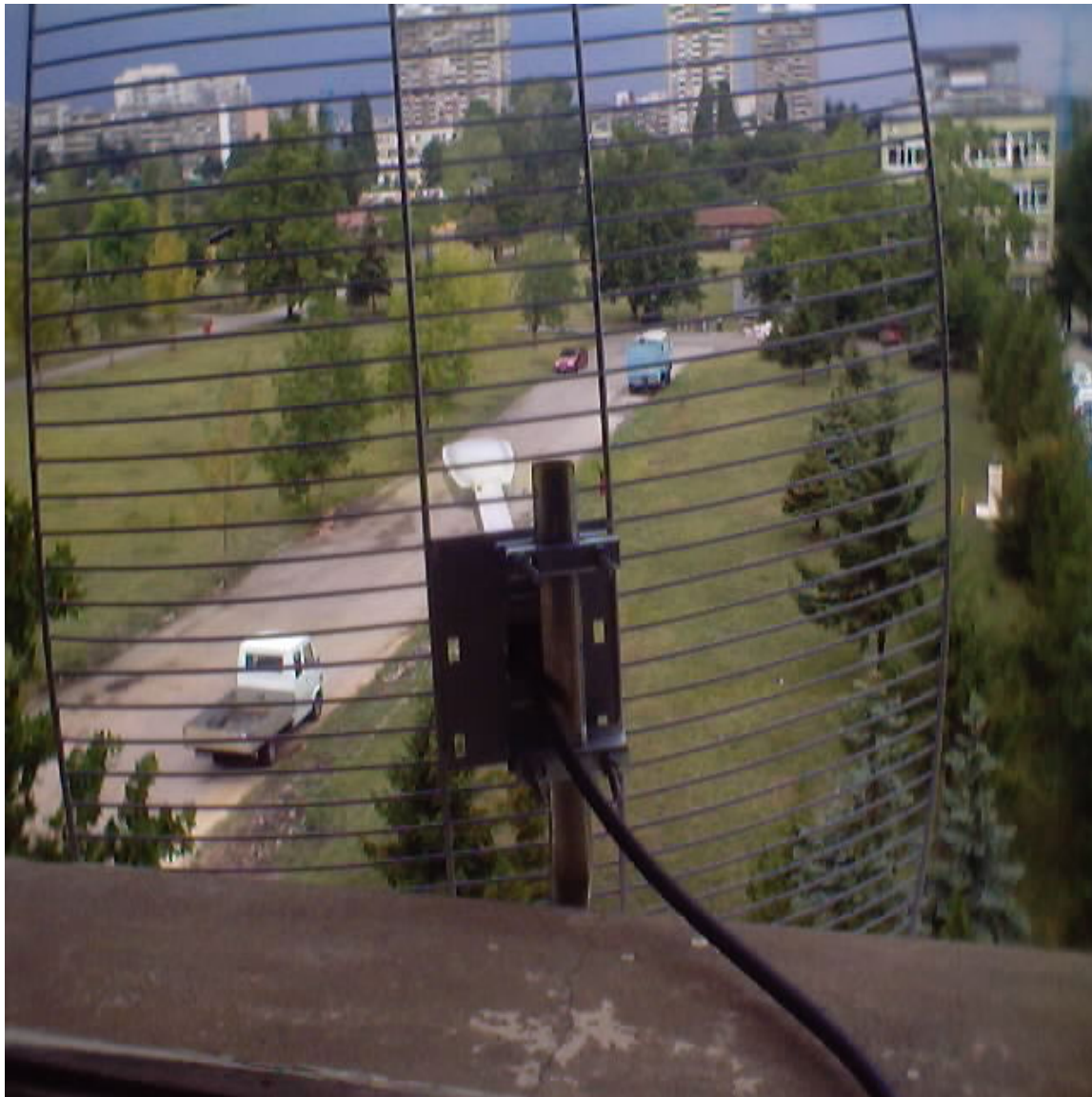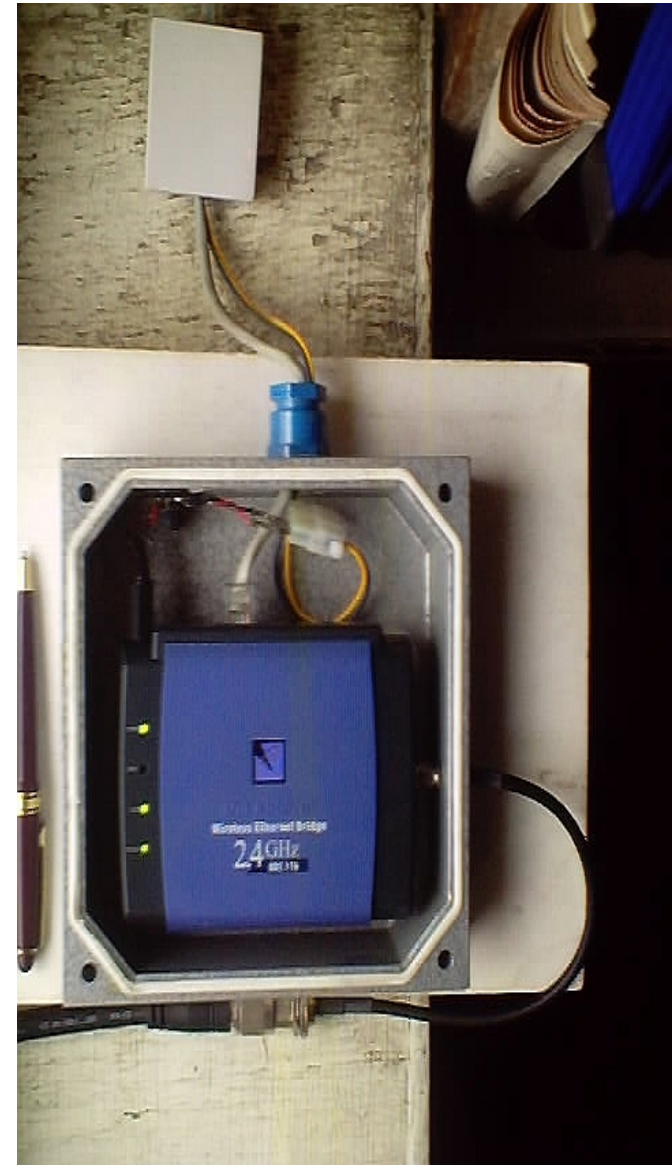End-stations plus active repeater. 4 LINKSYS WET11 Wi-Fi devices in total.

