Review Open call 8
XENO: THE PERSONAL CROWDSOURCED BODYGUARD

Blockchain 5.0 OÜ

w-iLab.t (imec)

FEC8

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XENO

THE PERSONAL CROWDSOURCED BODYGUARD

The Concept: What is XENO?

- XENO is a wearable device camouflaged as a women's accessory that can potentially save a woman in distress in the shortest possible time.

- World's first crowdsourced women's safety device that uses a network of anonymised peers (gig workers) to be the First Responders.

- Blockchained for safety and security.

- Maintains privacy & anonymity of the victim as well as the first responders using a novel decentralized P2P network.

- Works on a smart contract that ensures a financial reward to the crowdsourced FR for rescuing the victim.

- Consists of a hands free voice trigger & voice recognition AI/ML module and can be prompted to work with just a voice command.

- Integrated with BLE5 mesh-networking that solves the last mile connectivity problem.

- Disruptive platform with broad cross-sector applicability.

The Concept: How does XENO work?

- XENO is connected with a companion mobile application using Bluetooth.

- When triggered with voice command, it broadcasts the SOS signal that can reach the network of first responders connected to the XENO community using internet.

- The device is uniquely capable of working even in the most adverse conditions of multiple network connectivity failures by utilising its BLE5 mesh-networking capabilities to communicate with the crowdsourced FRs/peers in victim's vicinity.

- BLE mesh-networking protocol uses the available BLE signals to carry forward (hop) the SOS message triggered by the device, and ensures that it reaches a peer BLE device that has an active internet connection and broadcasts the SOS message over the internet.

- Once SOS message is broadcasted, it can be received by a gigworker/FR in the closest vicinity of the woman in distress.
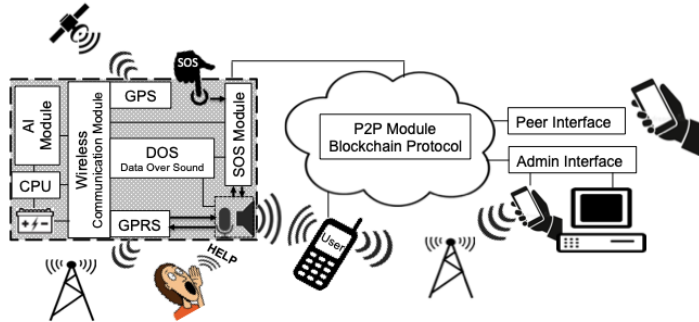
Objectives of the Experiment

- XENO originally comprised of a GPRS module for communicating with the adjacent peers.

- Drawbacks:

  1. Reduced battery life

  2. Recurring telecom cost
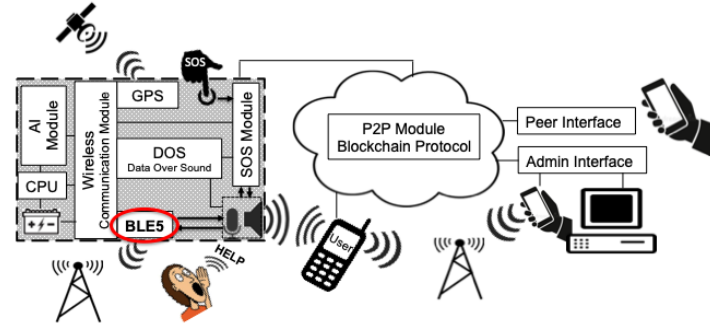
XENO Network Architecture `New`

The main objective of the experiment is to integrate the BLE5 module in place of GPRS to extend the battery life and make it free of any recurring telecom costs.

To test the BLE5 mesh-networking capabilities to communicate with the crowdsourced FRs/peers in victim's vicinity in most adverse conditions of multiple network connectivity failures.


XENO Network Architecture `Old`

Experiment Set Up

- Aim of the experiment: Replace GPRS module with BLE5 module and conduct various tests of the new XENO device for BLE5 mesh-networking connectivity in various adverse connectivity environments.

- We used distributed Bluetooth of nodes of w-ilab.t (imec) testbed for that purpose.

- w-iLab.t testbed is composed of two separate deployments a few 100meters apart, of which one deployment i.e. wilab1 is equipped with Bluetooth devices.

- The w-iLab1 had 38 nodes on the 10th floor and all nodes had BLE as well as WiFi modules.

- We successfully conducted the experiment to test and validate the BLE meshnetworking capabilities of the XENO device using these BLE nodes by simulating adverse connectivity environments such as no WiFi network & no GSM network.
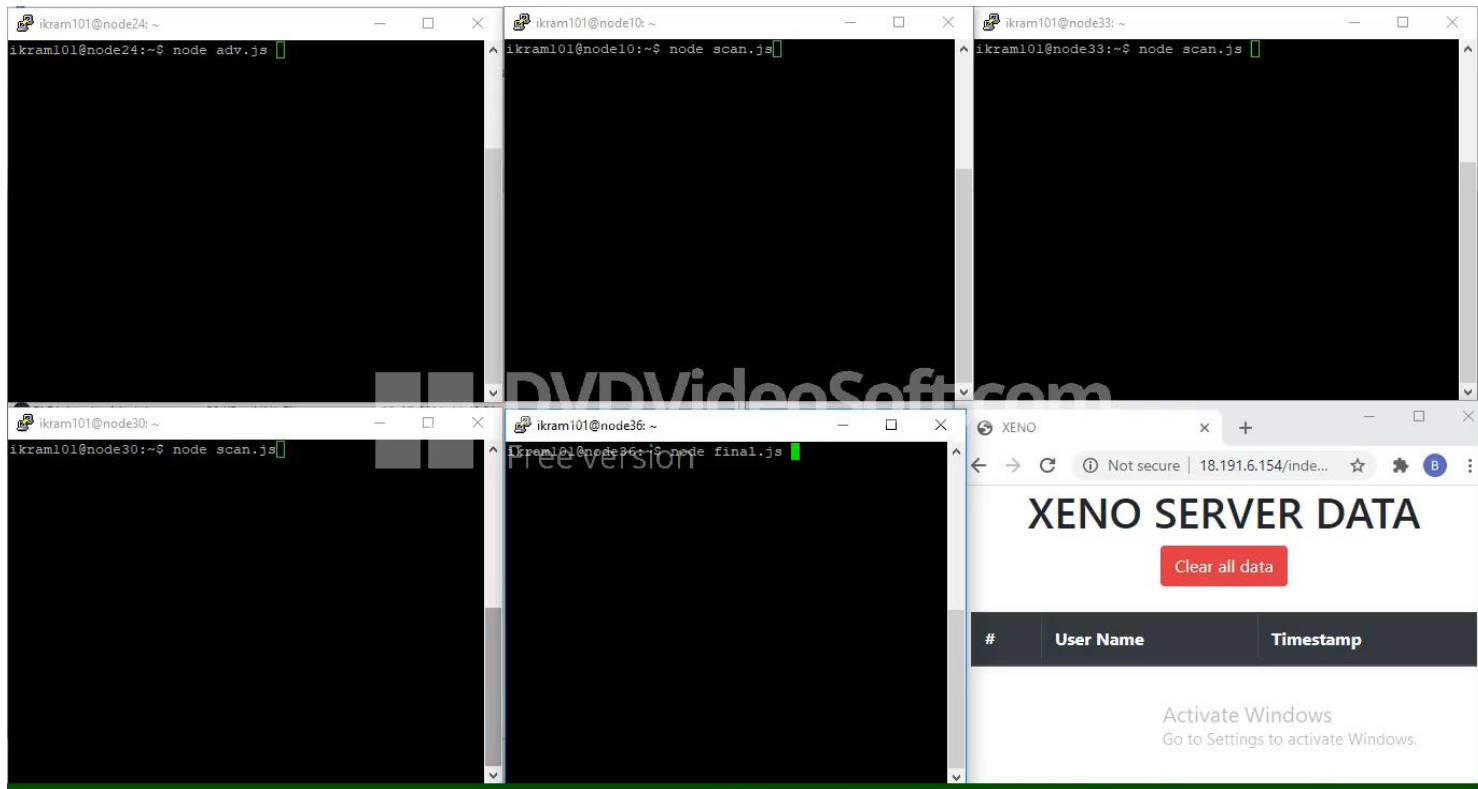
Testbed Nodes Set Up
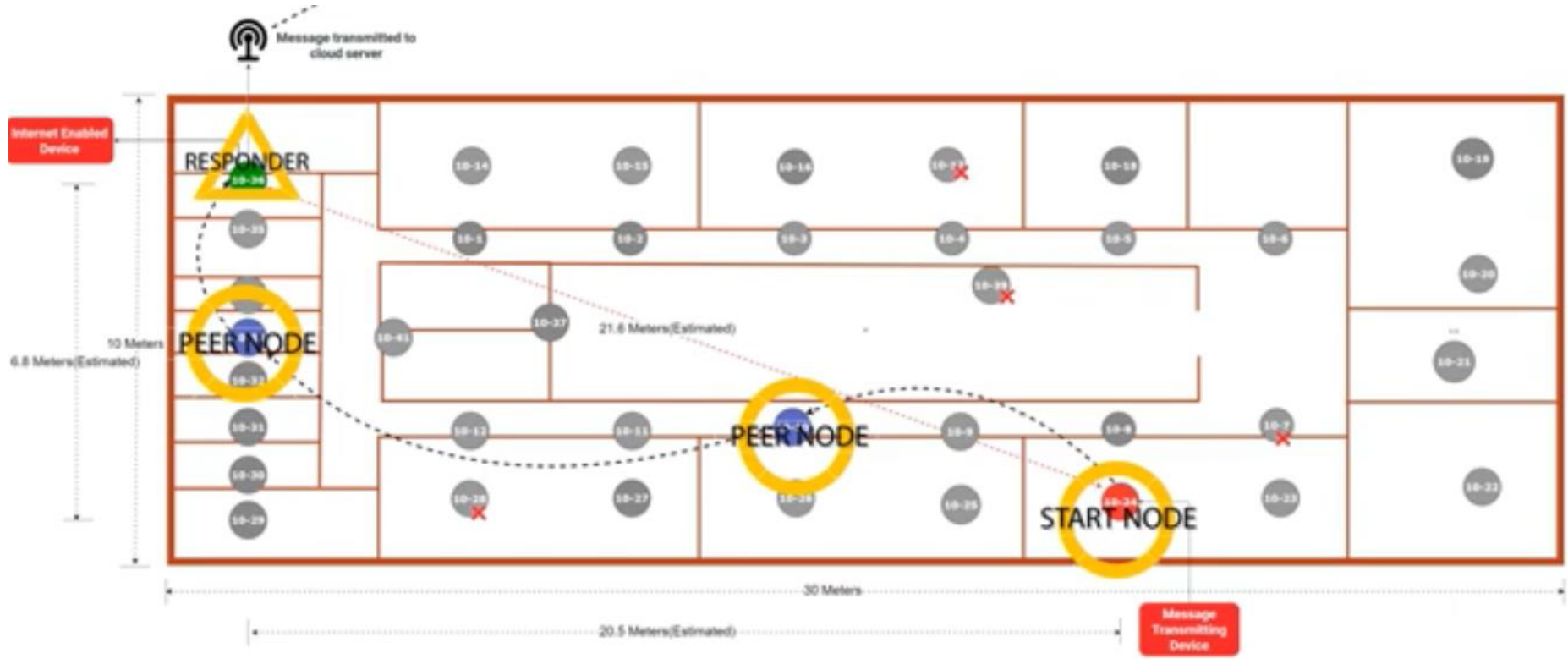
Experiment Set Up