Tower

Network Structure

INRNE
195.96.232.0/21

FzF
62.44.98.0/23

WLAN
192.168.1.0/24

eth0
62.44.98.37

eth0 | swan | eth1
195.96.232.192 | | 192.168.1.100

eth1 | duckling | eth2
192.168.1.101 | | 192.168.2.1

HEPH
192.168.2.0/24

Firewall Allowed Services

From Universe through FzF-net:

ssh heph2/62.44.98.20 -p32023
ssh heph4/62.44.98.54 -p32023
web at www.heph
mail to mail.heph

From INRNE-net through WLAN:

All

195.96.232.37

eth0 | nia

192.168.2.100
eth0 | heph

192.168.2.101
eth0 | heph1

Wireless Bridges

INRNE

FzF

to swan

to duckling

binrne ---- bhf1 | bhf2 ---- bfzf

192.168.1.226   192.168.1.227   192.168.1.228   192.168.1.229
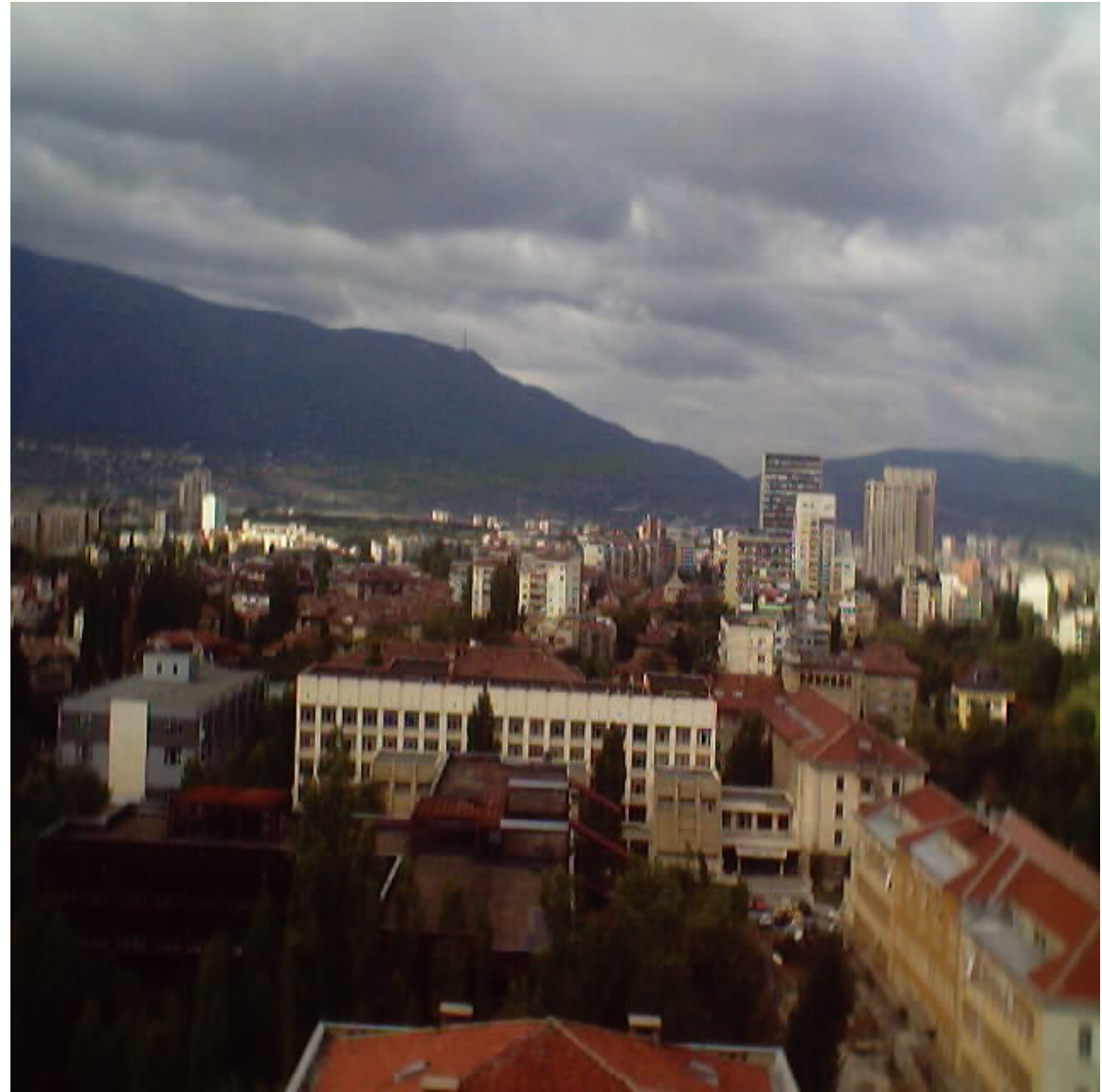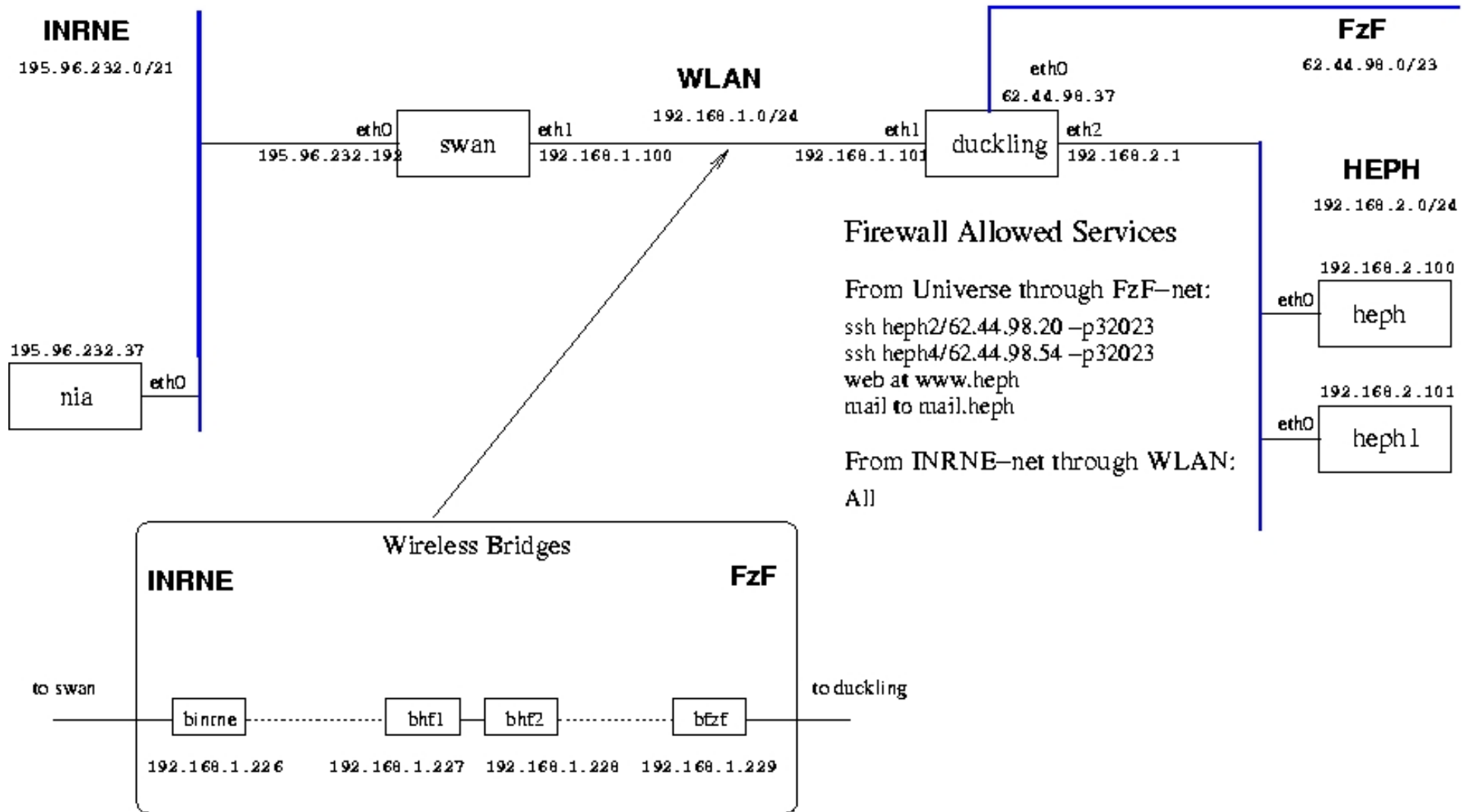
Part of our traffic goes through the air, and can be intercepted by a third party.