The experiment was conducted by developing and Installing the BLE5 mesh-networking scripts at pre-selected nodes of the w-iLab.t (imec) testbed and designated them either as:

1) **Sending BLE Node or the First Node** with no Internet connectivity that generates and sends the SOS signal to the peer nodes or intermediate nodes in the vicinity of the sending node,

2) **The Broadcasting or the Last Node**, which is furthest in the BLE mesh, but not within the transmission range of the First or Sending Node. The last node is connected to the Internet and capable of broadcasting the SOS message to the Internet.

3) **The Intermediate or Peer Nodes** that are not connected to the Internet but are located between the sending node and the receiving node.

The Experiment: Video

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The Experiment: Video

Experiment Results

- One BLE node located at one end of the testbed facility successfully delivered the message to the farthest BLE node at the other end of the testbed facility using the Bluetooth mesh-networking protocol (scripts) installed on the intermediate transmitting nodes.

- Successful propagation of a "Help" request from a simulated source node to an internet connected final node (out of range) with the message relayed by other nodes in the vicinity validated the utility of Bluetooth meshnetworking in last mile connectivity in absence of internet, GPRS and other direct network communication, in an SOS situation.

Final Result & Conclusion

The experiment clearly demonstrated that nodes simulating XENO device can propagate any SOS message in absence of any other means of communication like GPRS or WiFi, using BLE mesh networking protocol via data hopping through the BLE devices present in the vicinity until it reaches a device that's connected to the Internet.

Business Impact
Initial Project Funding & Functionality Testing

- We conceptualized XENO back in 2017 and were in search for a good opportunity to receive the initial funding.

- Secondly, the company did not have the resources to test the core functionality of the device.

- Fed4fire not only offers novel testing facilities but also the initial funding and hence there could not be a better platform for us to proceed with project XENO.

- Secondly, XENO aims to ensure a safer world for women and hence making the device robust enough to ensure the always-on connectivity with the peers is the most important aspect to achieve the intended goal.