WET11 already implements some encryption - WEP (Wired Equivalent Privacy)' - which, however, is considered not very secure (easily breakable).

FreeS/WAN project (http://www.freeswan.org) is a Linux implementation of the IPsec (IP security) protocols. IPsec provides encryption and authentication services at the IP (Internet Protocol) level of the network protocol stack.

Working at this level, IPsec can protect any traffic carried over IP, unlike other encryption which generally protects only a particular higher-level protocol – PGP for mail, SSH for remote login, SSL for web work, and so on.

In our project encryption is done at the two gateways (swan/duckling), ensuring no traffic can be intercepted from the wireless part of the link.

- Initial measurements showed good quality of the wireless link: Speeds of 4Mbits/s were achieved in test conditions.

- In-production system maintained speeds of 2Mbits/s in good weather.

- Recently speeds dropped to around 1Mbit/s due to excessive number of new wireless stations, resulting in high traffic pollution.

- In 6 months of operation we only had 2 hang-ups of a transmitter, requiring manual intervention (reboot).

Conclusions

- Fast to build and easy to setup system providing adequate bandwidth for the collaboration.

- Easy to maintain - direct access to the transmitters/antennas; Web-based configuration and monitoring tools.

- Channel pollution becomes a major factor.
  Deregulated is not always good!!!

- Good solution for short-term connectivity.