- Successful validation of BLE meshnetworking experiment has helped company achieve the intended technological milestone.

Business Impact:
Revamping the FR industry

- Gig workers, such as ride hailers, food deliverers, in today's economy, are always one to be found on the street, seconds away from an emergency in progress.

- The eyes of these workers are always on their mobile device for the next call to service, because that's their bread and butter.

- Recent reports indicate that their response time is faster than ambulance or even 911.

- XENO converges this rapidly growing gig or crowd work economy with FR industry.

- Turning the gig workers into FRs by incentivizing their participation in rescue operations opens up doors to not only revolutionizing rescue of a woman in distress but the entire FR industry.

- Blockchain, that forms the backbone of XENO network, ensures victim's privacy and rescuer's reward.

- XENO innovation compels the experts to revisit the traditional meaning of first response and redefines the very definition of first responders

Business Impact:
Forming a base for other H2020 proposals

- Validation of core concept of XENO BLE meshnetworking has already culminated into massive support from other researchers and academic peers.

- Company has entered into several collaborative agreements with partner organizations for deploying variants of XENO device technology.

- Support from over 35+ EU cross industry partners.

- XENO concept that originated as Woman's safety device has formed a solid base for our other H2020 projects:

  1**. COVID**: A smart watch device for tackling & preventing pandemics like COVID-19.

  2. **MOONSHOT**: Future First Responder Operating System (FROS) technology

  3. **CLINTOS** : A prototype for EU's ambitious Trials@Home project defining the future of clinical trials as Remote Decentralized Clinical Trial (RDCT)

  4. **SMS**: A versatile, future-ready, user-centric, privacy-preserving wearable device that stops preventable Acute Coronary Syndrome (ACS) deaths

Business Impact:
Cross Sectoral application

Although the original XENO device was designed a wearable device for women's safety challenge, the following three unique features of XENO make it a technology that has potential to disrupt not only the FR industry but enable a broad cross-sector applications ranging from health, pandemic control, anonymous contact tracing, remote care, so on and so forth:

First: Always-on BLE5 mesh-networking solves the last mile telecom problem existing in most emergencies. BLE meshnetworking can potentially revolutionalise the entire ICT industry.

Second: Privacy & anonymity of the victim via a novel decentralized P2P network.

Third: A smart contract that ensures a financial reward to the crowdsourced FR for rescuing the victim.

Business Impact:
F4f+ Stage 2 Funding

The successful validation of XENO BLE meshnetworking experiment has not only provided the initial push for the project XENO but also taken the XENO team a step closer to realize our dream of commercializing the XENO solution with the selection for stage 2 of the open call SME.

Feedback

- Fed4Fire+ affiliate facilities are state-of-the-art and a boon for SMEs that mostly don't have such infrastructure in-house to test and validate their research.

- The testbed resources available are really advanced and can be accessed 24*7.

- BLE meshnetworking, being the core functionality of the XENO device, needed to be tested on a regular basis before concluding on a final protocol.

- Fed4fire, offering these testing tools in a remotest possible way has turned out really beneficial for the project XENO.

- The successful validation of XENO BLE Meshnetworking experiment required a set of Bluetooth nodes, located at specific distance and in BLE range of one another.

- We found w-ilab.t (imec) testbed to be the most appropriate for this purpose.

Feedback

- w-iLab.t testbed is composed of two separate deployments a few 100meters apart, of which one deployment i.e. wilab1 is equipped with distinct nodes incorporating BLE & WiFi modules.

- The availability of BLE as well as WiFi modules at every node has really helped the experiment since we had to connect the end node to the internet while the other nodes only had Bluetooth modules switched ON.

- The nodes were flexible enough to be programmed as per our BLE meshnetworking script.

- The arrangement of the BLE nodes was appropriate to demonstrate the hopping of the SOS signal without the presence of any other mode of communication.

- The best part of conducting experiment with Fed4fire resources is that the testing facilities can be customised easily as per the need of the experiment.

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Feedback

- We found Fed4Fire+ one of the most valuable programmes within the H2020 framework, particularly for SMEs working in the field of IoT and wireless networking.

- No sooner the preliminary test results were available for XENO experiments, we were able to attract leading research teams across Europe to build at least three consortia based on XENO BLE meshnetworking concept.

- The successful completion of stage 1experiment has not only helped us gain the wider visibility in the EU domain but also helped us receive the initial funding necessary for any business to flourish.

- Since XENO is also selected for stage 2 funding, we expect that this association with fed4fire will help us realise our dream of commercialising this product.

THANKS FOR YOUR ATTENTION!

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